

SPECIAL PROVISIONS

TOWN DISTRICT SIDEWALK AND ACCESS MANAGEMENT PLAN

State LOTCIP Project No. L018-0001

Town of Brookfield, Connecticut

February 2017



AECOM
500 ENTERPRISE DRIVE
ROCKY HILL, CT 06067

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NOTICE TO CONTRACTOR – LUMP SUM CONTRACT

The Contractor is hereby notified that this contract is to be performed as a lump sum bid for the entire work described in the plans, specifications, and details. The specifications follow Connecticut Department of Transportation (CT DOT) format for a unit price contract. Sections regarding “Method of Measurement” and “Basis of Payment” shall not apply. There will be no individual measurement of items, and all payment for all work shall be included in the lump sum bid for the contract.

NOTICE TO CONTRACTOR – SPECIAL PROVISIONS

All construction under this contract shall adhere to and comply with the Department of Transportation, Form 816, “Standard Specifications for Roads, Bridges, and Incidental Construction”, 2004, including the most recent supplements thereto unless otherwise specified in these provisions.

In Form 816, where the words “State of Connecticut”, “Department”, “ConnDOT”, or “CTDOT” appear, it shall be interpreted to mean “Town of Brookfield” as if inserted therein.

The following Special Provisions and Sections of Form 816 are hereby incorporated and made part of this contract.

NOTICE TO CONTRACTOR – TOWN OF BROOKFIELD DISCLAIMER

Town of Brookfield Request for Proposals and other information and documents which are obtained through internet websites or other sources other than the Town of Brookfield or the Town of Brookfield’s website are not to be construed to be official information for the purposes of proposals or conducting other business with the Town.

It is the responsibility of each Firm and all other interested parties to obtain all proposal related information and documents from the Town of Brookfield’s website and/or official sources within the Town.

Persons and/or entities which reproduce and/or make such information available by any means are not authorized by the Town to do so and may be liable for claims resulting from the dissemination of unofficial, incomplete and/or inaccurate information.

NOTICE TO CONTRACTOR – NOISE POLLUTION

The Contractor shall take measures to control the noise intensity caused by his construction operations and equipment, including but not limited to equipment used for drilling, pile driving, blasting, excavation, or hauling.

All methods and devices employed to minimize noise shall be subject to the continuing approval of the Engineer and in accordance with the Town of Brookfield.

NOTICE TO CONTRACTOR – FIRE DEPARTMENT, POLICE, AND EMERGENCY MEDICAL SERVICES

The Contractor shall contact the Fire Department, Police, and Emergency Medical Services, prior to work and establish coordination necessary as to disruption of services during construction.

NOTICE TO CONTRACTOR – SAFEGUARDING OF RESIDENCES AND PEDESTRIANS

The Contractor shall maintain and protect traffic operations at all driveways and provide adequate sight lines. The Contractor shall not restrict sight lines with construction equipment when not actively working. The Contractor shall provide and maintain safe pedestrian operations on existing sidewalks or temporary bituminous walks at all times during and after construction hours. The Contractor shall provide adequate protection between work area and pedestrian sidewalk activities as directed by the Engineer.

NOTICE TO CONTRACTOR – CONSTRUCTION STAGING AREA

The Contractor shall submit for review and approval a plan and description for the proposed construction staging area. The plan and description shall be submitted to the Town of Brookfield Zoning Enforcement Officer and Inland Wetland Enforcement Officer within 7 calendar days after the Firm is awarded the contract.

The following is to be included in the plan and/or description:

- Location and type of erosion control measures (if required)
- Anti-tracking Pad location(s)
- Location and type of security fence (if required)
- Location and type of stockpiles stored on-site
- Location and type of hazardous materials stored on-site
- Location and type of equipment stored on-site
- Location and type of vehicles stored on-site
- Times and days in which construction activities will use the staging area
- Estimated number of trips in and out of the staging area
- Date the staging area will become active
- Date the staging area will be removed and returned to original conditions

NOTICE TO CONTRACTOR - PROCUREMENT OF MATERIALS

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

NOTICE TO CONTRACTOR - VEHICLE EMISSIONS

All motor vehicles and/or construction equipment (both on-highway and non-road) shall comply with all pertinent State and Federal regulations relative to exhaust emission controls and safety.

The Contractor shall establish staging zones for vehicles that are waiting to load or unload at the contract area. Such zones shall be located where the emissions from the vehicles will have minimum impact on abutters and the general public.

Idling of delivery and/or dump trucks, or other equipment shall not be permitted during periods of non-active use, and it should be limited to three minutes in accordance with the Regulations of Connecticut State Agencies Section 22a-174-18(b)(3)(c):

No mobile source engine shall be allowed "to operate for more than three (3) consecutive minutes when the mobile source is not in motion, except as follows:

- (i) When a mobile source is forced to remain motionless because of traffic conditions or mechanical difficulties over which the operator has no control,
- (ii) When it is necessary to operate defrosting, heating or cooling equipment to ensure the safety or health of the driver or passengers,
- (iii) When it is necessary to operate auxiliary equipment that is located in or on the mobile source to accomplish the intended use of the mobile source,
- (iv) To bring the mobile source to the manufacturer's recommended operating temperature,
- (v) When the outdoor temperature is below twenty degrees Fahrenheit (20 degrees F),
- (vi) When the mobile source is undergoing maintenance that requires such mobile source
be operated for more than three (3) consecutive minutes, or
- (vii) When a mobile source is in queue to be inspected by U.S. military personnel prior to gaining access to a U.S. military installation."

All work shall be conducted to ensure that no harmful effects are caused to adjacent sensitive receptors. Sensitive receptors include but are not limited to hospitals, schools, daycare facilities, elderly housing and convalescent facilities. Engine exhaust shall be located away from fresh air intakes, air conditioners, and windows.

A Vehicle Emissions Mitigation plan will be required for areas where extensive work will be performed in close proximity (less than 50 feet (15 meters)) to sensitive receptors. No work will proceed until a sequence of construction and a Vehicle Emissions Mitigation plan is submitted in writing to the Engineer for review and all comments are addressed prior to the commencement of any extensive construction work in close proximity (less than 50 feet (15 meters)) to sensitive receptors. The mitigation plan must address the control of vehicle emissions from all vehicles and construction equipment.

If any equipment is found to be in non-compliance with this specification, the contractor will be issued a Notice of Non-Compliance and given a 24 hour period in which to bring the equipment into compliance or remove it from the project. If the contractor then does not comply, the Engineer shall withhold all payments for the work performed on any item(s) on which the non-conforming equipment was utilized for the time period in which the equipment was out of compliance.

Any costs associated with this "Vehicle Emissions" 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.

NOTICE TO CONTRACTOR - SECTION 4.06 AND M.04 MIX DESIGNATION EQUIVALENCY

Sections 4.06 and M.04 have been replaced in their entirety with the Special Provisions included as part of this contract. These Special Provisions reflect changes in mix designations for various types of hot-mix asphalt (HMA). The following table is to be used to associate mix designations noted on the plans with that in the contract specifications and related documents. Mix designations on each row are equivalent and refer to a single mix, which shall be subject to the requirements of the Special Provisions replacing Sections 4.06 and M.04.

Mix Designation Equivalency Table

Official Mix Designation	Equivalent Mix Designation (a)	Equivalent Mix Designation (b)
(c)	Superpave 1.5 inch	Superpave 37.5 mm
HMA S1	Superpave 1.0 inch	Superpave 25.0 mm
HMA S0.5	Superpave 0.5 inch	Superpave 12.5 mm
HMA S0.375	Superpave 0.375 inch	Superpave 9.5 mm
HMA S0.25	Superpave 0.25 inch	Superpave 6.25 mm
(d)	Superpave #4	Superpave #4
Bituminous Concrete Class 1	N/A*	N/A*
Bituminous Concrete Class 2	N/A*	N/A*
Bituminous Concrete Class 3	N/A*	N/A*
Bituminous Concrete Class 4	N/A*	N/A*
Bituminous Concrete Class 12	N/A*	N/A*

(a) This mix designation is generally included with projects where the English measurement system is used. The mix designation may contain both the English measurement system designation and the SI (metric) measurement system designation, one of which would be in parentheses.

(b) This mix designation is generally included with projects where the SI (metric) measurement system is used. The mix designation may contain both the English measurement system designation and the SI measurement system designation, one of which would be in parentheses.

(c) This mix is no longer in use except by contract-specific Special Provision; if this mix is called for in the Plans but no such Special Provision is included for this contract a suitable substitute must be approved by the Engineer.

(d) This mix is no longer in use except by contract-specific Special Provision; if this mix is called for in the Plans but no such Special Provision is included for this contract a suitable substitute must be approved by the Engineer.

* N/A = Not applicable; mix designation has not changed.

NOTICE TO CONTRACTOR - SUPERPAVE DESIGN LEVEL INFORMATION

Hot-Mix Asphalt (HMA) constructed according to the Superpave mix-design system is required to attain a Superpave Design Level and is required to use a Performance Graded (PG) binder. The Superpave Design Levels required for this project are listed in Table 1. The required PG binder is indicated for each mix with an “X” in the appropriate box in Table 1.

TABLE 1 – Superpave Design Level and Performance Graded (PG) Binder

Project will require the following Superpave Design Level(s):				
Mix Designation	PG Binder	All Roads		
	PG64-22	Design Level	Design Level	Design Level
HMA S0.25	-	-	-	-
HMA S0.375	-	2	-	-
HMA S0.5	X	2	-	-
HMA S1	-	-	-	-

NOTICE TO CONTRACTOR - TRAFFIC DRUMS AND TRAFFIC CONES

Traffic Drums and 42-inch (1 m) Traffic Cones shall have four six-inch (150 mm) wide stripes (two - white and two - orange) of flexible bright fluorescent sheeting.

The material for the stripes shall be one of the following, or an approved equal:

- 3M Scotchlite Diamond Grade Flexible Work Zone Sheeting; Model 3910 for the white stripes and Model 3914 for the orange stripes.
- Avery Dennison WR-7100 Series Reboundable Prismatic Sheeting; Model WR-7100 for the white stripes and Model WR-7114 for the orange stripes.

NOTICE TO CONTRACTOR - NCHRP 350 REQ. FOR WORK ZONE TRAFFIC CONTROL DEVICES

CATEGORY 1 DEVICES (traffic cones, traffic drums, tubular markers, flexible delineator posts)

Prior to using the Category 1 Devices on the project, the Contractor shall submit to the Engineer a copy of the manufacturer's self-certification that the devices conform to NCHRP Report 350.

CATEGORY 2 DEVICES (construction barricades, construction signs and portable sign supports)

Prior to using Category 2 Devices on the project, the Contractor shall submit to the Engineer a copy of the Letter of Acceptance issued by the FHWA to the manufacturer documenting that the devices (both sign and portable support tested together) conform to NCHRP Report 350 (TL-3).

Specific requirements for these devices are included in the Special Provisions.

Information regarding NCHRP Report 350 devices may be found at the following web

sites: FHWA: http://safety.fhwa.dot.gov/roadway_dept/road_hardware/index.htm

ATSSA: <http://www.atssa.com/resources/NCHRP350Crashtesting.asp>

NOTE: The portable wooden sign supports that have been traditionally used by most contractors in the State of Connecticut do NOT meet NCHRP Report 350 criteria and shall not be utilized on any project advertised after October 01, 2000.

CATEGORY 3 DEVICES (Truck-Mounted Attenuators & Work Zone Crash Cushions)

Prior to using Category 3 Devices on the project, the Contractor shall submit to the Engineer a copy of the Letter of Acceptance issued by the FHWA to the manufacturer documenting that the devices conform to NCHRP Report 350.

NOTICE TO CONTRACTOR - EXISTING UTILITIES

It is understood that any references in the contract documents to Northeast Utilities, CL&P and/or Yankee Gas are meant to refer to Eversource.

It is understood that any references in the contract documents to AT&T is meant to refer to Frontier Communications. Existing utilities shall be maintained during construction. The Contractor shall verify the location of underground, structure mounted and overhead utilities. Construction work within the vicinity of utilities shall be performed in accordance with current safety regulations.

The Contractor shall notify "Call Before You Dig", telephone: 811 or 1-800-922-4455 for the location of public utility underground facilities, in accordance with Section 16-345 of the Regulations of the Department of Public Utility Control.

Contractors are cautioned that it is their responsibility to verify locations, conditions, and field dimensions of all existing features, as actual conditions may differ from information shown on the plans or contained elsewhere in the specifications. There is anticipated utility pole relocation work on this project so coordination with specific utility companies will be essential.

The Contractor shall notify the Engineer prior to the start of his work and shall be responsible for all coordination with the Department. The Contractor shall allow the Engineer complete access to the work.

The Contractor is hereby notified that utility work schedules will have to be accommodated prior to proceeding. The Contractor shall coordinate with the Utility Companies to accommodate his schedule with all utility company schedules. Any inconvenience or delay that may result from the utility company work shall be included in the contract proposal for the work.

All of the existing utility infrastructure must remain in service until the new facilities are acceptable to be put in service. The Contractor shall explore with the utilities this aspect of the project. This condition of serviceability applies to the work being done by the contractor for the utilities and to work that is being done under the control of the utility.

NOTICE TO CONTRACTOR – PRIVATE LIGHTS AND SIGNS

Existing private parking lot lights and private signs are located throughout the project on property that has been acquired for inclusion in the right-of-way. The Contractor shall carefully remove these lights and signs from the locations shown on the plans, store them as necessary, and deliver them to the property owner for his use. The Contractor shall coordinate with the property owner the location to place the removed sign or light.

The lights and signs will be examined in the presence of the engineer to document any pre-existing damage and the condition of the unit prior to removal. The unit shall be removed from any footings or foundations and placed on the adjacent property in a location that is acceptable to the owner, and that does not endanger, impede, or cause hazard to pedestrians, traffic or property. All electrical connections shall be removed in such a manner to allow the remaining portions of the lighting or electrical system to be safe and operable.

Care shall be taken to avoid damage to the units and to safeguard all parts from damage or loss. Removal shall include removal of existing concrete foundations in accordance with Section 2.02.03, and the foundations shall not be salvaged. The remaining hole shall be backfilled with clean fill material which shall be compacted and the ground restored to a grade and condition compatible with the surrounding area.

Removal of the lights shall include the luminaire, light housing, pole, arms all hardware, and internal wiring. Sign removal shall include all posts, braces, sign faces, decorative elements, electrical components, and hardware.

For signs that are serviced with power for internal and or external lighting, the work shall include the removal of conduit, wiring, junction boxes, brackets, dampers, grounding wire or other connections required to terminate the lighting operation and allow the remaining portions of the electrical system to be in a safe and operable condition.

All costs (except as noted below) associated with the removal, relocation, and re-installation of the private lights and business signs will be included in the overall contract price bid and will not be paid separately. The Contractor shall replace, at his own expense, all equipment which becomes damaged due to his operations. All private signs and/or lights that the Town decides to replace with a new signage and/or lights will be paid for by the Town and delivered to the property for installation by the Contractor.

NOTICE TO CONTRACTOR – TURF ESTABLISHMENT – LAWN

The Contractor shall use turf seed mix that conforms to Article M.13.04. Refer to the special provisions contained elsewhere in this Contract.

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.

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, will not begin until the items listed below are delivered to the Department of Transportation, Traffic Signal Lab in Rocky Hill.

Four (4) sets of cabinet wiring diagrams. Leave one set in the controller cabinet.
All spare load switches and flash relays.

SECTION 1.01 – DEFINITION OF TERMS AND PERMISSIBLE ABBREVIATIONS

Article 1.01.01 is amended as follows:

All references to Commissioner, Department, Engineer and State anywhere within the “Standard Specifications for Roads, Bridges, and Incidental Construction” or within the Supplemental Specifications or Special Provisions shall be interpreted to mean the Town of Brookfield or a duly authorized agent of the Town. Any question or ambiguity regarding any definitions shall be brought to the immediate attention of the Town.

Town: The Town of Brookfield, party of the first part to the contract, acting directly or through its agents or employees.

Contract Unit Price: The cost per established unit for each construction item as written in the Proposal Forms.

Special Provisions: Additions and revisions to the Standard and Supplemental Specifications covering conditions specific to this individual project.

The words “as described”, “as required”, “as permitted”, “as directed”, or phrases of like effect or import as used herein shall mean that the direction, requirement, permission or allowance of the Engineer is intended, and similarly the words “approved”, “reasonable”, “suitable”, “properly”, “satisfactory”, or words of like effect or import, unless otherwise particularly specified herein shall mean approved, reasonable, suitable, properly or satisfactory in the judgment of the Engineer.

Any reference to “Form 816” or “CTDOT Standard Specifications” shall be construed to mean the State of Connecticut, Department of Transportation, Form 816, “Standard Specifications for Roads, Bridges, and Incidental Construction”, 2004, including the latest Supplemental Specifications.

SECTION 1.05 - CONTROL OF THE WORK

Article 1.05.02 - Plans, Working Drawings and Shop Drawings
is supplemented as follows:

Subarticle 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 Division of Traffic Engineering for approval before fabrication. The packaged set of product data sheets, working drawings and/or shop drawings shall be submitted either in paper (hard copy) form or in an electronic portable document format (.pdf). The package submitted in paper form shall include one (1) set. Product data sheets shall be printed on ANSI A (8 ½" x 11"; 216 mm x 279mm; letter) sheets. Working drawings and shop drawings shall be printed on ANSI B (11" x 17"; 279 mm x 432 mm; ledger/tabloid) sheets.

Please mail to:

Traffic Electrical – Room 4307

Connecticut Department of Transportation
Division of Traffic Engineering – Electrical
2800 Berlin Turnpike
P.O. Box 317546
Newington, Connecticut 06131-7546
(860) 594-2791

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"; 216 mm x 279mm; letter) sheets. Working drawings and shop drawings shall be created on ANSI B (11" x 17"; 279 mm x 432 mm; ledger/tabloid) sheets.

Please send the pdf documents via email to:

DOT.TrafficElectrical@ct.gov

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.

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, working drawings, product data sheets and other descriptive literature which completely illustrates such items presented for formal approval. Such approval shall not change the requirements for a certified test report and materials certificate as may be called for. All documents shall be submitted at one time, unless otherwise approved by the engineer.

- Aluminum Pedestals
- Pedestrian Signals Housing and Hardware
- Pedestrian Pushbuttons and Type of Sign
- Accessible Pedestrian Signal & Detector

Loop Vehicle Detection

- Loop Detector
- Loop Sealant
- Loop Wire
- Loop Lead-in Wire

Video Vehicle Detection

- Camera Assembly
- Camera Extension Bracket
- Video Detector Processor
- Camera Cable
- Monitor
- CAT5/CAT6 Cable

Rectangular Rapid Flashing Beacon

SECTION 1.06 CONTROL OF MATERIALS

Article 1.06.07 - Certified Test Reports and Materials Certificate.

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

Aluminum Pedestals
Pedestrian Signals Housing and Hardware
Pedestrian Pushbuttons and Type of Sign
Accessible Pedestrian Signal & Detector

Loop Vehicle Detection
Loop Detector
Loop Sealant
Loop Wire Loop
Lead-in Wire

Video Vehicle Detection
Camera Assembly
Camera Extension Bracket
Video Detector Processor
Camera Cable
Monitor

Rectangular Rapid Flashing Beacon

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:

TOWN OF BROOKFIELD FIRE MARSHALL

Mr. Wayne Gravius
Fire Marshall
Brookfield Town Hall
100 Pocono Rd
Brookfield, CT 06804

COMMUNICATIONS (AT&T CONNECTICUT, SOUTHERN NEW ENGLAND TELEPHONE COMPANY)

Mr. Eric Clark, Manager-OSP Engineering
1441 North Colony Road
Meriden, CT. 06450
Tel. (203) 238-7407
Email: eric.r.clark@ftr.com

EVERSOURCE

Mr. Wayne D. Gagnon, Engineering - System Operations Manager
107 Selden Street
Berlin, CT 06037
Tel. (860) 665-3515
E-Mail: gagnow@eversource.com

AQUARION WATER COMPANY OF CT

Mr. Carlos J. Vizcarrando
Utility Systems Coordinator
Tel. 203-337-5950
Off. Fax. 203-337-5839
Alt. Fax. 203-330-4647
e-mail: cvizcarrando@aquarionwater.com

SPECTRUM BUSINESS (Charter Cable)

Tel. (800) 314-7195

TOWN OF BROOKFIELD PUBLIC WORKS

Mr. Ralph Tedesco, P.E.
100 Pocono Road
Brookfield, CT 06804
Tel. (203) 775-7318

WATER POLLUTION CONTROL AUTHORITY

Ms. Kristi McPadden
100 Pocono Road
Brookfield, CT 06804
Tel. (203) 775-7848

LIGHT TOWER

Mr. Ray Soma
Tel. (860) 643-4365
Tel. (860) 966-1857

SECTION 1.08 - PROSECUTION AND PROGRESS

Article 1.08.03 - Prosecution of Work:

Add the following:

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 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 Division of Traffic Engineering to coordinate a field inspection of all work.

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:

Sundays and on the following Legal Holidays:

- New Year's Day
- Martin Luther King Day
- President's Day
- Good Friday
- Memorial Day
- Independence Day
- Labor Day
- Columbus Day
- Veterans Day
- Thanksgiving Day
- Christmas Day

Also, any other day between the hours of 6:00 p.m. and 7:00 a.m.

Weekend Work

The Contractor will be allowed to perform work between the hours of 7:00 a.m. and 12:00 noon on Saturday. No Sunday work is allowed.

All Roadways

All construction activities, including the loading and unloading of materials and equipment, shall be limited to Monday through Friday, 7:00 a.m. to 4:00 p.m.

Access to local property and businesses must be maintained at all times unless prior arrangements are made with property owners or business proprietors.

The day before and after a holiday the contractor cannot work. The contractor cannot close any lanes (but can work on the sidewalks) until after 8:30 a.m. and before 4:00 p.m. on weekdays.

Additional Lane Closure Restrictions

It is anticipated that work on adjacent roadways 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-half 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-half 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.

Full Depth Reconstruction

During the allowable period, the Contractor shall excavate a maximum of 2,600 feet of existing roadway full width in each of the eight drainage basins and install permanent subbase to the permanent locations and elevations as shown on the cross sections or as directed by the engineer. The full width of the roadway shall be constructed during each allowable period. The Contractor shall provide the supporting subbase for the number of lanes and the prescribed widths as dictated in the Special Provision "Maintenance and Protection of Traffic".

All temporary connections to abutting driveways and existing roadways must be accomplished in a satisfactory manner prior to the end of the work day. Excavation and installation of subbase must be accomplished full width for the proposed roadway.

On the next to last day of the work week the Contractor shall ensure that all subbase work has been completed from the previous three workdays and ready for the placement of the first course of bituminous concrete pavement.

On the last day of the work week (considered to be Friday), the Contractor shall install a sufficient number of intermediate courses of bituminous concrete pavement for that length of roadway that was prepared during the past four workdays. The final course of pavement shall not be installed at this time. Temporary pavement markings shall be installed on the intermediate course of bituminous concrete pavement mentioned above in accordance with Article 9.71.03 as contained in the Special Provision "Maintenance and Protection of Traffic".

When the installation of all the intermediate courses of bituminous concrete pavement is completed for an entire roadway, the Contractor shall install the final course of bituminous concrete pavement. Final pavement markings shall be installed on the final course of bituminous concrete pavement in accordance with Article 9.71.03 as 'contained in the Special Provision "Maintenance and Protection of Traffic".

Other Limitations

No roadway, with the exception of transition areas, shall be open to traffic unless the appropriate pavement markings have been installed. The transition areas shall have pavement markings applied immediately upon opening to traffic.

Longitudinal dropdowns greater than 2 inches will not be allowed during those periods when the maximum number of lanes of through traffic is required. The Contractor shall temporarily provide a 4:1 traversable slope of suitable material in those areas where a longitudinal dropdown exists. The cost of furnishing, installing and removing this material shall be included in the contract lump sum for "Maintenance and Protection of Traffic."

The Contractor shall schedule operations so that pavement removal and roadway resurfacing shall be completed full width across a roadway section by the end of a workday. All transverse height differentials on a roadway surface shall be tapered to negate any "bump" to traffic as specified elsewhere in this contract or as approved by the Engineer. Material for this taper shall be as approved by the Engineer.

All temporary concrete barriers, other protective systems and traffic control devices as called for by the contract or ordered by the Engineer must be on-hand and available in sufficient quantity for immediate installation prior to any stage change.

Article 1.08.07 – Determination of Contract Time:

Add the following:

For this contract, the number of Calendar Days allowed for the completion of the project shall be 120 calendar days.

SECTION 4.06 - BITUMINOUS CONCRETE

Section 4.06 is being deleted in its entirety and replaced with the following:

4.06.01—Description

4.06.02—Materials

4.06.03—Construction Methods

4.06.04—Method of Measurement

4.06.05—Basis of Payment

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

The terms listed below as used in this specification are defined as:

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

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

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

Density Lot: The total tonnage of all bituminous concrete placed in a single lift and as defined in Article 4.06.03.

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

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

Hot Mix Asphalt (HMA): A bituminous concrete mixture typically produced at 325°F.

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

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

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

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

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

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

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

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

Superpave: A bituminous concrete mix design used in mixtures designated as “S*” Where “S” indicates Superpave and * indicates the sieve related to the nominal maximum aggregate size of the mix.

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

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

4.06.02—Materials: All materials shall conform to the requirements of Section M.04.

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

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

4.06.03—Construction Methods:

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

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

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

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

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

2. Transportation of Mixture: The mixture shall be transported in vehicles that are clean of all foreign material, excessive coating or cleaning agents, and, that have no gaps through which mixture might spill. Any material spilled during the loading or transportation process shall be quantified by re-weighing the vehicle. The Contractor shall load vehicles uniformly so that segregation is minimized. Loaded vehicles shall be tightly covered with waterproof covers acceptable to the Engineer. Mesh covers are prohibited. The cover must minimize air infiltration. Vehicles found not to be in conformance shall not be loaded.

Vehicles with loads of bituminous concrete being delivered to State projects must not exceed the statutory or permitted load limits referred to as gross vehicle weight (GVW). The Contractor shall furnish a list and allowable weights of all vehicles transporting mixture.

The State reserves the right to check the gross and tare weight of any vehicle. If the gross or tare weight varies from that shown on the delivery ticket by more than 0.4 percent, the Engineer will recalculate the net weight. The Contractor shall correct the discrepancy to the satisfaction of the Engineer.

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

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

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

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

Refueling or cleaning of equipment is prohibited in any location on the project where fuel or solvents might come in contact with paved areas or areas to be paved. Solvents used in cleaning mechanical equipment or hand tools shall be stored off of areas paved or to be paved.

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

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

Pneumatic tire rollers shall be equipped with wide-tread compaction tires capable of exerting an average contact pressure from 60 to 90 pounds per square inch uniformly over the surface, The Contractor shall furnish documentation to the Engineer regarding tire size; pressure and loading

to confirm that the proper contact pressure is being developed and that the loading and contact pressure is uniform for all wheels.

Lighting: For paving operations, which will be performed during hours of darkness, the paving equipment shall be equipped with lighting fixtures as described below, or with an approved equal. Lighting shall minimize glare to passing traffic. The lighting options and minimum number of fixtures are listed in Tables 4.06-1 and 4.06-2:

TABLE 4.06-1: Minimum Paver Lighting

Option	Fixture Configuration	Fixture Quantity	Requirement
1	Type A	3	Mount over screed area
	Type B (narrow) or Type C (spot)	2	Aim to auger and guideline
	Type B (wide) or Type C (flood)	2	Aim 25 feet behind paving machine
2	Type D Balloon	2	Mount over screed area

TABLE 4.06-2: Minimum Roller Lighting

Option	Fixture Configuration*	Fixture Quantity	Requirement
1	Type B (wide)	2	Aim 50 feet in front of and behind roller
	Type B (narrow)	2	Aim 100 feet in front of and behind roller
2	Type C (flood)	2	Aim 50 feet in front of and behind roller
	Type C (spot)	2	Aim 100 feet in front of and behind roller
3	Type D Balloon	1	Mount above the roller

*All fixtures shall be mounted above the roller.

Type A: Fluorescent fixture shall be heavy-duty industrial type. Each fixture shall have a minimum output of 8,000 lumens. The fixtures shall be mounted horizontally, and be designed for continuous row installation.

Type B: Each floodlight fixture shall have a minimum output of 18,000 lumens.

Type C: Each fixture shall have a minimum output of 19,000 lumens.

Type D: Balloon light: Each balloon light fixture shall have a minimum output of 50,000 lumens, and emit light equally in all directions.

Material Transfer Vehicle (MTV): A MTV shall be used when placing a bituminous concrete surface course as indicated in the contract documents.

The MTV must be a vehicle specifically designed for the purpose of delivering the bituminous concrete mixture from the delivery vehicle to the paver. The MTV must continuously remix the bituminous concrete mixture throughout the placement process.

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

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

4. Test Section: The Engineer may require the Contractor to place a test section whenever the requirements of this specification or Section M.04 are not met.

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

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

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

Permanent Transitions: Defined as any gradual change in pavement elevation that remains as a permanent part of the work.

A transition shall be constructed no closer than 75 feet from either side of a bridge expansion joint or parapet. All permanent transitions, leading and trailing, shall meet the following length requirements:

- a) Posted speed limit is greater than 35 MPH: 30 feet per inch of elevation change.
- b) Posted speed limit is 35 MPH or less: 15 feet per inch of elevation change.

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

Temporary Transitions: A temporary transition is defined as a transition that does not remain a permanent part of the work. All temporary transitions shall meet the following length requirements:

- a) Posted speed limit is greater than 50 MPH
 - (1) Leading Transitions = 15 feet per inch of vertical change (thickness)
 - (2) Trailing Transitions = 6 feet per inch of vertical change (thickness)
- b) Posted speed limit is 40, 45, or 50 MPH
 - (1) Leading and Trailing = 4 feet per inch of vertical change (thickness)
- c) Posted speed limit is 35 MPH or less
 - (1) Leading and Trailing = 3 feet per inch of vertical change (thickness)

Note: Any temporary transition to be in-place over the winter shutdown period or during extended periods of inactivity (more than 14 calendar days) shall conform to the greater than 50 MPH requirements shown above.

6. Spreading and Finishing of Mixture: Prior to the placement of the mixture, the underlying base course shall be brought to the plan grade and cross section within the allowable tolerance.

Immediately before placing a bituminous concrete lift, a uniform coating of tack coat shall be applied to all existing underlying pavement surfaces and on the exposed surface of a wedge joint. Such surfaces shall be clean and dry. Sweeping or other means acceptable to the Engineer shall be used.

The mixture shall not be placed whenever the surface is wet or frozen.

The Engineer may verify the mixture temperature by means of a probe or infrared type of thermometer. The Engineer may reject the load based on readings from a probe type thermometer and the specify temperature in the quality control plan (QCP) for placement.

Tack Coat Application: The tack coat shall be applied by a pressurized spray system that results in uniform overlapping coverage at an application rate of 0.03 to 0.05 gallons per square yard for a non-milled surface and an application rate of 0.05 to 0.07 gallons per square yard for a milled surface. For areas where both milled and un-milled surfaces occur, the tack coat shall be an application rate of 0.03 to 0.05 gallons per square yard. The Engineer must approve the equipment and the method of measurement prior to use. The material for tack coat shall not be heated in excess of 160°F and shall not be further diluted.

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

The Contractor may request to omit the tack coat application between bituminous concrete layers that have not been exposed to traffic and are placed during the same work shift. Requests to omit tack coat application on the exposed surface of a wedge joint will not be considered.

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

When unforeseen weather conditions prevent further placement of the mixture, the Engineer is not obligated to accept or place the bituminous concrete mixture that is in transit from the Plant.

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

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

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

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

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

TABLE 4.06-3: Thickness Tolerances

Mixture Designation	Lift Tolerance
S1	+/- $\frac{3}{8}$ inch
S0.25, S0.375, S0.5	+/- $\frac{1}{4}$ inch

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

- b) Area- Where the width of the lift exceeds that shown on the plans by more than the specified thickness, the Engineer will calculate the area adjustment in accordance with Article 4.06.04.

- c) **Delivered Weight of Mixture** - When the delivery ticket shows that the vehicle exceeds the allowable gross weight for the vehicle type, the Engineer will calculate the weight adjustment in accordance with Article 4.06.04.

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

Compaction: The Contractor shall compact the mixture to meet the density requirements as stated in Article 4.06.03 and eliminate all roller marks without displacement, shoving, cracking, or aggregate breakage.

When placing a lift with a specified thickness less than one and one-half (1 ½) inches, or a wedge course, the Contractor shall provide a minimum rolling pattern as determined by the development of a compaction curve. The procedure to be used shall be documented in the Contractor's QCP for placement and demonstrated on the first day of placement.

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

If the Engineer determines that the use of compaction equipment in the dynamic mode may damage highway components, utilities, or adjacent property, the Contractor shall provide alternate compaction equipment. The Engineer may allow the Contractor to operate rollers in the dynamic mode using the oscillatory system at the lowest frequency setting.

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

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

Surface Requirements:

Each lift of the surface course shall not vary more than ¼ inch from a Contractor-supplied 10 foot straightedge. For all other lifts, the tolerance shall be ⅜ inch. Such tolerance will apply to all paved areas.

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

7. Longitudinal Joint Construction Methods: The Contractor shall use Method I- Notched Wedge Joint (see Figure 4.06-1) when constructing longitudinal joints where lift thicknesses are between 1½ and 3 inches. S1.0 mixtures shall be excluded from using Method I. Method II Butt Joint (see Figure 4.06-2) shall be used for lifts less than 1½ inches or greater than or equal to 3 inches. During placement of multiple lifts, the longitudinal joint shall be constructed in such a

manner that it is located at least 6 inches from the joint in the lift immediately below. The joint in the final lift shall be at the centerline or at lane lines. Each longitudinal joint shall maintain a consistent offset from the centerline of the roadway along its entire length. The difference in elevation between the two faces of any completed longitudinal joint shall not exceed $\frac{1}{4}$ inch in any location.

Method I - Notched Wedge Joint:

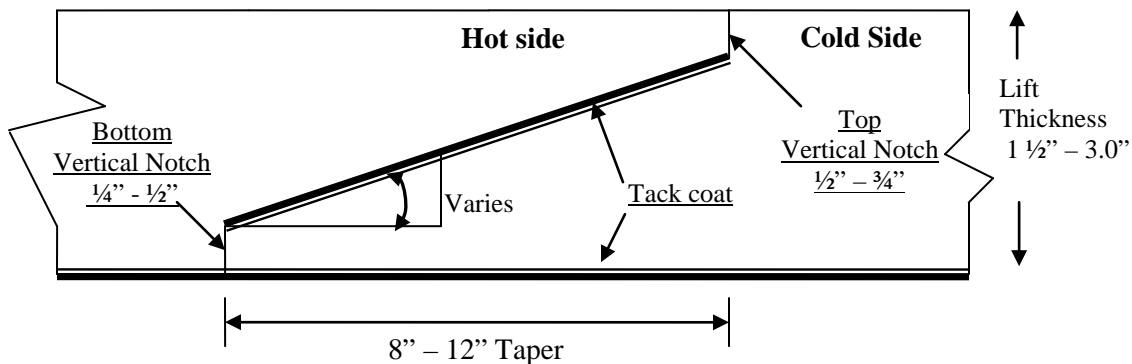


FIGURE 4.06-1: Notched Wedge Joint

A notched wedge joint shall be constructed as shown in Figure 4.06-1 using a device that is attached to the paver screed and is capable of independently adjusting the top and bottom vertical notches. The device shall have an integrated vibratory system.

The taper portion of the wedge joint must be placed over the longitudinal joint in the lift immediately below. The top vertical notch must be located at the centerline or lane line in the final lift. The requirement for paving full width “curb to curb” as described in Method II may be waived if addressed in the QC plan and approved by the Engineer.

The taper portion of the wedge joint shall be evenly compacted using equipment other than the paver or notch wedge joint device.

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

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

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

If Method I, Notched Wedge Joint cannot be used on lifts between 1.5 and 3 inches, Method III Butt Joint may be substituted according to the requirements below for “Method III – Butt Joint with Hot Pour Rubberized Asphalt Treatment.”

Method II - Butt Joint:

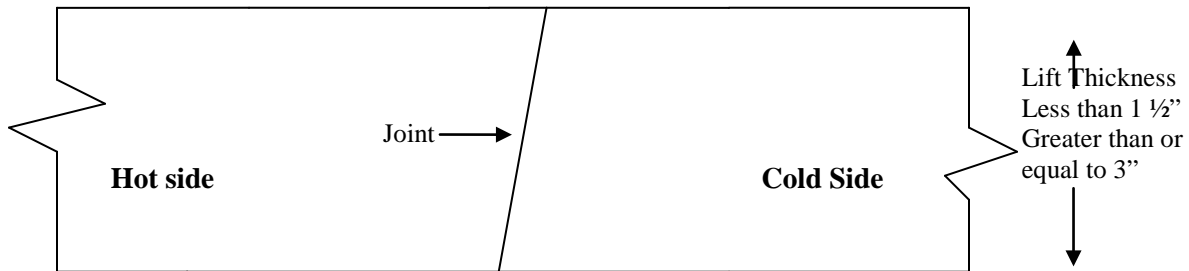


FIGURE 4.06-2: Butt Joint

When adjoining passes are placed, the Contractor shall utilize equipment that creates a near vertical edge (refer to Figure 4.06-2). The completing pass (hot side) shall have sufficient mixture so that the compacted thickness is not less than the previous pass (cold side). The end gate on the paver should be set so there is an overlap onto the cold side of the joint.

The Contractor shall not allow any butt joint to be incomplete at the end of a work shift unless otherwise allowed by the Engineer. When using this method, the Contractor is not allowed to leave a vertical edge exposed at the end of a work shift and must complete paving of the roadway full width “curb to curb.”

Method III- Butt Joint with Hot Poured Rubberized Asphalt Treatment: If Method I Wedge Joint cannot be used due to physical constraints in certain limited locations; the contractor may submit a request in writing for approval by the Engineer, to utilize Method III Butt Joint as a substitution in those locations. There shall be no additional measurement or payment made when the Method III Butt Joint is substituted for the Method I Notched Wedge Joint. When required by the contract or approved by the Engineer, Method III (see Figure 4.06-3) shall be used.

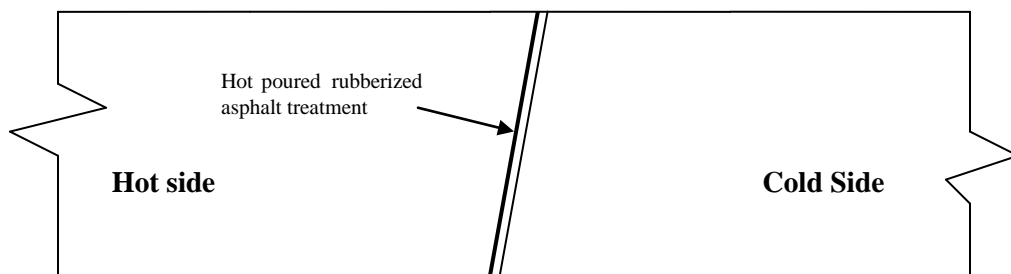


FIGURE 4.06-3: Butt Joint with Hot Poured Rubberized Asphalt Treatment

All of the requirements of Method II must be met with Method III. In addition, the longitudinal vertical edge must be treated with a rubberized joint seal material meeting the requirements of ASTM D 6690, Type 2. The joint sealant shall be placed on the face of the “cold side” of the butt joint as shown above prior to placing the “hot side” of the butt joint. The joint seal material shall be applied in accordance with the manufacturer’s recommendation so as to provide a uniform coverage and avoid excess bleeding onto the newly placed pavement.

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

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

The Standard QCP for production shall consist of the quality control program specific to the production facility.

There are three components to the QCP for placement: a Standard QCP, a Project Summary Sheet that details project specific information, and if applicable a separate Extended Season Paving Plan as required in Section 9 “Temperature and Seasonal Requirements”.

The Standard QCP for both production and placement shall be submitted to the Department for approval each calendar year and at a minimum of 30 days prior to production or placement.

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

Each QCP shall include the name and qualifications of a Quality Control Manager (QCM). The QCM shall be responsible for the administration of the QCP, and any modifications that may become necessary. The QCM shall have the ability to direct all Contractor personnel on the project during paving operations. All Contractor sampling, inspection and test reports shall be reviewed and signed by the QCM prior to submittal to the Engineer. The QCPs shall also include the name and qualifications of any outside testing laboratory performing any QC functions on behalf of the Contractor.

Approval of the QCP does not relieve the Contractor of its responsibility to comply with the project specifications. The Contractor may modify the QCPs as work progresses and must document the changes in writing prior to resuming operations. These changes include but are not limited to changes in quality control procedures or personnel. The Department reserves the right to deny significant changes to the QCPs.

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

QCP for Placement: The Standard QCP, Project Summary Sheet, and Extended Season Paving Plan shall conform to the format provided by the Engineer. The format is available at http://www.ct.gov/dot/lib/dot/documents/dconstruction/pat/qcp_outline_hma_placement.pdf.

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

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

The Contractor may obtain one (1) mat core and one (1) joint core per day for process control, provided this process is detailed in the QCP. The results of these process control cores shall not be used to dispute the Department determinations from the acceptance cores. The Contractor shall submit the location of each process control core to the Engineer for approval prior to taking the core. The core holes shall be filled to the same requirements described in sub-article 4.06.03-10.

9. Temperature and Seasonal Requirements: Paving, including placement of temporary pavements, shall be divided into two seasons, “In-Season” and “Extended-Season”. In-Season paving occurs from May 1 – October 14, and Extended Season paving occurs from October 15-April 30. The following requirements shall apply unless otherwise authorized or directed by the Engineer:

- Mixtures shall not be placed when the air or sub base temperature is less than 40°F regardless of the season.
- Should paving operations be scheduled during the Extended Season, the Contractor must submit an Extended Season Paving Plan for the project that addresses minimum delivered mix temperature considering WMA, PMA or other additives, maximum paver speed, enhanced rolling patterns and the method to balance mixture delivery and placement operations. Paving during Extended Season shall not commence until the Engineer has approved the plan.

10. Obtaining Bituminous Concrete Cores: This Section describes the methodology and sampling frequency the Contractor shall use to obtain pavement cores.

Coring shall be performed on each lift specified to a thickness of one and one-half (1 ½) inches or more within 5 days of placement. The Contractor shall extract cores (4 or 6 inch diameter for S0.25, S0.375 and S0.5 mixtures 6 inch diameter for S1.0 mixtures) from locations determined

by the Engineer. The Engineer must witness the extraction, labeling of cores and filling of the core holes.

A density lot will be complete when the full designed paving width and length of the lot has been placed and shall include all longitudinal joints between the curb lines. HMA S1 mixes are excluded from the longitudinal joint density requirements.

A standard density lot is the quantity of material placed within the defined area exclusive of any structures. A combo density lot is the quantity of material placed within the defined area inclusive of structures less than or equal to 500 feet long. A bridge density lot is the quantity of material placed on a structure larger than 500 feet in length.

Prior to paving, the type and number of lot (s) shall be determined by the Engineer. The number of cores per lot shall be determined in accordance to Tables 4.06-4, 4.06-5A and 4.06-5B. Noncontiguous areas such as highway ramps may be combined to create one lot. Combined areas should be set up to target a 2000 ton lot size. The longitudinal locations of mat cores within a lot containing multiple paving passes will be determined using the total distance covered by the paver. The locations of the joint cores will be determined using the total length of longitudinal joints within the lot.

Sampling is in accordance with the following tables:

TABLE 4.06-4: Bridge Density Lot(s)

Length of Each Structure (Feet)	No. of Mat Cores	No. of Joint Cores
≤ 500'	See Table 4.06-5(A or B)	See Table 4.06-5(A or B)
501' – 1500'	3	3
1501' – 2500'	4	4
2501' and greater	5	5

All material placed on structures less than or equal to 500 feet in length shall be included as part of a standard lot as follows:

TABLE 4.06-5A: Standard and Combo Density Lot(s) ≥ 500 Tons

Lot Type	No. of Mat Cores		No. of Joint Cores		Target Lot Size (Tons)
Standard Lot / Without Bridge (s)	4		4		2000
Combo Lot / Lot With Bridge(s) ⁽¹⁾	4 plus	1 per structure (≤ 300')	4 plus	1 per structure (≤ 300')	2000
		2 per structure (301' – 500')		2 per structure (301' – 500')	

TABLE 4.06-5B: Standard and Combo Density Lot < 500 Tons

Lot Type	No. of Mat Cores		No. of Joint Cores	
Standard Lot / Without Bridge (s)	3		3	
Combo Lot / Lot With Bridge(s) ⁽¹⁾	2 plus	1 per structure	2 plus	1 per structure

Note:

⁽¹⁾ If a combo lot mat or joint core location randomly falls on a structure, the core is to be obtained on the structure in addition to the core(s) required on the structure.

After the lift has been compacted and cooled, the Contractor shall cut cores to a depth equal to or greater than the lift thickness and remove them without damaging the lift(s) to be tested. Any core that is damaged or obviously defective while being obtained will be replaced with a new core from a location within 2 feet measured in a longitudinal direction.

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

Method I, Notched Wedge Joint cores shall be taken so that the center of the core is 5 inches from the visible joint on the hot mat side (Figure 4.06-5).

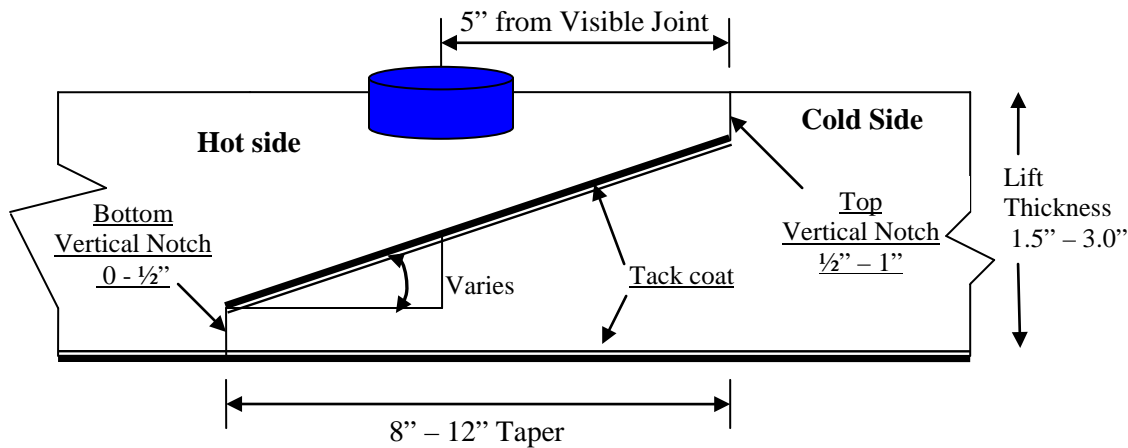


FIGURE 4.06-5: Notched Wedge Joint Cores

When Method II or Method III Butt Joint is utilized, cores shall be taken from the hot side so the edge of the core is within 1 inch of the longitudinal joint.

The cores shall be labeled by the Contractor with the project number, date placed, lot number and sub-lot number. The core's label shall, include "M" for a mat core and "J" for a joint core. A mat core from the second lot and first sub-lot shall be labeled "M2 - 1" (Figure 4.06-4). The Engineer shall fill out a MAT-109 to accompany the cores. The Contractor shall deliver the

cores and MAT-109 to the Department's Central Lab. The Contractor shall use a container approved by the Engineer. The container shall have a lid capable of being locked shut and tamper proof. The Contractor shall use foam, bubble wrap, or another suitable material to prevent the cores from being damaged during handling and transportation. Once the cores and MAT-109 are in the container the Engineer will secure the lid using a security seal. The security seal's identification number must be documented on the MAT-109. Central Lab personnel will break the security seal and take possession of the cores.

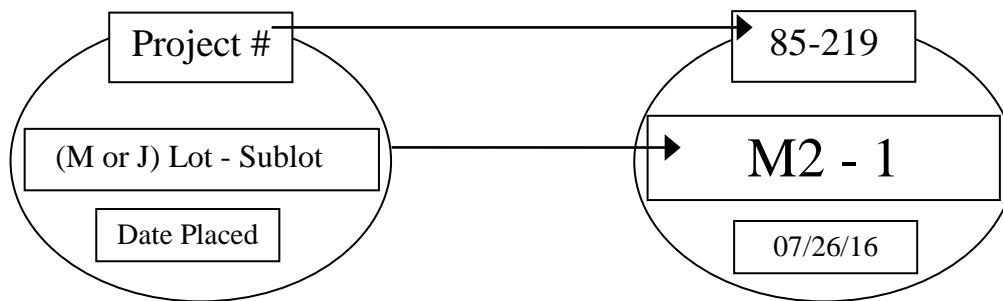


FIGURE 4.06-4: Labeling of Cores

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

11. Acceptance Sampling and Testing: Sampling and testing shall be performed at a frequency not less than the minimum frequency specified in Section M.04 and sub-article 4.06.03-10.

Sampling shall be performed in accordance with ASTM D 3665, or a statistically based procedure of stratified random sampling approved by the Engineer.

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

Density Acceptance: The Engineer will perform all acceptance testing in accordance with AASHTO T 331. The density of each core will be determined using the daily production's

average maximum theoretical specific gravity (Gmm) established during the testing of the parent material at the Plant. When there was no testing of the parent material or any Gmm exceeds the specified tolerances in the Department's current QA Program for Materials, the Engineer will determine the maximum theoretical density value to be used for density calculations.

12. Density Dispute Resolution Process: The Contractor and Engineer will work in partnership to avoid potential conflicts and to resolve any differences that may arise during quality control or acceptance testing for density. Both parties will review their sampling and testing procedures and results and share their findings. If the Contractor disputes the Engineer's test results, the Contractor must submit in writing a request to initiate the Dispute Resolution Process within 7 calendar days of the notification of the test results. No request for dispute resolution will be allowed unless the Contractor provides quality control results within the timeframe described in sub-article 4.06.03-9 supporting its position. No request for Dispute Resolution will be allowed for a Density Lot in which any core was not taken within the required 5 calendar days of placement. Should the dispute not be resolved through evaluation of existing testing data or procedures, the Engineer may authorize the Contractor to obtain a new set of core samples per disputed lot. The core samples must be extracted no later than 14 calendar days from the date of Engineer's authorization.

The number and location (mat, joint, or structure) of the cores taken for dispute resolution must reflect the number and location of the original cores. The location of each core shall be randomly located within the respective original sub lot. All such cores shall be extracted and the core hole filled using the procedure outlined in Article 4.06.03. The dispute resolution results shall be added to the original results and averaged for determining the final in-place density value.

13. Corrective Work Procedure:

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

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

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

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

4.06.04—Method of Measurement:

1. HMA S* or PMA S*: The quantity of bituminous concrete measured for payment will be determined by the documented net weight in tons accepted by the Engineer in accordance with this specification and Section M.04.

2. Adjustments: Adjustments may be applied to bituminous concrete quantities and will be measured for payment using the following formulas:

Yield Factor for Adjustment Calculation = 0.0575 Tons/SY/inch

Actual Area = [(Measured Length (ft)) x (Avg. of width measurements (ft))]

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

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

Tons Adjusted for Area (T_A) = $[(L \times W_{adj})/9] \times (t) \times 0.0575 \text{ Tons/SY/inch} = (-) \text{ Tons}$

Where: L = Length (ft)

(t) = Actual thickness (inches)

$W_{adj} = (\text{Designed width (ft)} + \text{tolerance} / 12) - \text{Measured Width}$

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

Tons Adjusted for Thickness (T_T) = $A \times t_{adj} \times 0.0575 = (-) \text{ Tons}$

Where: A = Area = $\{[L \times (\text{Designed width} + \text{tolerance (lift thickness)} / 12)] / 9\}$

t_{adj} = Adjusted thickness = $[(Dt + \text{tolerance}) - \text{Actual thickness}]$

Dt = Designed thickness (inches)

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

$$\text{Tons Adjusted for Weight (T}_w\text{)} = \text{GVW} - \text{DGW} = (-) \text{ Tons}$$

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

- d) **Mixture Adjustment:** The quantity of bituminous concrete representing the production lot at the Plant will be adjusted as follow:

- i. Non-PWL Production Lot (less than 3500 tons):

The adjustment values in Table 4.06-6 and 4.06-7 shall be calculated for each sub lot based on the Air Void (AV) and Asphalt Binder Content (PB) test results for that sub lot. The total adjustment for each day's production (lot) will be computed using tables and the following formulas:

$$\text{Tons Adjusted for Superpave Design (T}_{SD}\text{)} = [(\text{AdjAV}_t + \text{AdjPB}_t) / 100] \times \text{Tons}$$

$$\text{Percent Adjustment for Air Voids} = \text{AdjAV}_t = [\text{AdjAV}_1 + \text{AdjAV}_2 + \text{AdjAV}_i + \dots + \text{AdjAV}_n] / n$$

Where: AdjAV_t = Total percent air void adjustment value for the lot

AdjAV_i = Adjustment value from Table 4.06-7 resulting from each sub lot or the average of the adjustment values resulting from multiple tests within a sub lot, as approved by the Engineer.

n = number of sub lots based on Table M.04.03-2

TABLE 4.06-6: Adjustment Values for Air Voids

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

$$\text{Percent Adjustment for Asphalt Binder} = \text{AdjPB}_t = [(\text{AdjPB}_1 + \text{AdjPB}_2 + \text{AdjPB}_i + \dots + \text{AdjPB}_n)] / n$$

Where: AdjPB_t = Total percent asphalt binder adjustment value for the lot

AdjPB_i = Adjustment value from Table 4.06-7 resulting from each sub lot

n = number of binder tests in a production lot

TABLE 4.06-7: Adjustment Values for Binder Content

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

ii. PWL Production Lot (3500 tons or more):

For each lot, the adjustment values shall be calculated based on PWL for AV, VMA and PB test results. The lot will be considered as being normally distributed and all applicable equations in AASHTO R9 and AASHTO R42 Appendix X4 will apply.

Only one test result will be considered for each sub lot. The specification limits are listed in Section M.04.

For AV, PB and voids in mineral aggregate (VMA), the individual material quality characteristic adjustment (Adj) will be calculated as follow:

For PWL between 50 and 90%: Adj(AV_t or PB_t or VMA_t)= (55 + 0.5 PWL) - 100

For PWL at and above 90%: Adj(AV_t or PB_t or VMA_t)= (77.5 + 0.25 PWL) - 100

Where:

AdjAV_t = Total percent AV adjustment value for the lot

AdjPB_t = Total percent PB adjustment value for the lot

AdjVMA_t = Total percent VMA adjustment value for the lot

Lots with PWL less than 50% in any of the three individual material quality characteristics will be evaluated under 1.06.04.

The total adjustment for each production lot will be computed using the following formula:

Tons Adjusted for Superpave Design (T_{SD}) = [(0.5AdjAV_t + 0.25AdjPB_t + 0.25 AdjVMA_t) / 100] X Tons

iii. Partial Lots:

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

Lots with 4 or more sublots will be calculated as indicated in 4.06.04-2.d.ii.

- e) **Density Adjustment:** The quantity of bituminous concrete measured for payment in a lift of pavement specified to be 1½ inches or greater may be adjusted for density. Separate density adjustments will be made for each lot and will not be combined to establish one density adjustment. The final lot quantity shall be the difference between the total payable tons for the project and the sum of the previous lots. If either the Mat or Joint adjustment value is “remove and replace”, the density lot shall be removed and replaced (curb to curb).

No positive adjustment will be applied to a Density Lot in which any core was not taken within the required 5 calendar days of placement.

Tons Adjusted for Density (T_D) = $[(PA_M \times .50) + (PA_J \times .50)] / 100 \times \text{Density Lot Tons}$

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

PA_M = Mat density percent adjustment from Table 4.06-9

PA_J = Joint density percent adjustment from Table 4.06-10

TABLE 4.06-9: Adjustment Values for Pavement Mat density

Average Core Result Percent Mat Density	Percent Adjustment (Bridge and Non-Bridge) ⁽¹⁾⁽²⁾
97.1 - 100	-1.667*(ACRPD-98.5)
94.5 – 97.0	+2.5
93.5 – 94.4	+2.5*(ACRPD-93.5)
92.0 – 93.4	0
90.0 – 91.9	-5*(92-ACRPD)
88.0 – 89.9	-10*(91-ACRPD)
87.0 – 87.9	-30
86.9 or less	Remove and Replace (curb to curb)

TABLE 4.06-10: Adjustment Values for Pavement Joint Density

Average Core Result Percent Joint Density	Percent Adjustment (Bridge and Non-Bridge) ⁽¹⁾⁽²⁾
97.1 – 100	-1.667*(ACRPD-98.5)
93.5 – 97.0	+2.5
92.0 – 93.4	+1.667*(ACRPD-92)
91.0 – 91.9	0
89.0 – 90.9	-7.5*(91-ACRPD)
88.0 – 88.9	-15*(90-ACRPD)
87.0 – 87.9	-30
86.9 or less	Remove and Replace (curb to curb)

⁽¹⁾ ACRPD = Average Core Result Percent Density

⁽²⁾ All Percent Adjustments to be rounded to the second decimal place. For example, 1.667 is to be rounded to 1.67.

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

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

4. Cut Bituminous Concrete Pavement: The quantity of bituminous concrete pavement cut will be measured in accordance with Article 2.02.04.

5. Material for Tack Coat: The quantity of tack coat will be measured for payment by the number of gallons furnished and applied on the Project and approved by the Engineer. No tack coat material shall be included that is placed in excess of the tolerance described in Article 4.06.03.

- a. Container Method- Material furnished in a container will be measured to the nearest ½ gallon. The volume will be determined by either measuring the volume in the original container by a method approved by the Engineer or using a separate graduated container capable of measuring the volume to the nearest ½ gallon. The container in which the material is furnished must include the description of material, including lot number or batch number and manufacturer or product source.

b. Vehicle Method-

i. Measured by Weight: The number of gallons furnished will be determined by weighing the material on calibrated scales furnished by the Contractor. To convert weight to gallons, one of the following formulas will be used:

$$\text{Tack Coat (gallons at } 60^{\circ}\text{F)} = \frac{\text{Measured Weight (pounds)}}{\text{Weight per gallon at } 60^{\circ}\text{F}}$$

$$\text{Tack Coat (gallons at } 60^{\circ}\text{F)} = \frac{0.996 \times \text{Measured Weight (pounds)}}{\text{Weight per gallon at } 77^{\circ}\text{F}}$$

ii. Measured by automated metering system on the delivery vehicle:

Tack Coat (gallons at 60°F) = Factor (from Table 4.06-11) multiplied by the measured gallons.

TABLE 4.06-11: Factor to Convert Volume of Tack Coat to 60°F

Tack Coat Application Temperature (°F)	Factor	Tack Coat Application Temperature (°F)	Factor
75	0.996	120	0.985
80	0.995	125	0.984
85	0.994	130	0.983
90	0.993	135	0.982
95	0.991	140	0.980
100	0.990	145	0.979
105	0.989	150	0.978
110	0.988	155	0.977
115	0.986	160	0.976

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

4.06.05—Basis of Payment:

1. HMA S* or PMA S*: The furnishing and placing of bituminous concrete will be paid for at the Contract unit price per ton for “HMA S*” or “PMA S*”.

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

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

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

Production Lot: $[T_T + T_A + T_W + T_{SD}] \times \text{Unit Price} = \text{Est. (P)}$

Density Lot: $T_D \times \text{Unit Price} = \text{Est. (D)}$

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

T_* = Total tons of each adjustment calculated in Article 4.06.04

Est. () = Pay Unit represented in dollars representing incentive or disincentive.

The Bituminous Concrete Adjustment Cost item if included in the bid proposal or estimate is not to be altered by the Contractor.

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

4. The cutting of bituminous concrete pavement will be paid in accordance with Article 2.02.05.

5. Material for tack coat will be paid for at the Contract unit price per gallon at 60°F for "Material for Tack Coat".

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

<u>Pay Item*</u>	<u>Pay Unit*</u>
HMA S*	ton
PMA S*	ton
Bituminous Concrete Adjustment Cost	est.
Material for Tack Coat	gal.
Material Transfer Vehicle	ton

*For contracts administered by the State of Connecticut, Department of Administrative Services, the pay items and pay units are as shown in contract award price schedule.

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:

12.00.06 – Data Labels:

For the purpose of developing and maintaining a highway sign inventory and for the purpose of sampling and testing reflective sheeting, the Contractor shall affix a Data Label(s) to the back of each sign face-extruded aluminum sign and each sign face-sheet aluminum sign in the vicinity of the lower left hand corner or quadrant. Data Labels shall be 2 (two) separate 5 (five) inch by 3 (three) inch (125mm by 75mm), non-reflective weatherproof films with black copy on a yellow background having a pressure sensitive adhesive backing.

A “Fabrication” Data Label is to include information about the sign fabricator, date of fabrication and the sheeting manufacturer - type. An “Installation” Data Label is to include The State Project Number or Maintenance Permit Number that installed the sign and date of installation.

The cost of the data labels coded and in place on the sign shall be included in the unit cost of the respective sign material. Payment for the respective quantities of each sign face-extruded aluminum sign and each sign face-sheet aluminum sign may be withheld until all Data Label(s) have been installed to the satisfaction of the Engineer.

The Data Label designs, with additional notes relative to design requirements are attached herewith.

DATA LABELS
NON REFLECTIVE, WEATHERPROOF FILM
BLACK COPY, YELLOW BACKGROUND

CONN DOT SIGN FACE DATA LABEL											
Fabricator: (Insert NAME or State) Sheeting Manufacturer - Type (Insert NAME - TYPE)											
Date Fabricated - Month / Year											
J	F	M	A	M	J	J	A	S	O	N	D
12	13	14	15	16	17	18	19	20	21	22	23

CONN DOT SIGN FACE DATA LABEL											
Installed By: Project No.: (Insert 000-0000 or State) Permit No.: (Insert D_-000000)											
Date Installed - Month / Year											
J	F	M	A	M	J	J	A	S	O	N	D
12	13	14	15	16	17	18	19	20	21	22	23

Data Labels To Be 5 Inch By 3 Inch Each (125mm x 75mm) With Face Designs As Shown Above.

All Copy Ink Must Be Durable And Not Fade, Discolor Or Smudge.

All Variable Legends To Be Included At Label Fabrication.

Only One "Installed By" Permit Or Project Number Should Be Provided.

Sign Fabrication And / Or Installation By State Forces, Insert "State."

The Month And Year Of Fabrication And Installation May Be Punched Or Marked Out.

The Back Of The Data Label Must Contain A Pre-coated Pressure- Sensitive Adhesive Covered By A Removable Liner.

At Application, The Liner Must Be removable Without Soaking In Water Or Other Solvents.

The Adhesive Must Form A Durable Bond To Surfaces That Are Smooth, Clean, Corrosion-Free And Weather Resistant.

Completed Data Labels Must Not Discolor, Crack, Craze, Blister, Delaminate, Peel, Chalk Or Lose Adhesion When Subjected To Temperatures From -30 Degrees to 200 Degrees Fahrenheit.

SECTION 12.08 - SIGN FACE-SHEET ALUMINUM

Work under this item shall conform to the requirements of Section 12.08 amended as follows:

General: Delete all references to parapet mounted sign supports.

Article M.18.15 – Sign Mounting Bolts: *Replace with the following:*

Bolts used for sign mounting shall be stainless steel and conform to ASTM F593, Group 1 or 2 (Alloy Types 304 or 316). Locking nuts shall be stainless steel and shall conform to ASTM F594 (Alloy Types 304 or 316). Washers shall also be stainless steel and shall conform to ASTM A240 (Alloy Types 304 or 316).

SECTION M.04 BITUMINOUS CONCRETE MATERIALS

Section M.04 is being deleted in its entirety and replaced with the following:

M.04.01—Bituminous Concrete Materials and Facilities

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

M.04.03—Production Requirements

M.04.01—Bituminous Concrete Materials and Facilities: Each source of component material, Plant and laboratory used to produce and test bituminous concrete must be qualified on an annual basis by the Engineer. AASHTO or ASTM Standards noted with an (M) have been modified and are detailed in Table M.04.03-6.

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

1. Coarse Aggregate:

All coarse aggregate shall meet the requirements listed in Section M.01.

2. Fine Aggregate:

All fine aggregate shall meet the requirements listed in Section M.01

3. Mineral Filler:

Mineral filler shall conform to the requirements of AASHTO M 17.

4. Performance Graded (PG) Asphalt Binder:

a. General:

i. PG asphalt binder shall be uniformly mixed and blended and be free of contaminants such as fuel oils and other solvents. Binder shall be properly heated and stored to prevent damage or separation.

ii. The binder shall meet the requirements of AASHTO M 332 and shall be graded or verified in accordance with AASHTO R 29. The Contractor shall submit a Certified Test Report and bill of lading representing each delivery in accordance with AASHTO R 26(M). The Certified Test Report must also indicate the binder specific gravity at 77°F; rotational viscosity at 275°F and 329°F and the mixing and compaction viscosity-temperature chart for each shipment.

iii. The Contractor shall submit the name(s) of personnel responsible for receipt, inspection, and record keeping of PG binder. Contractor plant personnel shall document specific storage tank(s) where binder will be transferred and stored until used, and provide binder samples to the Engineer upon request. The person(s) shall assure that each shipment is accompanied by a statement certifying that the transport vehicle was inspected before loading and was found acceptable for the material

shipped, and, that the binder is free of contamination from any residual material, along with two (2) copies of the bill of lading.

- iv. The blending or combining of PG binders in one storage tank at the Plant from different suppliers, grades, or additive percentages is prohibited.

b. Basis of Approval:

The request for approval of the source of supply shall list the location where the material will be manufactured, and the handling and storage methods, along with necessary certification in accordance with AASHTO R 26(M). Only suppliers/refineries that have an approved "Quality Control Plan for Performance Graded Binders" formatted in accordance with AASHTO R 26(M) may supply PG binders to Department projects.

c. Standard Performance Grade (PG) Binder:

- i. Standard PG binder shall be defined as "Neat". Neat PG binders shall be free from modification with: fillers, extenders, reinforcing agents, adhesion promoters, thermoplastic polymers, acid modification and other additives such as re-refined motor oil, and shall indicate such information on each bill of lading and certified test report.
- ii. The standard asphalt binder grade shall be PG 64S-22.

d. Modified Performance Grade (PG) Binder:

The modified asphalt binder shall be Performance Grade PG 64E-22 asphalt modified solely with a Styrene-Butadiene-Styrene (SBS) polymer. The polymer modifier shall be added at either the refinery or terminal and delivered to the bituminous concrete production facility as homogenous blend. The stability of the modified binder shall be verified in accordance with ASTM D7173 using the Dynamic Shear Rheometer (DSR). The DSR $G^*/\sin(\delta)$ results from the top and bottom sections of the ASTM D7173 test shall not differ by more than 10%. The results of ASTM D7173 shall be included on the Certified Test Report. The binder shall meet the requirements of AASHTO M 332 (including Appendix X1) and AASHTO R 29.

e. Warm Mix Additive or Technology:

- i. The warm mix additive or technology must be listed on the North East Asphalt User Producer Group (NEAUPG) Qualified Warm Mix Asphalt (WMA) Technologies List at the time of bid, which may be accessed online at <http://www.neaupg.uconn.edu>.
- ii. The warm mix additive shall be blended with the asphalt binder in accordance with the manufacturer's recommendations.
- iii. The blended binder shall meet the requirements of AASHTO M 332 and shall be graded or verified in accordance with AASHTO R 29 for the specified binder grade. The Contractor shall submit a Certified Test Report showing the results of the testing demonstrating the binder grade. In addition, it must include the grade of the virgin

binder, the brand name of the warm mix additive, the manufacturer's suggested rate for the WMA additive, the water injection rate (when applicable) and the WMA Technology manufacturer's recommended mixing and compaction temperature ranges.

5. Emulsified Asphalts:

a. General:

- i. The emulsified asphalt shall meet the requirements of AASHTO M 140 or AASHTO M 208 as applicable.
- ii. The emulsified asphalts shall be free of contaminants such as fuel oils and other solvents.
- iii. The blending at mixing plants of emulsified asphalts from different suppliers is prohibited.

b. Basis of Approval

- i. The request for approval of the source of supply shall list the location where the material is manufactured, the handling and storage methods, and certifications in accordance with AASHTO PP 71. Only suppliers that have an approved "Quality Control Plan for Emulsified Asphalt" formatted in accordance with AASHTO PP 71 and submit monthly split samples per grade to the Engineer may supply emulsified asphalt to Department projects.
- ii. Each shipment of emulsified asphalt delivered to the project site shall be accompanied with the corresponding Certified Test Report listing Saybolt viscosity, residue by evaporation, penetration of residue, and weight per gallon at 77°F and Material Certificate.
- iii. Anionic emulsified asphalts shall conform to the requirements of AASHTO M-140. Materials used for tack coat shall not be diluted and meet grade RS-1 or RS-1H. When ambient temperatures are 80°F and rising, grade SS-1 or SS-1H may be substituted if permitted by the Engineer.
- iv. Cationic emulsified asphalt shall conform to the requirements of AASHTO M-208. Materials used for tack coat shall not be diluted and meet grade CRS-1. The settlement and demulsibility test will not be performed unless deemed necessary by the Engineer. When ambient temperatures are 80°F and rising, grade CSS-1 or CSS-1h may be substituted if permitted by the Engineer.

6. Reclaimed Asphalt Pavement (RAP):

- a. General: RAP is a material obtained from the cold milling or removal and processing of bituminous concrete pavement. RAP material shall be crushed to 100% passing the ½ inch sieve and free from contaminants such as joint compound, wood, plastic, and metals.
- b. Basis of Approval: The RAP material will be accepted on the basis of one of the following criteria:
 - i. When the source of all RAP material is from pavements previously constructed on Department projects, the Contractor shall provide a Materials Certificate listing the detailed locations and lengths of those pavements and that the RAP is only from those locations listed.
 - ii. When the RAP material source or quality is not known, the Contractor shall request for approval to the Engineer at least 30 calendar days prior to the start of the paving operation. The request shall include a Material Certificate and applicable test results stating that the RAP consists of aggregates that meet the specification requirements of sub articles M.04.01-1 through 3, and, that the binder in the RAP is substantially free of solvents, tars and other contaminants. The Contractor is prohibited from using unapproved material on Department projects and shall take necessary action to prevent contamination of approved RAP stockpiles. Stockpiles of unapproved material shall remain separate from all other RAP materials at all times. The request for approval shall include the following:
 1. A 50-pound sample of the RAP to be incorporated into the recycled mixture.
 2. A 25-pound sample of the extracted aggregate from the RAP.

7. Crushed Recycled Container Glass (CRCG):

- a. Requirements: The Contractor may propose to use clean and environmentally-acceptable CRCG in an amount not greater than 5% by weight of total aggregate.
- b. Basis of Approval: The Contractor shall submit to the Engineer a request to use CRCG. The request shall state that the CRCG contains no more than 1% by weight of contaminants such as paper, plastic and metal and conform to the following gradation:

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

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

8. Joint Seal Material:

- a. Requirements: Joint seal material must meet the requirements of ASTM D 6690 – Type 2. The Contractor shall submit a Material Certificate in accordance with Article 1.06.07 certifying that the joint seal material meets the requirements of this specification.

9. Recycled Asphalt Shingles (RAS)

- a. Requirements: RAS shall consist of processed asphalt roofing shingles from post-consumer asphalt shingles or from manufactured shingle waste. The RAS material under consideration for use in bituminous concrete mixtures must be certified as being asbestos free and shall be entirely free of whole, intact nails. The RAS material shall meet the requirements of AASHTO MP 23.

The producer shall test the RAS material to determine the asphalt content and the gradation of the RAS material. The producer shall take necessary action to prevent contamination of RAS stockpiles.

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

10. Plant Requirements:

- a. General: The Plant producing bituminous concrete shall comply with AASHTO M 156.
- b. Storage Silos: The Contractor may use silos for short-term storage with the approval of the Engineer. A silo must have heated cones and an unheated silo cylinder if it does not contain a separate internal heating system. When multiple silos are filled, the Contractor shall discharge one silo at a time. Simultaneous discharge of multiple silos for the same Project is not permitted.

<u>Type of silo cylinder</u>	<u>Maximum storage time for all classes (hr)</u>	
	HMA	WMA/PMA
Open Surge	4	Mfg Recommendations*
Unheated – Non-insulated	8	Mfg Recommendations*
Unheated – Insulated	18	Mfg Recommendations*
Heated – No inert gas	TBD by the Engineer	

*Not to exceed HMA limits

- c. Documentation System: The mixing plant documentation system shall include equipment for accurately proportioning the components of the mixture by weight and in the proper order, controlling the cycle sequence and timing the mixing operations. Recording equipment shall monitor the batching sequence of each component of the

mixture and produce a printed record of these operations on each Plant ticket, as specified herein.

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

If a WMA Technology is added at the Plant, the Plant tickets shall include the actual dosage rate.

For drum Plants, the Plant ticket shall be produced at 5 minute intervals and maintained by the vendor for a period of three years after the completion of the project.

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

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

The entire batching and mixing interlock cut-off circuits shall interrupt and stop the automatic batching operations when an error exceeding the acceptable tolerance occurs in proportioning.

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

- d. Aggregates: Aggregate stockpiles shall be managed to prevent segregation and cross contamination. For drum plants only, the percent moisture content at a minimum prior to production and half way through production shall be determined.
- e. Mixture: The dry and wet mix times shall be sufficient to provide a uniform mixture and a minimum particle coating of 95% as determined by AASHTO T 195(M) .

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

- f. RAP: RAP moisture content shall be determined a minimum of twice daily (prior to production and halfway through production).
- g. Asphalt Binder: A binder log shall be submitted to the Department's Central Lab on a monthly basis.
- h. Warm mix additive: For mechanically foamed WMA, the water injection rate shall be monitored during production and not exceed 2.0% by total weight of binder. For additive added at the Plant, the dosage rate shall be monitored during production.
- i. Plant Laboratory: The Contractor shall maintain a laboratory at the production facility to test bituminous concrete mixtures during production. The laboratory shall have a minimum of 300 square feet, have a potable water source and drainage in accordance with the CT Department of Public Health Drinking Water Division, and be equipped with all necessary testing equipment as well as with a PC, printer, and telephone with a dedicated hard-wired phone line. In addition, the PC shall have internet connection and a functioning web browser with unrestricted access to <https://ctmail.ct.gov>. This equipment shall be maintained in working order at all times and be made available for use by the Engineer.

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

The laboratory testing apparatus, supplies, and safety equipment shall be capable of performing all tests in their entirety that are referenced in AASHTO R 35 and AASHTO M 323. The Contractor shall ensure that the Laboratory is adequately supplied at all times during the course of the project with all necessary testing supplies and equipment.

The Contractor shall maintain a list of laboratory equipment used in the acceptance testing processes including but not limited to, balances, scales, manometer/vacuum gauge, thermometers, gyratory compactor, clearly showing calibration and/or inspection dates, in accordance with AASHTO R 18. The Contractor shall notify the Engineer if any modifications are made to the equipment within the laboratory. The Contractor shall take immediate action to replace, repair, and/or recalibrate any piece of equipment that is out of calibration, malfunctioning, or not in operation.

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

1. Curb Mix:

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

- b. **Basis of Approval:** Annually, an approved JMF based on a mix design for curb mix must be on file with the Engineer prior to use. .
Any change in component source of supply or consensus properties must be approved by the Engineer. A revised JMF shall be submitted prior to use.

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

Notes: (a) Compaction Parameter 50gyration N_{des} . (b) The percent passing the #200 sieve shall not exceed the percentage of bituminous asphalt binder.

Mix	Curb Mix	Production Tolerances from JMF target
Grade of PG Binder content %	PG 64S-22 6.5 - 9.0	0.4
Sieve Size		
# 200	3.0 – 8.0 (b)	2.0
# 50	10 - 30	4
# 30	20 - 40	5
# 8	40 - 70	6
# 4	65 - 87	7
¼"		
3/8 "	95 - 100	8
½ "	100	8
¾"		8
1"		
2"		
Additionally, the fraction of material retained between any two consecutive sieves shall not be less than 4%		
Mixture Temperature		
Binder	325°F maximum	
Aggregate	280-350° F	
Mixtures	265-325° F	
Mixture Properties		
Air Voids (VA) %	0 – 4.0 (a)	

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

- a. **Requirements:** All designated mixes shall be designed using the Superpave mix design method in accordance with AASHTO R 35. A JMF based on the mix design shall meet the requirements of Tables M.04.02-2 through Table M.04.02-5. Each JMF must be submitted no less than seven (7) days prior to production and must be approved by the Engineer prior to use. All approved JMFs expire at the end of the calendar year.

All aggregate component consensus properties and tensile strength ratio (TSR) specimens shall be tested at an AASHTO Materials Reference Laboratory (AMRL) by NETTCP certified technicians.

All bituminous concrete mixes shall be tested for stripping susceptibility by performing the tensile strength ratio (TSR) test procedure in accordance with AASHTO T 283(M) at a minimum every 36 months. The compacted specimens may be fabricated at the Plant and then tested at an AMRL accredited facility. TSR specimens, and corresponding JMF shall be submitted with each test report.

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

- RAP amounts up to 15% may be used with no binder grade modification.
- RAP amounts up to 20% may be used provided a new JMF is approved by the Engineer. The JMF submittal shall include the grade of virgin binder added. The JMF shall be accompanied by a blending chart and supporting test results in accordance with AASHTO M 323 Appendix X1, or by testing that shows the combined binder (recovered binder from the RAP, virgin binder at the mix design proportions, warm mix asphalt additive and any other modifier if used) meets the requirements of the specified binder grade.
- Two representative samples of RAP shall be obtained. Each sample shall be split and one split sample shall be tested for binder content in accordance with AASHTO T 164 and the other in accordance AASHTO T 308.
- RAP material shall not be used with any other recycling option.

ii. Superpave Mixtures with RAS: RAS may be used solely in HMA S1 mixtures with the following conditions:

- RAS amounts up to 3% may be used.
- RAS total binder replacement up to 15% may be used with no binder grade modification.
- RAS total binder replacement up to 20% may be used provided a new JMF is approved by the Engineer. The JMF submittal shall include the grade of virgin binder added. The JMF shall be accompanied by a blending chart and supporting test results in accordance to AASHTO M 323 appendix X1 or by testing that shows the combined binder (recovered binder from the RAP, virgin binder at the mix design proportions, warm mix asphalt additive and any other modifier if used) meets the requirements of the specified binder grade.
- Superpave Mixtures with RAS shall meet AASHTO PP 78 design considerations. The RAS asphalt binder availability factor (F) used in AASHTO PP 78 shall be 0.85.

iii. Superpave Mixtures with CRCG: CRCG may be used solely in HMA S1 mixtures. One percent of hydrated lime, or other accepted non-stripping agent, shall be added to all mixtures containing CRCG. CRCG material shall not be used with any other recycling option.

- b. Basis of Approval: The following information must be included with the JMF submittal:
- Gradation, consensus properties and specific gravities of the aggregate, RAP or RAS.
 - Average asphalt content of the RAP or RAS by AASHTO T 164.
 - Source of RAP or RAS, and percentage to be used.
 - Warm mix Technology, manufacturer's recommended additive rate and tolerances and manufacturer recommended mixing and compaction temperatures.
 - TSR test report and anti-strip manufacturer and recommended dosage rate if applicable.
 - Mixing and compaction temperature ranges for the mix with and without the warm-mix technology incorporated.
 - JMF ignition oven correction factor by AASHTO T 308.

With each JMF submittal, the following samples shall be submitted to the Division of Materials Testing:

- 4 - one quart cans of PG binder, with corresponding Safety Data Sheet (SDS)
- 1 - 50 lbs bag of RAP
- 2 - 50 lbs bag of plant blended virgin aggregate

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

Any material based on a JMF, once approved, shall only be acceptable for use when it is produced by the designated plant, it utilizes the same components, and the production of material continues to meet all criteria as specified herein, and component aggregates are maintained within the tolerances shown in Table M.04.02-2. A new JMF must be submitted to the Engineer for approval whenever a new component source is proposed.

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

- c. Mix Status: Each facility will have each type of mixture rated based on the results of the previous year's production. Mix Status will be provided to each bituminous concrete producer annually prior to the beginning of the paving season.

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

Criteria A: Percentage of acceptance test results with compliant air voids.

Criteria B: The average of the percentage of acceptance test results with compliant VMA, and percentage of acceptance test results with compliant air voids.

The final rating assigned will be the lower of the rating obtained with Criteria A or B.

Mix status is defined as:

“A” – Approved:

Assigned to each mixture type from a production facility with a current rating of 70% or greater, or to each mixture type completing a successful PPT.

“PPT” – Pre-Production Trial:

Temporarily assigned to each mixture type from a production facility when:

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

Bituminous concrete mixtures with a “PPT” status cannot be used on Department projects. Testing shall be performed by the Producer with NETTCP certified personnel on material under this status. Test results must confirm that specifications requirements in Table M.04.02-2 and Table M.04.02-5 are met before material can be used. One of the following methods must be used to verify the test results:

Option A: Schedule a day when a Department Inspector can be at the facility to witness testing or,

Option B: When the Contractor or their representative performs testing without being witnessed by an Inspector, the Contractor shall submit the test results and a split sample including 2 gyratory molds, 5,000 grams of boxed bituminous concrete, and 5,000 grams of cooled loose bituminous concrete for verification testing and approval.

Option C: When the Contractor or their representative performs testing without being witnessed by a Department Inspector, the Engineer may verify the mix in the Contractor’s laboratory.

Witnessing or verifying by the Department of compliant test results will change the mix’s status to an “A”.

The differences between the Department’s test results and the Contractor’s must be within the “C” tolerances included in the Department’s QA Program for Materials, Acceptance and Assurance Testing Policies and Procedures in order to be verified.

“U” – Not Approved:

Status assigned to a type of mixture that does not have an approved JMF. . Bituminous concrete mixtures with a “U” status cannot be used on Department projects.

TABLE M.04.02– 2: Superpave Mixture Design Criteria

Notes: ⁽¹⁾ For all mixtures using a WMA technology, the mix temperature shall meet PG binder and WMA manufacturer's recommendations.								
	S0.25		S0.375		S0.5		S1	
Sieve	CONTROL POINTS		CONTROL POINTS		CONTROL POINTS		CONTROL POINTS	
inches	Min (%)	Max (%)	Min (%)	Max (%)	Min (%)	Max (%)	Min (%)	Max (%)
2.0	-	-	-	-	-	-	-	-
1.5	-	-	-	-	-	-	100	-
1.0	-	-	-	-	-	-	90	100
3/4	-	-	-	-	100	-	-	90
1/2	100	-	100	-	90	100	-	-
3/8	97	100	90	100	-	90	-	-
#4	75	90	-	75	-	-	-	-
#8	32	67	32	67	28	58	19	45
#16	-	-	-	-	-	-	-	-
#30	-	-	-	-	-	-	-	-
#50	-	-	-	-	-	-	-	-
#100	-	-	-	-	-	-	-	-
#200	2.0	10.0	2.0	10.0	2.0	10.0	1.0	7.0
VMA (%)	16.5 ± 1		16.0 ± 1		15.0 ± 1		13.0 ± 1	
VA (%)	4.0 ± 1		4.0 ± 1		4.0 ± 1		4.0 ± 1	
Gse	JMF value		JMF value		JMF value		JMF value	
Gmm	JMF ± 0.030		JMF ± 0.030		JMF ± 0.030		JMF ± 0.030	
Dust / binder	0.6 – 1.2		0.6 – 1.2		0.6 – 1.2		0.6 – 1.2	
Mix Temp ⁽¹⁾	265 – 325°F		265 – 325°F		265 – 325°F		265 – 325°F	
TSR	≥ 80%		≥ 80%		≥ 80%		≥ 80%	
T-283 Stripping	Minimal, as determined by the Engineer							

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

Notes: (1) 95/90 denotes that a minimum of 95% of the coarse aggregate, by mass, shall have one fractured face and that a minimum of 90% shall have two fractured faces.. (2) Criteria presented as maximum Percent by mass of flat and elongated particles of materials retained on the #4 sieve, determined at 5:1 ratio.					
Traffic Level	Design ESALs (80 kN), Millions	Coarse Aggregate Angularity ⁽¹⁾ ASTM D 5821, Minimum %	Fine Aggregate Angularity AASHTO T 304, Method A Minimum %	Flat and Elongated Particles ⁽²⁾ ASTM D 4791, Maximum %	Sand Equivalent AASHTO T 176, Minimum %
1	< 0.3	55/- -	40	10	40
2	0.3 to < 3.0	75/- -	40	10	40
3	≥ 3.0	95/90	45	10	45

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

Traffic Level	Design ESALs	Number of Gyration by Superpave Gyrotory Compactor			Percent Density of Gmm from HMA/WMA specimen			Voids Filled with Asphalt (VFA) Based on Nominal mix size – inch			
	(million)	Nini	Ndes	Nmax	Nini	Ndes	Nmax	0.25	0.375	0.5	1
1	< 0.3	6	50	75	≤ 91.5	96.0	≤ 98.0	70 - 80	70 - 80	70 - 80	67 - 80
2	0.3 to < 3.0	7	75	115	≤ 90.5	96.0	≤ 98.0	65 - 78	65 - 78	65 - 78	65 - 78
3	≥ 3.0	8	100	160	≤ 90.0	96.0	≤ 98.0	65 – 77	73 - 76	65 - 75	65 - 75

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

Mix Type	Level	Binder Content Minimum
S0.25	1	5.70
S0.25	2	5.60
S0.25	3	5.50
S0.375	1	5.70
S0.375	2	5.60
S0.375	3	5.50
S0.5	1	5.10
S0.5	2	5.00
S0.5	3	4.90
S1	1	4.60
S1	2	4.50
S1	3	4.40

M.04.03— Production Requirements:

1. Standard Quality Control Plan (QCP) for Production:

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

Control Chart(s) shall be developed and maintained for critical aspect(s) of the production process as determined by the Contractor. The control chart(s) shall identify the material property, applicable upper and lower control limits, and be updated with current test data. As a minimum, the following quality characteristics shall be included in the control charts: percent passing #4 sieve, percent passing #200 sieve, binder content, air voids, Gmm and VMA. The control chart(s) shall be used as part of the quality control system to document variability of the bituminous concrete production process. The control chart(s) shall be submitted to the Engineer the first day of each month.

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

The Contractor shall submit complete production testing records to the Engineer within 24 hours in a manner acceptable to the Engineer.

The QCP shall also include the name and qualifications of any outside testing laboratory performing any QC functions on behalf of the Contractor. The QCP must also include a list of sampling & testing methods and frequencies used during production, and the names of all Quality Control personnel and their duties.

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

2. Acceptance Requirements:

i. General:

Acceptance samples shall be obtained from the hauling vehicles and tested by the Contractor at the Plant.

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

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

Anytime during production that testing equipment becomes defective or inoperable, production can continue for a maximum of 1 hour. The Contractor shall obtain box sample(s) in accordance with Table M.04.03-2 to satisfy the daily acceptance testing requirement for the quantity shipped to the project. The box sample(s) shall be tested once the equipment issue has been resolved to the satisfaction of the Engineer. Production beyond 1 hour may be considered by the Engineer. Production will not be permitted beyond that day until the subject equipment issue has been resolved.

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

Should the Department be unable to verify the Contractor's acceptance test result(s) due to a failure of the Contractor to retain acceptance test specimens or supporting documentation, the Contractor shall review its quality control plan, determine the cause of the nonconformance and

respond in writing within 24 hours to the Engineer describing the corrective action taken. In addition, the Contractor must provide supporting documentation or test results to validate the subject acceptance test result(s). The Engineer may invalidate any adjustments for material corresponding to the subject acceptance test(s). Failure of the Contractor to adequately address quality control issues at a facility may result in suspension of production for Department projects at that facility.

ii. Curb Mix Acceptance Sampling and Testing Procedures:

Curb Mix shall be tested in accordance to Table M.04.03-1 by the Contractor at a frequency of one test per every 250 tons of cumulative production, regardless of the day of production.

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

Protocol	Reference	Description
1	AASHTO T 30(M)	Mechanical Analysis of Extracted Aggregate
2	AASHTO T 168	Sampling of Bituminous Concrete
3	AASHTO T 308	Binder content by Ignition Oven method (adjusted for aggregate correction factor)
4	AASHTO T 209(M) ⁽²⁾	Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures
5	AASHTO T 312 ⁽²⁾	⁽¹⁾ Superpave Gyratory molds compacted to N _{des}
6	AASHTO T 329	Moisture Content of Hot-Mix Asphalt (HMA) by Oven Method

Notes: ⁽¹⁾ One set equals two six-inch molds. Molds to be compacted to 50 gyrations

⁽²⁾ Once per year or when requested by the Engineer

a. Determination of Off-Test Status:

- i. Curb Mix is considered “off test” when the test results indicate that any single value for bitumen content or gradation are not within the tolerances shown in Table M.04.02-1. If the mix is “off test”, the Contractor must take immediate actions to correct the deficiency and a new acceptance sample shall be tested on the same day or the following day of production.
- ii. When multiple silos are located at one site, mixture supplied to one project is considered as coming from one source for the purpose of applying the “off test” status.
- iii. The Engineer may cease supply from the plant when test results from three consecutive samples are not within the JMF tolerances or the test results from two consecutive samples not within the control points indicated in Table M.04.02-1 regardless of production date.

b. JMF revisions

- i. If a test indicates that the bitumen content or gradation are outside the tolerances, the Contractor may make a single JMF revision as allowed by the Engineer prior to any additional testing. Consecutive test results outside the requirements of Table M.04.02-1 JMF tolerances may result in rejection of the mixture.
- ii. Any modification to the JMF shall not exceed 50% of the JMF tolerances indicated in Table M.04.02-1 for any given component of the mixture without approval of the Engineer. When such an adjustment is made to the bitumen, the corresponding production percentage of bitumen shall be revised accordingly.

iii. Superpave Mix Acceptance:

a. Sampling and Testing Procedures

Production Lot: The Lot will be defined as one of the following types:

- Non-PWL Production Lot for total estimated project quantities per mixture less than 3500 tons: All mixture placed during a single continuous paving operation.
- PWL Production Lot for total estimated project quantities per mixture of 3500 tons or more: Each 3500 tons of mixture produced within 30 calendar days.

Production Sub Lot:

- For Non-PWL: As defined in Table M.04.03 – 2
- For PWL: 500 tons (the last Sub Lot may be less than 500 tons)

Partial Production Lots (For PWL only): A Lot with less than 3500 tons due to:

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

The acceptance sample(s) location(s) shall be selected using stratified – random sampling in accordance with ASTM D 3665 based on:

- the total daily estimated tons of production for non-PWL lots, or
- the total lot size for PWL lots.

One acceptance sample shall be obtained and tested per Sub Lot. The Engineer may direct that additional acceptance samples be obtained. For non-PWL lots, one acceptance test shall always be performed in the last sub-lot based on actual tons of material produced.

For Non-PWL lots, quantities of the same mixture per plant may be combined daily for multiple State projects to determine the number of sub lots.

The payment adjustment will be calculated as described in 4.06.

**TABLE M.04.03 – 2:
Superpave Acceptance Testing Frequency per Type/Level/Plant for Non-PWL lots**

Daily quantity produced in tons (lot)	Number of Sub Lots/Tests
0 to 150	0, Unless requested by the Engineer
151 to 500	1
501 to 1,000	2
1,001 to 2,000	3
2,001 or greater	1 per 500 tons or portions thereof

The following test procedures shall be used for acceptance:

TABLE M.04.03– 3: Superpave Acceptance Testing Procedures

Protocol	Procedure	Description
1	AASHTO T 168	Sampling of bituminous concrete
2	AASHTO R 47	Reducing samples to testing size
3	AASHTO T 308	Binder content by ignition oven method (adjusted for aggregate correction factor)
4	AASHTO T 30(M)	Gradation of extracted aggregate for bituminous concrete mixture
5	AASHTO T 312	⁽¹⁾ Superpave gyratory molds compacted to N _{des}
6	AASHTO T 166	⁽²⁾ Bulk specific gravity of bituminous concrete
7	AASHTO R 35	⁽²⁾ Air voids, VMA
8	AASHTO T 209(M)	Maximum specific gravity of bituminous concrete (average of two tests)
9	AASHTO T 329	Moisture content of bituminous concrete

Notes: ⁽¹⁾ One set equals two six-inch molds. Molds to be compacted to N_{max} for PPTs and to N_{des} for production testing. The first subplot of the year will be compacted to N_{max}

⁽²⁾ Average value of one set of six-inch molds.

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

The test specimen must be placed in an ignition oven for testing in accordance with AASHTO T 308 within thirty minutes of being obtained from the hauling vehicle and the test shall start immediately after.

The Contractor shall perform TSR testing within 30 days after the start of production for all design levels of HMA- and PMA- S0.5 plant-produced mixtures, in accordance with AASHTO T 283(M). The TSR test shall be performed at an AMRL certified laboratory by NETTCP certified technicians. The compacted specimens may be fabricated at the Plant and then tested at an AMRL accredited facility. The test results and specimens shall be submitted to the Engineer for review. Superpave mixtures that require anti-strip additives (either liquid or mineral) shall continue to meet all requirements specified herein for binder and bituminous concrete. The Contractor shall submit the name, manufacturer, percent used, technical datasheet and SDS for the anti-strip additive (if applicable) to the Engineer.

b. Determination of Off-Test Status:

- i. Superpave mixes shall be considered "*off test*" when any Control Point Sieve, binder content, VA, VMA, or Gmm value is outside of the limits specified in Table M.04.03-4 or the target binder content at the Plant is below the minimum binder content stated in Table M.04.02-5. Note that further testing of samples or portions of samples not initially tested for this purpose cannot be used to change the status.
- ii. Any time the bituminous concrete mixture is considered Off-test:
 1. The Contractor shall notify the Engineer when the Plant is "*off test*" for any mix design that is delivered to the project in any production day. When multiple silos are located at one site, mixture supplied to one project is considered as coming from one source for the purpose of applying the "*off test*" determination.
 2. The Contractor must take immediate actions to correct the deficiency, minimize "*off test*" production to the project, and obtain an additional Process Control (PC) test after any corrective action to verify production is in conformance to the specifications. A PC test will not be used for acceptance and is solely for the use of the Contractor in its quality control process.

c. Cessation of Supply for Superpave Mixtures in non-PWL lots:

A mixture shall not be used on Department's projects when it is "off test" for:

- i. four (4) consecutive tests in any combination of VA, VMA or Gmm, regardless of date of production, or,
- ii. two (2) consecutive tests in the Control Point sieves in one production shift.

As a result of cessation of supply, the mix status will be changed to PPT.

d. JMF revisions:

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

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

Revisions to aggregate and RAP specific gravities are only permitted when testing is performed at an AMRL certified laboratory by NETTCP certified technicians.

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

TABLE M.04.03– 4: Superpave Mixture Production Requirements

Notes: (1) 300°F minimum after October 15. (2) JMF tolerances shall be defined as the limits for production compliance. (3) For all mixtures with WMA technology, changes to the minimum aggregate temperature will require Engineer's approval. (4) For PMA and mixtures with WMA technology, the mix temperature shall meet manufacturer's recommendations. In addition, for all mixtures with WMA technology, the maximum mix temperature shall not exceed 325°F. (5) 0.4 for PWL lots (6) 1.3 for PWL lots (7) 1.2 for PWL lots									
	S0.25		S0.375		S0.5		S1		Tolerances
Sieve	CONTROL POINTS		CONTROL POINTS		CONTROL POINTS		CONTROL POINTS		From JMF Targets ⁽²⁾
inches	Min(%)	Max(%)	Min(%)	Max(%)	Min(%)	Max(%)	Min(%)	Max(%)	± Tol
1.5	-	-	-	-	-	-	100	-	
1.0	-	-	-	-	-	-	90	100	
3/4	-	-	-	-	100	-	-	90	
1/2	100	-	100	-	90	100	-	-	
3/8	97	100	90	100	-	90	-	-	
#4	75	90	-	75	-	-	-	-	
#8	32	67	32	67	28	58	19	45	
#16	-	-	-	-	-	-	-	-	
#200	2.0	10.0	2.0	10.0	2.0	10.0	1.0	7.0	
Pb	JMF value		JMF value		JMF value		JMF value		0.3 ⁽⁵⁾
VMA (%)	16.5		16.0		15.0		13.0		1.0 ⁽⁶⁾
VA (%)	4.0		4.0		4.0		4.0		1.0 ⁽⁷⁾
Gmm	JMF value		JMF value		JMF value		JMF value		0.030
Agg. Temp ⁽³⁾	280 – 350F		280 – 350F		280 – 350F		280 – 350F		
Mix Temp ⁽⁴⁾	265 – 325 F ⁽¹⁾		265 – 325 F ⁽¹⁾		265 – 325 F ⁽¹⁾		265 – 325 F ⁽¹⁾		
Prod. TSR	N/A		N/A		≥80%		N/A		
T-283 Stripping	N/A		N/A		Minimal as determined by the Engineer		N/A		

TABLE M.04.03– 5:
Superpave Traffic Levels and Design Volumetric Properties

Traffic Level	Design ESALs	Number of Gyration by Superpave Gyratory Compactor	
	(million)	Nini	Ndes
1	< 0.3	6	50
2	0.3 to < 3.0	7	75
3	≥3.0	8	100

TABLE M.04.03-6:
Modifications to Standard AASHTO and ASTM Test Specifications and Procedures

AASHTO Standard Method of Test	
Reference	Modification
T 30	Section 7.2 thru 7.4 Samples are not routinely washed for production testing
T 168	<p>Samples are taken at one point in the pile. Samples from a hauling vehicle are taken from only one point instead of three as specified.</p> <p>Selection of Samples: Sampling is equally important as the testing, and the sampler shall use every precaution to obtain samples that are truly representative of the bituminous mixture.</p> <p>Box Samples: In order to enhance the rate of processing samples taken in the field by construction or maintenance personnel the samples will be tested in the order received and data processed to be determine conformance to material specifications and to prioritize inspections by laboratory personnel.</p>
T 195	Section 4.3 only one truck load of mixture is sampled. Samples are taken from opposite sides of the load.
T 209	<p>Section 7.2 The average of two bowls is used proportionally in order to satisfy minimum mass requirements.</p> <p>8.3 Omit Pycnometer method.</p>
T 283	When foaming technology is used, the material used for the fabrication of the specimens shall be cooled to room temperature, and then reheated to the manufactures recommended compaction temperature prior to fabrication of the specimens.

AASHTO Standard Recommended Practices	
Reference	Modification
R 26	<p>All laboratory technician(s) responsible for testing PG-binders be certified or Interim Qualified by the New England Transportation Technician Certification Program (NETTCP) as a PG Asphalt Binder Lab Technician.</p> <p>All laboratories testing binders for the Department are required to be accredited by the AASHTO Materials Reference Laboratory (AMRL).</p> <p>Sources interested in being approved to supply PG-binders to the Department by use of an “in-line blending system,” must record properties of blended material, and additives used.</p> <p>Each source of supply of PG-binder must indicate that the binders contain no additives used to modify or enhance their performance properties. Binders that are manufactured using additives, modifiers, extenders etc., shall disclose the type of additive, percentage and any handling specifications/limitations required.</p> <p>All AASHTO M 320 references shall be replaced with AASHTO M 332.</p> <p>Once a month, one split sample and test results for each asphalt binder grade and each lot shall be submitted by the PG binder supplier to the Department’s Central Lab. Material remaining in a certified lot shall be re-certified no later than 30 days after initial certification. Each April and September, the PG binder supplier shall submit test results for two (2) BBR tests at two (2) different temperatures in accordance with AASHTO R 29.</p>

SECTION M.13 – ROADSIDE DEVELOPMENT

Article M.13.04 – Seed Mixtures:

Replace (a) with the following:

(a) Turf Seed Mix:

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

Species		
<u>Common name</u>	<u>Scientific name</u>	<u>Proportion (Percent)</u>
Abbey Kentucky Bluegrass	Poa pratensis	25
Ambrose Chewing Fescue	Festuca rubra	15
Envicta Kentucky Bluegrass	Poa pratensis	15
Manhattan Ryegrass	Lolium perenne	20
Pennlawn Red Fescue	Festuca rubra	25

ITEM # 0100100A – RESET MONITORING WELL

Description:

This item shall consist of resetting existing monitoring well covers to the new grades as proposed based on plan typical sections, grading plans, profiles and cross sections. The work will include coordination with the owner in advance of any work to the monitoring well cover.

Materials:

Cover frames and sleeves shall be new of equal kind to the existing. Covers shall be reused.

Concrete shall be Class A Concrete when placed in bituminous driveway areas. Concrete shall be Class C concrete when placed within sidewalk and concrete driveway apron areas.

Construction Methods:

The Contractor shall remove and adjust the existing concrete, monitoring well frame and riser sleeve and replace with new. The reset monitoring well shall be set flush all around to the proposed grade. The area shall be protected from traffic during the construction process until the monitoring well box can support traffic without damage. Any material damaged as a result of the contractor's activity will be replaced at no cost to the project.

Method of Measurement:

Reset Monitoring Well will be measured for payment by the actual number of monitoring wells that are adjusted and accepted, which measurement shall include all excavation, removal of existing, installation of new materials, concrete, backfill, equipment, tools and labor incidental thereto.

Basis for Payment:

This work shall be paid for at the Contract Unit Price each for "Reset Monitoring Well" which price shall include all excavation, removal of existing, installation of new materials, concrete, backfill, equipment, tools and labor incidental thereto for the satisfactory completion of the work.

Pay Item

Reset Monitoring Well

Pay Unit

Each

ITEM #0202001A – EARTH EXCAVATION

Work under this item shall conform to the requirements of Section 2.02, amended as follows:

Article 2.02.01 – Description:

Add the following:

The work shall include the removal of sidewalk as show on the plans or as ordered by the Engineer and shall include Concrete Sidewalk, Bituminous Concrete Sidewalk and sidewalk ramps. Cutting concrete sidewalk at the limits shown if needed shall also be included in the work for Earth Excavation.

Article 2.01.05 – Basis of Payment:

Add the following:

All cost per cubic yard shall include the excavation and disposal of concrete and bituminous concrete sidewalk and ramps which price shall include all materials, equipment, tools, and labor incidental thereto.

Pay Item

Earth Excavation

Pay Unit

CY

ITEM #0219011A – SEDIMENT CONTROL SYSTEM AT CATCH BASIN

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

Materials

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

Siltsack®

SI Geosolutions:
www.sigeosolutions.com
(800)621-0444

Dandy Sack™

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

FLeXstorm Inlet Filters

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

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

Construction Methods:

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

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

Basis of Payment:

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

Pay Item

Sediment Control System at Catch Basin

Pay Unit

EA

ITEM #0219011A

ITEM #0406267A - MILLING OF HMA (0" TO 4")

Description: This work shall consist of the milling, removal, and disposal of existing HMA pavement.

Materials: The existing HMA surface shall be disposed of offsite by the Contractor at an approved disposal facility unless otherwise stated in the contract documents.

Construction Methods: The Contractor shall remove the HMA material using means acceptable to the Engineer. The pavement surface shall be removed to the line, grade, and existing or typical cross-section shown on the plans or directed by the Engineer.

The equipment for milling the pavement surface shall be designed and built for milling flexible pavements. It shall be self-propelled with sufficient power, traction, and stability to maintain depth and slope and shall be capable of removing the existing HMA pavement.

The milling machine shall be equipped with a built-in automatic grade averaging control system that can control the longitudinal profile and the transverse cross-slope to produce the specified results. The longitudinal controls shall be capable of operating from any longitudinal grade reference, including string line, contact ski (30 feet minimum), non-contact ski (20 feet minimum), or mobile string line (30 feet minimum). The transverse controls shall have an automatic system for controlling cross-slope at a given rate. The Engineer may waive the requirement for automatic grade or slope controls where the situation warrants such action.

The rotary drum of the machine shall utilize carbide tip tools spaced not more than $\frac{5}{8}$ inches apart. The forward speed of the milling machine shall be limited to no more than 45 feet/minute. The tools on the revolving cutting drum must be continually maintained and shall be replaced as warranted to provide a uniform pavement texture. The Contractor may request to perform a test strip to demonstrate that the same surface tolerance can be attained at an increased forward speed. The test strip shall be a maximum length of 500 feet and shall have the same criteria for surface tolerance as noted in this specification. The final decision for implementing the increased forward speed will be at the discretion of the Engineer.

The machine shall be equipped with an integral pickup and conveying device to immediately remove material being milled from the surface of the roadway and discharge the millings into a truck, all in one operation. The machine shall also be equipped with a means of effectively limiting the amount of dust escaping from the milling and removal operation.

When milling smaller areas or areas where it is impractical to use the above described equipment, the use of a lesser equipped milling machine may be permitted when approved by the Engineer.

Protection shall be provided around existing catch basin inlets, manholes, utility valve boxes, and any similar structures. Any damage to such structures as a result of the milling operation is the Contractor's responsibility and shall be repaired at the Contractor's expense.

To prevent the infiltration of milled material into the storm drainage system, the Contractor shall take special care to prevent the milled material from falling into the inlet openings or inlet grates. Any milled material that has fallen into inlet openings or inlet grates shall be removed at the Contractor's expense.

Surface Tolerance: The milled surface shall provide a satisfactory riding surface with a uniform textured appearance. The milled surface shall be free from gouges, longitudinal grooves and ridges, oil film, and other imperfections that are a result of defective equipment, improper use of equipment, or poor workmanship. The Contractor, under the direction of the inspector, shall perform random spot-checks with a Contractor supplied ten-foot straightedge to verify surface tolerances at a minimum of five locations per day. The variation of the top of two ridges from the testing edge of the straightedge, between any two ridge contact points, shall not exceed $\frac{3}{8}$ inch. The variation of the top of any ridge to the bottom of the groove adjacent to that ridge shall not exceed $\frac{3}{8}$ inch. Any unsatisfactory surfaces produced are the responsibility of the Contractor and shall be corrected at the Contractor's expense and to the satisfaction of the Engineer.

The depth of removal will be verified by taking a measurement every 250 feet per each pass of the milling machine, or as directed by the Engineer. These depth measurements shall be used to monitor the average depth of removal.

Where a surface delamination between HMA layers or a surface delamination of HMA on Portland cement concrete causes a non-uniform texture to occur, the depth of milling shall be adjusted in small increments to a maximum of a +/- $\frac{1}{2}$ inch to eliminate the condition.

When removing a HMA pavement entirely from an underlying Portland cement concrete pavement, all of the HMA pavement shall be removed leaving a uniform surface of Portland cement concrete, unless otherwise directed by the Engineer.

Any unsatisfactory surfaces produced by the milling operation are the Contractor's responsibility and shall be corrected at the Contractor's expense and to the satisfaction of the Engineer.

No vertical faces, transverse or longitudinal, shall be left exposed to traffic unless it meets the requirements below. This shall include roadway structures (catch basins, manholes, utility valve boxes, etc.). If any vertical face is formed in an area exposed to traffic a temporary paved transition will be established according to the requirements shown on the plans. If the milling machine is used to form a temporary transition, the length of the temporary transition shall conform to Special Provision Section 4.06 - Bituminous Concrete, "Transitions for Roadway Surface", the requirements shown on the plans, or as directed by the Engineer. At all permanent limits of removal, a clean vertical face shall be established by saw cutting prior to paving.

Roadway structures shall not have a vertical face of greater than 1 inch exposed to traffic as a result of milling. All structures within the roadway that are exposed to traffic and greater than 1 inch above the milled surface shall receive a transition meeting the following requirements: For roadways with a posted speed limit of 35 mph or less*:

Round structures with a vertical face of greater than 1 inch to 2.5 inches shall be transitioned with a hard rubber tapered protection ring of the appropriate inside diameter designed specifically to protect roadway structures.

Round structures with a vertical face greater than 2.5 inches shall receive a transition of bituminous concrete formed at a minimum 24 to 1 taper.

All rectangular structures shall receive a transition of bituminous concrete formed at a minimum 24 to 1 taper.

*Bituminous concrete tapers at a minimum 24 to 1 taper may be substituted for the protection rings if approved by the Engineer.

For roadways with a posted speed limit of greater than 35 mph:

All structures shall receive a transition of bituminous concrete meeting the temporary transition requirements in Special Provision Section 4.06- Bituminous Concrete, "Transitions for Roadway Surface".

The milling operation shall proceed in accordance with the requirements of the "Maintenance and Protection of Traffic" and "Prosecution and Progress" specifications, or other contract requirements. The more stringent specification shall apply.

Prior to opening an area which has been milled to traffic, the pavement shall be thoroughly swept with a sweeper. The sweeper shall be equipped with a water tank and be capable of removing the millings and loose debris from the surface. Other sweeping equipment may be provided in lieu of the sweeper where acceptable by the Engineer.

Any milled area that will not be exposed to live traffic for a minimum of 48 hours prior to paving shall require a vacuum sweeper truck in addition to, or in lieu of, mechanical sweeping. The vacuum sweeper truck shall have sufficient power and capacity to completely remove all millings from the roadway surface including any fine particles within the texture of the milled surface. Vacuum sweeper truck hose attachments shall be used to clean around pavement structures or areas that cannot be reached effectively by the main vacuum. Compressed air may be used in lieu of vacuum attachments if approved by the Engineer.

Method of Measurement: This work will be measured for payment by the number of square yards of area from which the milling of asphalt has been completed and the work accepted. No area deductions will be made for minor unmilled areas such as catch basin inlets, manholes, utility boxes and any similar structures.

The depth of removal will be calculated by taking a measurement at a minimum every 250 feet per each pass of the milling machine, or as directed by the Engineer. The average depth of each section will determine which payment item is applicable.

Basis of Payment: This work will be paid for at the contract unit price per square yard for "Milling of HMA (0 to 4 inches) (greater than 4 to 8 inches) (greater than 8 inches)". This price shall include all equipment, tools, labor, and materials incidental thereto.

No additional payments will be made for multiple passes with the milling machine to remove the bituminous surface.

No separate payments will be made for cleaning the pavement prior to paving; providing protection and doing handwork removal of bituminous concrete around catch basin inlets, manholes, utility valve boxes and any similar structures; repairing surface defects as a result of the Contractors negligence; providing protection to underground utilities from the vibration of the milling operation; removal of any temporary milled transition; removal and disposal of millings; furnishing a sweeper and sweeping after milling. The costs for these items shall be included in the contract unit price.

Pay Item	Pay Unit
Milling HMA (0" to 4")	Sq. Yd

ITEM #0406999A - ASPHALT ADJUSTMENT COST

The Asphalt Price is available on the Department of Transportation web site at:

<http://www.ct.gov/dot/asphaltadjustment>

The asphalt adjustment cost will be based on the variance in price for the performance-graded binder component of hot mix asphalt (HMA), Polymer Modified Asphalt (PMA), and Ultra-Thin Bonded Hot-Mix Asphalt mixtures completed and accepted in the contract.

An asphalt adjustment cost will be applied only if all of the following conditions are met:

- I. For HMA and PMA mixtures:
 - a. The HMA or PMA mixture in which the adjustment is being applied is listed as a contract item with a pay unit of tons or metric tons.
 - b. The total quantity for all HMA and PMA mixtures in a contract or individual purchase order (Department of Administrative Service contract awards) exceeds 1000 tons or more.
 - c. The difference between the posted *Asphalt Base Price* and *Asphalt Period Price* varies by more than \$5.00.
- II. For Ultra-Thin Bonded HMA mixtures:
 - a. The Ultra-Thin Bonded HMA mixture in which the adjustment is being applied is listed as a contract item.
 - b. The total quantity for Ultra-Thin Bonded HMA mixture in a contract exceeds:
 - i. 800 tons (727 metric tons) if Ultra-Thin Bonded HMA is listed as a contract item with a pay unit of tons or metric tons.
 - ii. 30,000 square yards (25,080 square meters) if Ultra-Thin Bonded HMA is listed as a contract item with a pay unit of square yards or square meters.
Note: The quantity of Ultra-Thin Bonded HMA measured in tons shall be determined from the material documentation requirements set forth in the Ultra-Thin Bonded HMA Special Provision.
 - c. The difference between the posted *Asphalt Base Price* and *Asphalt Period Price* varies by more than \$5.00.
 - d. No Asphalt Adjustment Cost shall be applied to the liquid emulsion that is specified as part of the Ultra-Thin Bonded HMA mixture system.
- III. Regardless of the binder used in all HMA and/or PMA mixtures, the Asphalt Adjustment Cost will be based on PG 64-22.

The Connecticut Department of Transportation (ConnDOT) shall 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 a standard ton (US\$/ST). The metric ton price is determined by applying a factor of 1.1023 (US\$/ST x 1.1023 = US\$/mton). Example: \$150.00/ton x 1.1023 = \$165.34/mton

Formula:
$$\text{HMA} \times \frac{\text{PG}\%}{100} \times [(\text{Period Price} - \text{Base Price})] = \$ \text{ ______ }, \text{ where}$$

- **HMA:**
 1. For HMA, PMA, and Ultra-Thin Bonded HMA mixtures with pay units of mass:
The quantity (tons or metric tons) of accepted HMA, PMA, or Ultra-Thin Bonded HMA mixture measured and accepted for payment.
 2. For Ultra-Thin Bonded HMA mixtures with pay units of area:
The quantity of Ultra-Thin Bonded HMA mixture delivered, placed, and accepted for payment, calculated in tons or metric tons as documented according to the Material Documentation provision (section E) of the Ultra-Thin Bonded HMA Special Provision.
- **Asphalt Base Price:** The asphalt price that is posted on the ConnDOT website 28 days before the actual bid opening posted.
- **Asphalt Period Price:** The asphalt price that is posted on the ConnDOT website for the period in which the HMA, PMA mixture is placed.
- Performance-Graded Binder percentage (**PG%**)
 1. For HMA or PMA mixes:
 - PG% = 4.5
 - For Superpave 1.5 inch (37.5mm), Superpave 1.0 inch (25.0mm), PMA S1, HMA S1, and Class 4
 - PG % = 5.0
 - For Superpave 0.50 inch (12.5mm), HMA S0.5, PMA S0.5, and Class 1
 - PG % = 6.0
 - For Superpave 0.375 inch (9.5mm), HMA S0.375, PMA S0.375, Superpave 0.25 inch (6.25mm), HMA S0.25, PMA S0.25, Superpave #4 (4.75mm) and Class 2
 2. For Ultra-Thin Bonded HMA mixes:
 - PG% = Design % PGB (Performance Graded Binder) in the approved job mix formula, expressed as a percentage to one decimal point (e.g. 5.1%)

The adjustment shall not be considered as a changed condition in the contract because of this provision and because the Contractors are being notified before submission of bids.

Basis of Payment: The "Asphalt Adjustment Cost" will be calculated using the formula

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 payment 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.

<u>Pay Item</u>
Asphalt Adjustment Cost

<u>Pay Unit</u>
EST.

ITEM NO. 0507001A – TYPE “C” CATCH BASIN
ITEM NO. 0507006A – TYPE “C” CATCH BASIN TOP
ITEM NO. 0507021A – TYPE “C” CATCH BASIN DOUBLE GRATE – TYPE I
ITEM NO. 0507201A – TYPE “C-L” CATCH BASIN
ITEM NO. 0507754A – RESET TYPE "C" CATCH BASIN DOUBLE GRATE - TYPE I
ITEM NO. 0507781A – RESET MANHOLE
ITEM NO. 0507831A – CONVERT CATCH BASIN TO MANHOLE
ITEM NO. 0507899A –OFFSET TYPE “C” CATCH BASIN

The work shall conform to Section 5.07 supplemented as follows:

Article 5.07.01 – Description

Add the following:

The work will include temporary shoring needed for excavations adjacent to the existing travel way. Temporary shoring will not be paid for separately but will be included in the cost of the work.

In areas of rock, rock will be removed by mechanical means only; no blasting is permitted unless approved by the Engineer.

In areas where incremental lowering is required to lower the roadway during off peak traffic periods and open the roadway full width during off work periods, resetting catch basins and manholes shall be reset to accommodate the incremental lowering as required so that the difference in the structure rim or grate elevation is no more than 3 inches above or below the roadway grade at the time the roadway is opened to traffic at the end of the work day. Reset catch basin and or manhole regardless of how many times they are needed to be reset shall be measured for payment one time.

Section 5.07.04 – Method of Measurement: is supplemented with the following:

There will be no measurement for resetting the structure to accommodate the incremental lowering for the roadway construction. Reset Catch basin and or Reset Manhole shall be measured one time. Incremental lowering to accommodate traffic and roadway grades shall be considered incidental to the work.

Section 5.07.05 – Basis of Payment: is supplemented with the following:

There will be no separate payment for resetting catch basins and or manholes to accommodate the incremental lowering for the roadway construction. The work, materials and labor are required to reset the structure, no matter how many times a structure requires resetting to accommodate the incremental lowering of the roadway shall be paid one time. Incremental lowering to accommodate traffic and roadway grades shall be considered incidental to the work.

<u>Pay Item</u>	<u>Pay Unit</u>
Type "C" Catch Basin	Each
Type "C" Catch Basin Top	Each
Type "C" Catch Basin Double Grate – Type I	Each
Type "C-L" Catch Basin	Each
Reset Type "C" Catch Basin Double Grate - Type I	Each
Reset Manhole	Each
Convert Catch Basin to Manhole	Each
Offset Type "C" Catch Basin	Each

ITEM #0921001A CONCRETE SIDEWALK
ITEM #0921005A CONCRETE SIDEWALK RAMP
ITEM #0921039A DETECTABLE WARNING STRIP

Delete Section 9.21 in its entirety and replace it with the following:

9.21.01—Description: This item shall consist of concrete sidewalks and ramps constructed on a gravel or reclaimed miscellaneous aggregate base course in the locations and to the dimensions and details shown on the plans or as ordered and in accordance with these specifications. Cutting of existing concrete sidewalk for the installation of new concrete sidewalk or concrete ramps shall be included in the respective items.

9.21.02—Materials: Materials for this work shall conform to the requirements of Article M.03.01 for Class “F” Concrete.

Gravel or reclaimed miscellaneous aggregate for base shall conform to Article M.02.01 for granular fill.

Detectable warning strips shall be a prefabricated detectable warning tile chosen from the Department’s Qualified Products List for retrofit and/or cast in place applications.

Metal Edging shall be placed in areas where the brick border is adjacent to the grass buffer strip. The edging shall be ¼” with a black finish, anchored with 18” landscape spikes.

9.21.03—Construction Methods:

1. Excavation: Excavation, including removal of any existing sidewalk (bituminous or concrete) and curbing, 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.

When connecting new concrete sidewalk to a section of existing concrete sidewalk, the connection point shall be at the nearest joint in the existing sidewalk.

The Contractor shall establish the limits required to achieve grades for each ramp prior to removal of existing sidewalk and ramps. The Contractor shall document and notify the Engineer of any control points that may conflict with the design grades or configuration of ramps shown on the plans. Control points can be but are not limited to ROW, utility poles, drainage structures, buildings, fences, walls or other features found near the proposed ramp. When control points are encountered within the limits of the ramp, the Engineer will determine if an alternative ramp type is required or the ramp is to be constructed as shown on the plans.

2. Gravel or Reclaimed Miscellaneous Aggregate Base: The gravel or reclaimed miscellaneous aggregate base shall be placed in layers not over 6 inches in depth and to such a depth that after compaction it shall be at the specified depth below the finished grade of the walk. The base shall be wetted and rolled or tamped after the spreading of each layer.

3. Forms: Forms shall be of metal or wood, straight, free from warp and of sufficient strength to resist springing from the pressure of the concrete. If made of wood, they shall be of 2-inch surfaced plank except that at sharp curves thinner material may be used. If made of metal, they shall be of an approved section and have a flat surface on the top. Forms shall be of a depth equal to the depth of the sidewalk. Forms shall be securely staked, braced and held firmly to the

required line and grade and shall be sufficiently tight to prevent leakage of mortar. All forms shall be cleaned and oiled or wetted before concrete is placed against them. Sheet metal templates 1/8 inch in thickness, of the full depth and width of the walk, shall be spaced at intervals of 12 feet or as directed. If the concrete is placed in alternate sections, these templates shall remain in place until concrete has been placed on both sides of the template. As soon as the concrete has obtained its initial set, the templates shall be removed.

4. Concrete: The concrete shall be proportioned, mixed, placed, etc., in accordance with the provisions of Section 6.01 for Class “F” Concrete. Concrete shall be cured in accordance with the provisions of Article 4.01.03 for Concrete Pavement.

5. Finishing: The surface of the concrete shall be finished with a wood float or by other approved means. The outside edges of the slab and all joints shall be edged with a 1/4-inch radius edging tool. Each slab shall be divided into two or more sections by forming dummy joints with a jointing tool as directed.

6. Backfilling and Removal of Surplus Material: The sides of the sidewalk shall be backfilled with suitable material thoroughly compacted and finished flush with the top of the sidewalk. All surplus material shall be removed and the site left in a neat and presentable condition to the satisfaction of the Engineer.

7. Detectable Warning Strip: The detectable warning strip for new construction shall be set directly in poured concrete and each tile shall be weighted down to prevent the tile from floating after placement in wet concrete in accordance with curing procedures. Install detectable warning strip, according to the plans and the Manufacturer’s specifications, or as directed by the Engineer.

The detectable warning strip for retrofit construction shall be installed according to the plans in the direction of pedestrian route and contained wholly within painted crosswalk when present. Its installation shall conform to all Manufactures requirements.

9.21.04—Method of Measurement: This work will be measured for payment as follows:

1. Concrete Sidewalk or Sidewalk Ramp: This work will be measured by the actual number of square feet of completed and accepted concrete sidewalk or ramp.

2. Excavation: Excavation below the finished grade of the sidewalk or ramp, backfilling, and disposal of surplus material will not be measured for payment, but the cost shall be included in the price bid for the sidewalk or ramp. Excavation above the finished grade of the sidewalk or ramp will be measured and paid for in accordance with Section 2.02

3. Gravel or Reclaimed Miscellaneous Aggregate Base: This work will not be measured for payment, but the cost shall be considered as included in the price bid for the sidewalk or ramp.

4. Detectable Warning Strip: For new construction (cast in place), the detectable warning strip will be measured for payment by the actual number of each ramp where a detectable warning strip has been installed and accepted regardless of the number of tiles installed.

5. Retrofit Detectable Warning Strip: For retrofit construction (surface applied), the detectable warning strip will be measured for payment by the actual number of each ramp where a detectable warning strip has been installed and accepted regardless of the number of tiles installed.

6. Construction Staking: The establishment of control points and limits of grading will be measured in accordance with the item Construction Staking.

7. Cut Concrete Sidewalk: This work shall not be measured but shall be included in the

measurement for concrete sidewalk or concrete ramp.

9.21.05—Basis of Payment: Construction of a concrete sidewalk or ramp will be paid for at the contract unit price per square foot for "Concrete Sidewalk," or "Concrete Sidewalk Ramp" complete in place, which price shall include all excavation as specified above, backfill, disposal of surplus material, curb removal and any monolithic or separately cast sidewalk curb when required for the sidewalk ramp as shown on the plans, gravel or reclaimed miscellaneous aggregate base, equipment, tools, materials and labor incidental thereto.

Cut Concrete Sidewalk shall not be paid separately but shall be paid in the item - concrete sidewalk or concrete ramp.

A new detectable warning strip will be paid for at the contract unit price for each ramp where the detectable warning strip has been installed complete in place. This price shall include all tiles, materials, equipment, tools and labor incidental thereto.

Retrofitting the existing concrete sidewalk with a detectable warning strip will be paid for at the contract unit price for each ramp where the retrofit detectable warning strip has been installed complete in place. This price will include all tiles, saw cutting concrete, adhesive, drilling holes for fasteners, materials, equipment, tools and labor incidental there to.

The establishment of control points and limits of grading will be paid for in accordance with the item Construction Staking.

<u>Pay Item</u>	<u>Pay Unit</u>
Concrete Sidewalk	SF
Concrete Sidewalk Ramp	SF
Detectable Warning Strip	Each

ITEM #0921013A – CONCRETE DRIVEWAY APRON

Work under this item shall conform to the requirements of Section 9.24, amended as follows:

Article 9.24.04 – Method of Measurement

This item shall consist of all work associated with furnishing and installing concrete driveway apron in accordance with these specifications, as detailed on the plans or as directed by the Engineer. This shall include all materials, labor, saw cutting, excavation, base preparation and installation to the lines and grades shown on the plans including any incidentals thereto.

Measurement for this item will be based on the number of square feet of Concrete Driveway Apron that is completed and accepted.

Article 9.24.05 – Basis of Payment

Payment for this item will be based on the unit price per Square Foot of Concrete Driveway Apron constructed and accepted, including all labor, materials, tools, and equipment necessary to complete the work as specified.

PAY ITEM

Concrete Driveway Apron

PAY UNIT

S.F.

ITEM #0921031A - DECORATIVE CONCRETE CROSSWALK (HERRINGBONE PATTERN)

Description:

This item shall consist of all work associated with furnishing and installing concrete stamped crosswalks in accordance with these specifications, as detailed on the plans or as directed by the Engineer. This shall include all materials, labor, saw cutting, excavation, base preparation and installation to the lines and grades shown on the plans including any incidentals thereto.

Materials:

Concrete finish to be an Increte Systems stamped concrete decorative finish or an approved equal. The pattern and layout to be installed shall be HERRINGBONE as is shown on the project plans and located at the mid-block crossing on Whisconier Road (Route 25). The color used shall match the red brick pavers to be used for the edging on the concrete sidewalk as shown on the plans. The decorative concrete crosswalk color hardeners on the crosswalk surface shall be used as part of the installation. All materials used shall meet the applicable manufacturer's specifications and recommendations for an installation of this type. All pertinent manufacturer's information for decorative concrete systems shall be submitted to the Town for approval. This includes: engineering calculations, colors, patterns and locations of similar installations with names and phone numbers.

For Increte Systems product information, call:

INCRETE SYSTEMS
8509 Sunstate Street
P.O. Box 151103
Tampa, Florida 33634
(800) 752-4626

Welded steel fabric shall conform to the requirements of Article M.06.01 of Form 816.

Concrete shall meet the requirements for Class "A" concrete of Section M.03 of Form 816 and shall be "High Early Concrete".

Joint seal shall meet the requirements of Article M.03.01 (8)(a.) of Form 816.

Expansion joint material shall be Korkpak, or approved equivalent.

Construction Methods:

The work shall comply with Section 9.21 of Form 816 supplemented as follows.

1. Unless otherwise approved by the Engineer, the crosswalks shall be constructed after

completing paving of adjacent roadway bituminous concrete finish course. Only half of the length of the crosswalk may be constructed at one time to allow vehicular access for the roadway utilizing one way alternating traffic during off peak periods. Steel plates with bituminous concrete shims may be used to allow vehicular access after the crosswalk is poured but not suitable to support vehicular traffic. The roadway shall be opened to two way traffic during peak traffic periods in accordance with Section 1.08.

2. Excavation, forms, concrete finishing, backfilling and removal of surplus materials shall meet the requirements of Technical Specifications sections 105 and 265.

3. Work associated with the installation of the decorative concrete crosswalk shall be performed by a trained and certified contractor for the product used. All work shall meet the manufacturers specifications and recommendations for an installation of this type.

4. Reinforcing shall be installed free from dirt, oil, paint, grease, mill scale and loose or thick rust which could impair the bond of steel with the concrete.

275.4 MEASUREMENT

Measurement for this item will be based on the number of square feet of Decorative Concrete Crosswalk (Herringbone Pattern) that is completed and accepted.

275.5 PAYMENT

Payment for this item will be based on the unit price per Square Foot of Decorative Concrete Crosswalk (Herringbone Pattern) constructed and accepted, including all labor, materials, tools, and equipment necessary to complete the work as specified.

PAY ITEM

PAY UNIT

Decorative Concrete Crosswalk (Herringbone Pattern)

S.F.

ITEM NO. 0921102A – BRICK PAVERS

Description:

This item shall consist of furnishing and installing brick pavers on a processed aggregate base to the dimensions and details as shown on the plans and in accordance with these specifications.

Materials:

Material for this work shall conform to the following requirements:

Processed Aggregate Base: Materials for this surface shall conform to the requirements of Subarticles M.05.01-1, M.05.01-2, and M.05.01-3.

Brick Pavers: Brick pavers shall meet the following Standards for Pedestrian traffic - ASTM C 902, Application PS, Property Requirements C 902 Class SX and Dimensional Tolerance Requirements for 3-5 inches PS. The Contractor shall provide samples of the brick for approval by the Engineer.

Construction Methods:

The Contractor shall receive approval on the brick paver prior to the installation. The pavers will be free from excessive chips, cracks, voids, discoloration or other defects that might be visible or cause staining in finished work. The brick pavers will be mixed from several pallets or cubes, as they are placed, to produce uniform blend of colors and textures. The brick pavers will be cut with motor-driven masonry saw equipment to provide clean, sharp, un-chipped edges. Cut units to provide pattern indicated and to fit adjoining work neatly. Use full units without cutting where possible. Hammer cutting is not acceptable

1 – Excavation: Excavation shall be made to required depths below finish grade, as shown necessary to achieve the desire surface drainage for the finish surface. The Contractor shall be careful of the adjacent concrete sidewalks, building and bituminous concrete driveway and curbing. Any damage caused to the surrounding features will be replaced at the Contractor's expense.

2 – Base Course: The Processed Aggregate Base for the base course shall be uniformly spread upon the compacted subgrade to the require depth and thoroughly compacted.

3 – Brick Pavers: The brick pavers shall be set to the line and grade to achieve the desired finished surface drainage using the running bond pattern. The brick pavers shall be installed hand tight with a maximum joint not to exceed 1/8". After the brick pavers have been completely laid, sweep joint sand into the joints until full. Lightly fog with water and continue to fill with sand until no further settlement occurs. Paver edge restraints shall be installed around the entire perimeter that is not restrained by the concrete sidewalk. Place the edge restraint on

the base material and spike through pre-drilled holes into the compacted base material using 10” x 3/8” diameter steel spikes as per the manufacturer’s recommendations. Upon completion, the surface shall be swept clean.

Method of Measurement

1 – Brick Pavers: This work will be measured by the actual numbers of square yards of brick pavers completed and accepted.

2 – Excavation: All excavation required for the installation of the brick pavers to the lines and grades directed by the plans or as directed by the Engineer, will not be measured for payment. The disposal of surplus material will not be measured for payment, but the cost shall be included in the price bid for the brick pavers.

3 – Processed Aggregate Base: This work will not be measured for payment but the cost thereof shall be included in the price bid for the brick pavers.

Basis of Payment:

This work will be paid for at the contract unit price per square yard for “Brick Pavers” complete in place, which price shall include all excavation as specified above, backfill, disposal of surplus material, processed aggregate base, edge restraints, and all equipment, tools, labor and materials incidental thereto.

Pay Item

Brick Pavers

Pay Unit

SY

ITEM #0922250A – BITUMINOUS CONCRETE BIKEWAY

Work under this item shall conform to the requirements of Section 9.22, amended as follows:

Article 9.22.01 – Description

This item shall consist of all work associated with furnishing and installing Bituminous Concrete Bikeway in accordance with the specifications, as detailed on the plans or as directed by the Engineer. This shall include all materials, labor, saw cutting, excavation, base preparation and installation to the lines and grades shown on the plans including any incidentals thereto.

Article 9.22.04 – Method of Measurement

Measurement for this item will be based on the number of square yard of Bituminous Concrete Bikeway that is completed and accepted.

Article 9.24.05 – Basis of Payment

Payment for this item will be based on the unit price per Square Yard of Bituminous Concrete Bikeway constructed and accepted, including all labor, materials, tools, and equipment necessary to complete the work as specified.

PAY ITEM

Bituminous Concrete Bikeway

PAY UNIT

SY

ITEM #0944000A – FURNISHING AND PLACING TOPSOIL

Work under this item shall conform to the requirements of Section 9.44, amended as follows:

Article 9.44.02 - Materials

Add the following at the end of the sentence:

“except that the topsoil shall contain no rocks or stones over 1/2 inch in diameter.”

Pay Item

Furnishing and Placing Topsoil

Pay Unit

SY

ITEM #0950005A - TURF ESTABLISHMENT

Work under this item shall conform to the requirements of Section 9.50, amended as follows:

Article 9.50.03 – Construction Methods

4. Compaction - *Replace the first two words in the section with the following:*

"Following seeding, the entire area shall be rolled with a 100 pound manual landscape roller. Otherwise the Contractor".

M.13.04 - Seed Mixtures

Delete subsection (a) and replace with:

(a) The grass seed mixture shall conform to the

following: Trifecta Perennial Ryegrass Blend

Pure Seed:

40% Charismatic Perennial Ryegrass

30% Exacta Perennial Ryegrass

30% Affirmed Perennial Ryegrass

Under no circumstances should annual Ryegrass, Italian Rye or any other seed be added to the seed mixture.

Pay Item

Turf Establishment

Pay Unit

SY

ITEM 0970006A – TRAFFIC PERSON (MUNICIPAL POLICE OFFICER)
ITEM 0970007A – TRAFFIC PERSON (UNIFORMED FLAGGER)

9.70.01—Description: Under this item the Contractor shall provide the services of Trafficpersons of the type and number, and for such periods, as the Engineer approves for the control and direction of vehicular traffic and pedestrians. Traffic persons requested solely for the contractor's operational needs will not be approved for payment.

9.70.03—Construction Method: Prior to the start of operations on the project requiring the use of Trafficpersons, a meeting will be held with the Contractor, Trafficperson agency or firm, Engineer, and State Police, if applicable, to review the Trafficperson operations, lines of responsibility, and operating guidelines which will be used on the project. A copy of the municipality's billing rates for Municipal Police Officers and vehicles, if applicable, will be provided to the Engineer prior to start of work.

On a weekly basis, the Contractor shall inform the Engineer of their scheduled operations for the following week and the number of Trafficpersons requested. The Engineer shall review this schedule and approve the type and number of Trafficpersons required. In the event of an unplanned, emergency, or short term operation, the Engineer may approve the temporary use of properly clothed persons for traffic control until such time as an authorized Trafficperson may be obtained. In no case shall this temporary use exceed 8 hours for any particular operation.

If the Contractor changes or cancels any scheduled operations without prior notice of same as required by the agency providing the Trafficpersons, and such that Trafficperson services are no longer required, the Contractor will be responsible for payment at no cost to the Department of any show-up cost for any Trafficperson not used because of the change. Exceptions, as approved by the Engineer, may be granted for adverse weather conditions and unforeseeable causes beyond the control and without the fault or negligence of the Contractor.

Trafficpersons assigned to a work site are to only take direction from the Engineer.

Trafficpersons shall wear a high visibility safety garment that complies with OSHA, MUTCD, ASTM Standards and the safety garment shall have the words "Traffic Control" clearly visible on the front and rear panels (minimum letter size 2 inches (50 millimeters)). Worn/faded safety garments that are no longer highly visible shall not be used. The Engineer shall direct the replacement of any worn/faded garment at no cost to the State.

A Trafficperson shall assist in implementing the traffic control specified in the Maintenance and Protection of Traffic contained elsewhere in these specifications or as directed by the Engineer. Any situation requiring a Trafficperson to operate in a manner contrary to the Maintenance and Protection of Traffic specification shall be authorized in writing by the Engineer.

Trafficpersons shall consist of the following types:

1. Uniformed Law Enforcement Personnel: Law enforcement personnel shall wear the high visibility safety garment provided by their law enforcement agency. If no high visibility safety garment is provided, the Contractor shall provide the law enforcement personnel with a garment meeting the requirements stated for the Uniformed Flaggers' garment.

Law Enforcement Personnel may be also be used to conduct motor vehicle enforcement operations in and around work areas as directed and approved by the Engineer.

Municipal Police Officers: Uniformed Municipal Police Officers shall be sworn Municipal Police Officers or Uniformed Constables who perform criminal law enforcement duties from the Municipality in which the project is located. Their services will also include an official Municipal Police vehicle when requested by the Engineer. Uniformed Municipal Police Officers will be used on non-limited access highways. If Uniformed Municipal Police Officers are unavailable, other Trafficpersons may be used when authorized in writing by the Engineer. Uniformed Municipal Police Officers and requested Municipal Police vehicles will be used at such locations and for such periods as the Engineer deems necessary to control traffic operations and promote increased safety to motorists through the construction sites.

2. Uniformed Flagger: Uniformed Flaggers shall be persons who have successfully completed flagger training by the American Traffic Safety Services Association (ATSSA), National Safety Council (NSC) or other programs approved by the Engineer. A copy of the Flagger's training certificate shall be provided to the Engineer before the Flagger performs any work on the project. Uniformed Flaggers shall conform to Chapter 6E, Flagger Control, in the Manual of Uniformed Traffic Control Devices (MUTCD) and shall wear high-visibility safety apparel, use a STOP/SLOW paddle that is at least 18 inches (450 millimeters) in width with letters at least 6 inches (150 millimeters) high. The paddle shall be mounted on a pole of sufficient length to be 6 feet (1.8 meters) above the ground as measured from the bottom of the sign.

Uniformed Flaggers will only be used on non-limited access highways to control traffic operations when authorized in writing by the Engineer.

9.70.04—Method of Measurement: Services of Trafficpersons will be measured for payment by the actual number of hours for each person rendering services approved by the Engineer. These services shall include, however, only such trafficpersons as are employed within the limits of construction, project right of way of the project or along detours authorized by the Engineer to assist the motoring public through the construction work zone. Services for continued use of a detour or bypass beyond the limitations approved by the Engineer, for movement of construction vehicles and equipment, or at locations where traffic is unnecessarily restricted by the Contractor's method of operation, will not be measured for payment.

Trafficpersons shall not work more than twelve hours in any one 24 hour period. In case such services are required for more than twelve hours, additional Trafficpersons shall be furnished and measured for payment. In cases where the Trafficperson is an employee on the Contractor's payroll, payment under the item "Trafficperson (Uniformed Flagger)" will be made only for those hours when the Contractor's employee is performing Trafficperson services.

Travel time will not be measured for payment for services provided by Uniformed Municipal Police Officers or Uniformed Flaggers.

Mileage fees associated with Trafficperson services will not be measured for payment.

Safety garments and STOP/SLOW paddles will not be measured for payment.

9.70.05—Basis of Payment: Trafficpersons will be paid in accordance with the schedule described herein.

There will be no direct payment for safety garments or STOP/SLOW paddles. All costs associated with furnishing safety garments and STOP/SLOW paddles shall be considered included in the general cost of the item.

1. Uniformed Law Enforcement Personnel: The sum of money shown on the Estimate and in the itemized proposal as "Estimated Cost" for this work will be considered the bid price even though payment will be made as described below. 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 for the contract.

The Department will pay the Contractor its actual costs for "Trafficperson (Municipal Police Officer)" plus an additional 5% as reimbursement for the Contractor's administrative expense in connection with the services provided.

The invoice must include a breakdown of each officer's actual hours of work and actual rate applied. Mileage fees associated with Trafficperson services are not reimbursable expenses and are not to be included in the billing invoice. The use of a municipal police vehicle authorized by the Engineer will be paid at the actual rate charged by the municipality. Upon receipt of the invoice from the municipality, the Contractor shall forward a copy to the Engineer. The invoice will be reviewed and approved by the Engineer prior to any payments. *Eighty (80%) of the invoice will be paid upon completion of review and approval. The balance (20%) will be paid upon receipt of cancelled check or receipted invoice, as proof of payment.* The rate charged by the municipality for use of a uniformed municipal police officer and/or a municipal police vehicle shall not be greater than the rate it normally charges others for similar services.

2. Uniformed Flagger: Uniformed flaggers will be paid for at the contract unit price per hour for "Trafficperson (Uniformed Flagger)", which price shall include all compensation, insurance benefits and any other cost or liability incidental to the furnishing of the trafficpersons ordered.

Pay Item	Pay Unit
Trafficperson (Municipal Police Officer)	est.
Trafficperson (Uniformed Flagger)	Hr.

ITEM #0971001A – MAINTENANCE AND PROTECTION OF TRAFFIC

Work under this item shall conform to the requirements of Section 9.71, supplemented and amended as follows:

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 "Prosecution and Progress":

All Project Roadways

The Contractor shall maintain and protect existing traffic operations.

Except therefrom will be periods, during the allowable periods, when the Contractor is actively working, at which time the Contractor will be allowed to maintain and protect at least one lane of through traffic in each direction, each lane on a paved travel path not less than 11 feet in width.

Excepted therefrom will be those periods, during the allowable periods, when the Contractor is actively working, at which time the Contractor will be allowed to maintain and protect at least an alternating one-way traffic operation on a paved travel path not less than 12 feet in width. The length of the alternating one-way traffic operation shall not exceed 300 feet.

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 allowed to close said driveways to perform the required work during those periods when the businesses are closed, unless permission is granted from the business owner to close the driveway during business hours. If a temporary closure of a residential driveway is necessary, the Contractor shall coordinate with the owner to determine the time period of the closure.

Article 9.71.03 - Construction Method is supplemented as follows:

General

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

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 section by the end of a workday (work night), 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 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 workday, if the vertical drop-off exceeds 3 inches, the Contractor shall provide a temporary traversable slope of 4:1 or flatter that is acceptable to the Engineer.

The Contractor, during the course of active construction work on overhead signs and structures, 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.

If applicable, when an existing sign is removed, it shall be either relocated or replaced by a new sign during the same working day.

The Contractor shall not store any material on-site which would present a safety hazard to motorists or pedestrians (e.g. fixed object or obstruct sight lines).

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

Construction vehicles entering travel lanes at speeds less than the posted speed are interfering with traffic, and 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 posted speeds, in order to merge with existing traffic.

Existing Signing

The Contractor shall maintain all existing overhead and side-mounted signs throughout the project limits during the duration of the project. The Contractor shall temporarily relocate signs and sign supports as many times as deemed necessary, and install temporary sign supports if necessary and as directed by the Engineer.

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

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

Interim Pavement Markings

The Contractor shall install painted pavement markings, which shall include centerlines, shoulder edge lines, lane lines (broken lines), 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 day/night. If the next course of bituminous concrete pavement will be placed within seven days, shoulder edge lines are not required. The painted pavement markings will be paid under the appropriate items.

If the Contractor will install another course of bituminous concrete pavement within 24 hours, the Contractor may install Temporary Plastic Pavement Marking Tape in place of the painted pavement markings by the end of the work day/night. These temporary pavement markings shall include centerlines, lane lines (broken lines) and stop bars; shoulder edge lines are not required. Centerlines shall consist of two 4 inch wide yellow markings, 2 feet in length, side by side, 4 to 6 inches apart, at 40-foot intervals. No passing zones should be posted with signs in those areas where the final centerlines have not been established on two-way roadways. Stop bars may consist of two 6 inch wide white markings or three 4 inch wide white markings placed side by side. The Contractor shall remove and dispose of the Temporary Plastic Pavement Marking Tape when another course of bituminous concrete pavement is installed. The cost of furnishing, installing and removing the Temporary Plastic Pavement Marking Tape shall be at the Contractor's expense.

If an intermediate course of bituminous concrete pavement will be exposed throughout the winter, then Epoxy Resin Pavement Markings should be installed unless directed otherwise by the Engineer.

Final Pavement Markings

The Contractor should install painted pavement markings on the final course of bituminous concrete pavement by the end of the work day/night. If the painted pavement markings are not installed by the end of the work day/night, then Temporary Plastic Pavement Marking Tape shall be installed as described above and the painted pavement markings shall be installed by the end of the work day/night on Friday of that week.

If Temporary Plastic Pavement Marking Tape is installed, the Contractor shall remove and dispose of these markings when the painted pavement markings are installed. The cost of furnishing, installing and removing the Temporary Plastic Pavement Marking Tape shall be at the Contractor's expense.

The Contractor shall install permanent Epoxy Resin Pavement Markings in accordance with Section 12.10 entitled "Epoxy Resin Pavement Markings, Symbols, and Legends" after such time as determined by the Engineer.

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 the safe and 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. 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 so as to command respect from the motorist.

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.

If a lane reduction taper is required to shift traffic, the entire length of the taper should be installed on a tangent section of roadway so that the entire taper area can be seen by the motorist.

Any existing signs that are in conflict with the traffic control patterns shall be removed, covered, or turned so that they are not readable by oncoming traffic.

When installing a traffic control pattern, a Buffer Area should be provided and this area shall be free of equipment, workers, materials and parked vehicles.

Typical traffic control plans 19 through 25 may be used for moving operations such as line striping, pot hole patching, mowing, or sweeping when it is necessary for equipment to occupy a travel lane.

Traffic control patterns will not be required when vehicles are on an emergency patrol type activity or when a short duration stop is made and the equipment can be contained within the shoulder. Flashing lights and appropriate trafficperson shall be used when required.

Although each situation must be dealt with individually, conformity with the typical traffic control plans contained herein is required. In a situation not adequately covered by the typical traffic control plans, the Contractor must contact the Engineer for assistance prior to setting up a traffic control pattern.

PLACEMENT OF SIGNS

Signs must be placed in such a position to allow 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 TRAFFIC CONTROL PLANS

The 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 whenever possible.

The proper application of the traffic control plans and installation of traffic control devices depends on actual field conditions.

Adjustments to the traffic control plans shall be made only at the direction of the Engineer to improve the visibility of the signs and devices and to better control traffic operations. Adjustments to the traffic control plans shall be based on safety of work forces and motorists, abutting property requirements, driveways, side roads, and the vertical and horizontal curvature of the roadway.

The Engineer may require that the traffic control pattern be located significantly in advance of the work area to provide better sight line to the signing and safer traffic operations through the work zone.

Table I indicates the minimum taper length required for a lane closure based on the posted speed limit of the roadway. These taper lengths shall only be used when the recommended taper lengths shown on the traffic control plans cannot be achieved.

TABLE I – MINIMUM TAPER LENGTHS

POSTED SPEED LIMIT MILES PER HOUR	MINIMUM TAPER LENGTH IN FEET FOR A SINGLE LANE CLOSURE
30 OR LESS	180
35	250
40	320
45	540
50	600
55	660
65	780

SECTION 1. WORK ZONE SAFETY MEETINGS

- 1.a) Prior to the commencement of work, a work zone safety meeting will be conducted with representatives of Town, 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. 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 Town and the Town's Inspector. The agenda should include:

- Review Project scope of work and time
- Review Section 1.08, Prosecution and Progress
- Review Section 9.70, Trafficpersons
- Review Section 9.71, Maintenance and Protection of Traffic
- Review Contractor's schedule and method of operations
- Review areas of special concern: ramps, turning roadways, medians, lane drops, etc.
- Open discussion of work zone questions and issues
- Discussion of review and approval process for changes in contract requirements as they relate to work zone areas

SECTION 2. GENERAL

2.a) If the required minimum number of signs and equipment (i.e. one High Mounted Internally Illuminated Flashing Arrow for each lane closed, two TMAs, Changeable Message Sign, etc.) are not available; the traffic control pattern shall not be installed.

2.b) The Contractor shall have back-up equipment (TMAs, High Mounted Internally Illuminated Flashing Arrow, Changeable Message Sign, construction signs, cones/drums, etc.) available at all times in case of mechanical failures, etc. The only exception to this is in the case of sudden equipment breakdowns in which the pattern may be installed but the Contractor must provide replacement equipment 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 loss time.

2.d) In cases of legitimate differences of opinion between the Contractor and the Inspection staff, the Inspection staff shall err on the side of safety. 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.

SECTION 3. INSTALLING AND REMOVING TRAFFIC CONTROL PATTERNS

3.a) Lane Closures shall be installed beginning with the advanced warning signs and proceeding forward toward the work area.

3.b) Lane Closures shall be removed in the reverse order, beginning at the work area, or end of the traffic control pattern, and proceeding back toward the advanced warning signs.

3.c) Stopping traffic may be allowed:

- As per the contract for such activities as blasting, steel erection, etc.
 - During paving, milling operations, etc. 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 and traffic should not travel across the longitudinal joint or difference in roadway elevation.
 - To move slow moving equipment across live traffic lanes into the work area.
- 3.d) Under certain situations when the safety of the traveling public and/or that of the workers may be compromised due to conditions such as traffic volume, speed, roadside obstructions, or sight line deficiencies, as determined by the Engineer and/or the Town, traffic may be briefly impeded while installing and/or removing the advanced warning signs and the first ten traffic cones/drums only. Appropriate measures shall be taken to safely slow traffic. If required, traffic slowing techniques may be used and shall include the use of Truck Mounted Impact Attenuators (TMAs) as appropriate, for a minimum of one mile in advance of the pattern starting point. Once the advanced warning signs and the first ten traffic cones/drums are installed/removed, the TMAs and sign crew shall continue to install/remove the pattern as described in Section 4c and traffic shall be allowed to resume their normal travel.
- 3.e) The Contractor must adhere to using the proper signs, placing the signs correctly, and ensuring the proper spacing of signs.
- 3.f) 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/exiting with/from the main line traffic. This shall be completed before installing the mainline pattern past the ramp or intersecting roadway.
- 3.g) Prior to installing a pattern, any conflicting existing signs shall be covered with an opaque material. Once the pattern is removed, the existing signs shall be uncovered.
- 3.h) On limited access roadways, workers are prohibited from crossing the travel lanes 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.

SECTION 4. USE OF HIGH MOUNTED INTERNALLY ILLUMINATED FLASHING ARROW

- 4.a) On limited access roadways, one Flashing Arrow shall be used for each lane that is closed. The Flashing Arrow shall be installed concurrently with the installation of the traffic control pattern and its placement shall be as shown on the traffic control plan. For multiple lane closures, one Flashing Arrow is required for each lane closed. If conditions warrant, additional Flashing Arrows should be employed (i.e.: curves, major ramps, etc.).

4.b) On non-limited access roadways, the use of a Flashing Arrow for lane closures is optional. The roadway geometry, sight line distance, and traffic volume should be considered in the decision to use the Flashing Arrow.

4.c) The Flashing Arrow shall not be used on two lane, two-way roadways for temporary alternating one-way traffic operations.

4.d) The Flashing Arrow board display shall be in the “arrow” mode for lane closure tapers and in the “caution” mode (four corners) for shoulder work, blocking the shoulder, or roadside work near the shoulder. The Flashing Arrow shall be in the “caution” mode when it is positioned in the closed lane.

4.e) The Flashing Arrow shall not be used on a multi-lane roadway to laterally shift all lanes of traffic, because unnecessary lane changing may result.

SECTION 5. USE OF TRUCK MOUNTED IMPACT ATTENUATOR VEHICLES (TMAs)

5.a) For lane closures on limited access roadways, a minimum of two TMAs shall be used to install and remove traffic control patterns. If two TMAs are not available, the pattern shall not be installed.

5.b) On non-limited access roadways, the use of TMAs to install and remove patterns closing a lane(s) is optional. The roadway geometry, sight line distance, and traffic volume should be considered in the decision to utilize the TMAs.

5.c) Generally, to establish the advance and transition signing, one TMA shall be placed on the shoulder and the second TMA shall be approximately 1,000 feet ahead blocking the lane. The flashing arrow board mounted on the TMA should be in the “flashing arrow” mode when taking the lane. The sign truck and workers should be immediately 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 Changeable Message Signs, signs, Flashing Arrows, and cones/drums are installed. The flashing arrow board mounted on the TMA should be in the “caution” mode when traveling in the closed lane.

5.d) A TMA shall be placed prior to the first work area in the pattern. If there are multiple work areas within the same pattern, then additional TMAs shall be positioned at each additional work area as needed. The flashing arrow board mounted on the TMA should be in the “caution” mode when in the closed lane.

5.e) TMAs shall be positioned a sufficient distance prior to the workers or equipment being protected to allow for appropriate vehicle roll-ahead in the event that the TMA is hit, but not so far that an errant vehicle could travel around the TMA and into the work area. For additional placement and use details, refer to the specification entitled “Type ‘D’ Portable Impact Attenuation System”. 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) should be placed at the beginning of the work area and

shall be advanced as the paving or concrete operations proceed.

5.f) TMAs should be paid in accordance with how the unit is utilized. When it is used as a TMA and is in the proper location as specified, and then it should be paid at the specified hourly rate for “Type ‘D’ Portable Impact Attenuation System”. When the TMA is used as a Flashing Arrow, it should be paid at the daily rate for “High Mounted Internally Illuminated Flashing Arrow”. If a TMA is used to install and remove a pattern and then is used as a Flashing Arrow, the unit should be paid as a “Type ‘D’ Portable Impact Attenuation System” for the hours used to install and remove the pattern, typically 2 hours (1 hour to install and 1 hour to remove), and is also paid for the day as a “High Mounted Internally Illuminated Flashing Arrow”.

SECTION 6. USE OF TRAFFIC DRUMS AND TRAFFIC CONES

6.a) Traffic drums shall be used for taper channelization on limited-access roadways, ramps, and turning roadways and to delineate raised catch basins and other hazards.

6.b) 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.

6.c) Traffic Cones less than 42 inches in height shall not be used on limited-access roadways or on non-limited access roadways with a posted speed limit of 45 mph and above.

6.d) Typical spacing of traffic drums and/or cones shown on the Traffic Control Plans in the Contract are maximum spacings and may be reduced to meet actual field conditions as required.

SECTION 7. USE OF (REMOTE CONTROLLED) CHANGEABLE MESSAGE SIGNS (CMS)

7.a) For lane closures on limited access roadways, one CMS shall be used in advance of the traffic control pattern. Prior to installing the pattern, the CMS shall be installed and in operation, displaying the appropriate lane closure information (i.e.: Left Lane Closed - Merge Right). The CMS shall be positioned ½ - 1 mile ahead of the lane closure taper. If the nearest Exit ramp is greater than the specified ½ - 1 mile distance, than an additional CMS shall be positioned a sufficient distance ahead of the Exit ramp to alert motorists to the work and therefore offer them an opportunity to take the exit.

7.b) CMS should not be installed within 1000 feet of an existing CMS.

7.c) On non-limited access roadways, the use of CMS for lane closures is optional. The roadway geometry, sight line distance, and traffic volume should be considered in the decision to use the CMS.

7.d) The advance CMS is typically placed off the right shoulder, 5 feet from the

edge of pavement. In areas where the CMS cannot be placed beyond the edge of pavement, it may be placed on the paved shoulder with a minimum of five (5) traffic drums placed in a taper in front of it to delineate its position. The advance CMS shall be adequately protected if it is used for a continuous duration of 36 hours or more.

7.e) When the CMS are no longer required, they should be removed from the clear zone and have the display screen cleared and turned 90 degrees away from the roadway.

7.f) The CMS generally should not be used for generic messages (ex: Road Work Ahead, Bump Ahead, Gravel Road, etc.).

7.g) The CMS should be used for specific situations that need to command the motorist's attention which cannot be conveyed with standard construction signs (Examples include: Exit 34 Closed Sat/Sun - Use Exit 35, All Lanes Closed - Use Shoulder, Workers on Road - Slow Down).

7.h) Messages that need to be displayed for long periods of time, such as during stage construction, should be displayed with construction signs.

7.i) The messages that are allowed on the CMS are as follows:

<u>Message No.</u>	<u>Frame 1</u>	<u>Frame 2</u>	<u>Message No.</u>	<u>Frame 1</u>	<u>Frame 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	WORKERS ON ROAD	REDUCE SPEED
4	2 LEFT LANES CLOSED	REDUCE SPEED	12	WORKERS ON ROAD	SLOW DOWN
5	RIGHT LANE CLOSED	MERGE LEFT	13	EXIT XX CLOSED	USE EXIT YY
6	2 RIGHT LANES CLOSED	MERGE LEFT	14	EXIT XX CLOSED USE YY	FOLLOW DETOUR
7	RIGHT LANE CLOSED	REDUCE SPEED	15	2 LANES SHIFT AHEAD	USE CAUTION
8	2 RIGHT LANES CLOSED	REDUCE SPEED	16	3 LANES SHIFT AHEAD	USE CAUTION

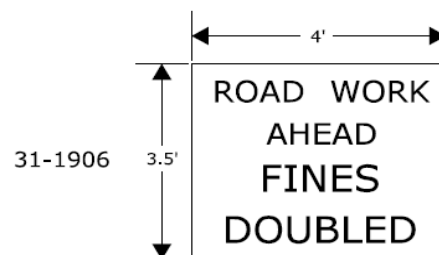
For any other message(s), approval must be received from the Office of Construction prior to their use. No more than two (2) displays shall be used within any message cycle.

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 IN CONNECTICUT WHERE THERE ARE WORKERS ON THE HIGHWAY OR WHEN THERE IS OTHER THAN EXISTING TRAFFIC OPERATIONS.

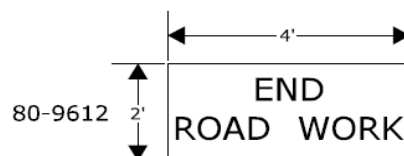
THE "ROAD WORK AHEAD FINES DOUBLED" REGULATORY SIGN SHALL NOT BE INSTALLED ON TOWN ROADS.

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



"END ROAD WORK" SIGN

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



SCALE: NONE

CONSTRUCTION TRAFFIC CONTROL PLAN

REQUIRED SIGNS

CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION

APPROVED

Charles S. Harrow
PRINCIPAL ENGINEER

Digitally signed by Charles S. Harrow
Date: 2012.11.20 13:02:37-05'00'

ITEM#0971001A

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 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. IF THIS PLAN REMAINS IN CONTINUOUS OPERATION FOR MORE THAN 36 HOURS, THEN TRAFFIC DRUMS SHALL BE USED IN PLACE OF TRAFFIC CONES.
5. ANY LEGAL SPEED LIMIT 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 36 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 < 40 MPH).
8. IF THIS PLAN IS TO REMAIN IN OPERATION DURING THE HOURS OF DARKNESS, INSTALL BARRICADE WARNING LIGHTS - HIGH INTENSITY ON ALL POST-MOUNTED DIAMOND SIGNS IN THE ADVANCE WARNING AREA.
9. A CHANGEABLE MESSAGE SIGN SHALL BE INSTALLED ONE HALF 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' (55m)
35	250' (75m)
40	320' (100m)
45	540' (165m)
50	600' (180m)
55	660' (200m)
65	780' (240m)

METRIC CONVERSION CHART (1" = 25mm)

ENGLISH	METRIC	ENGLISH	METRIC	ENGLISH	METRIC
12"	300mm	42"	1050mm	72"	1800mm
18"	450mm	48"	1200mm	78"	1950mm
24"	600mm	54"	1350mm	84"	2100mm
30"	750mm	60"	1500mm	90"	2250mm
36"	900mm	66"	1650mm	96"	2400mm



SCALE: NONE

CONSTRUCTION TRAFFIC CONTROL PLAN

NOTES

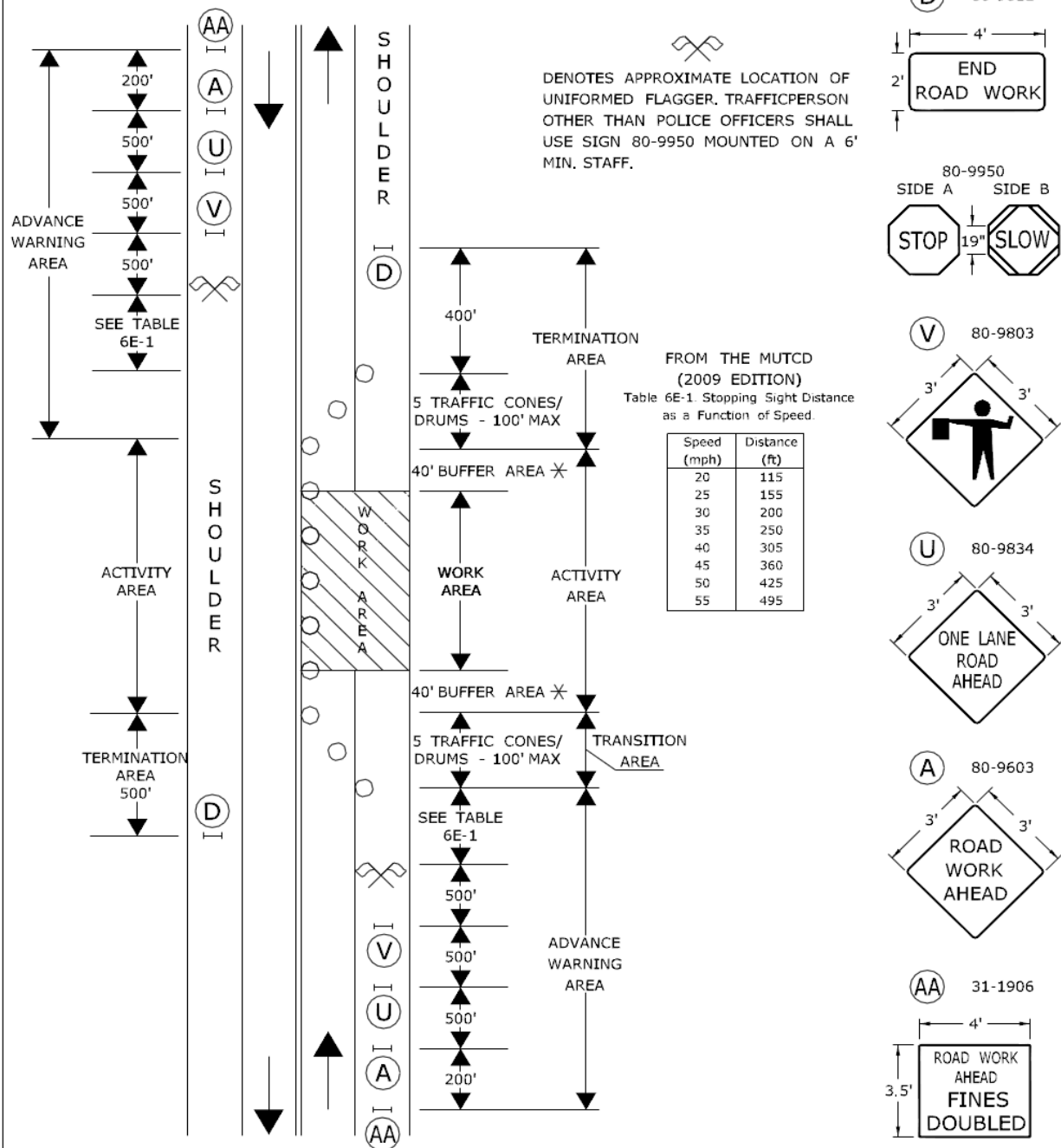
CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION

APPROVED

Charles S. Harlow
Charles S. Harlow
2012.06.05 15:50:35-0400
PRINCIPAL ENGINEER

ITEM#0971001A

SIGN FACE
108 SQ. FT (MIN.)



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



SCALE: NONE

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

APPROVED

Charles S. Harlow
2012.06.05 15:55:23-04'00'

ITEM#0971001A

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

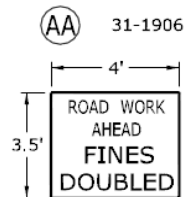
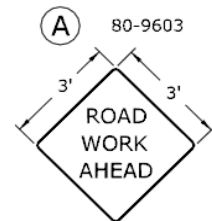
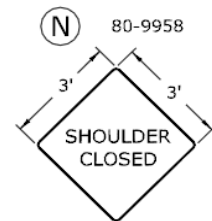
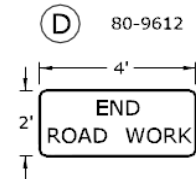
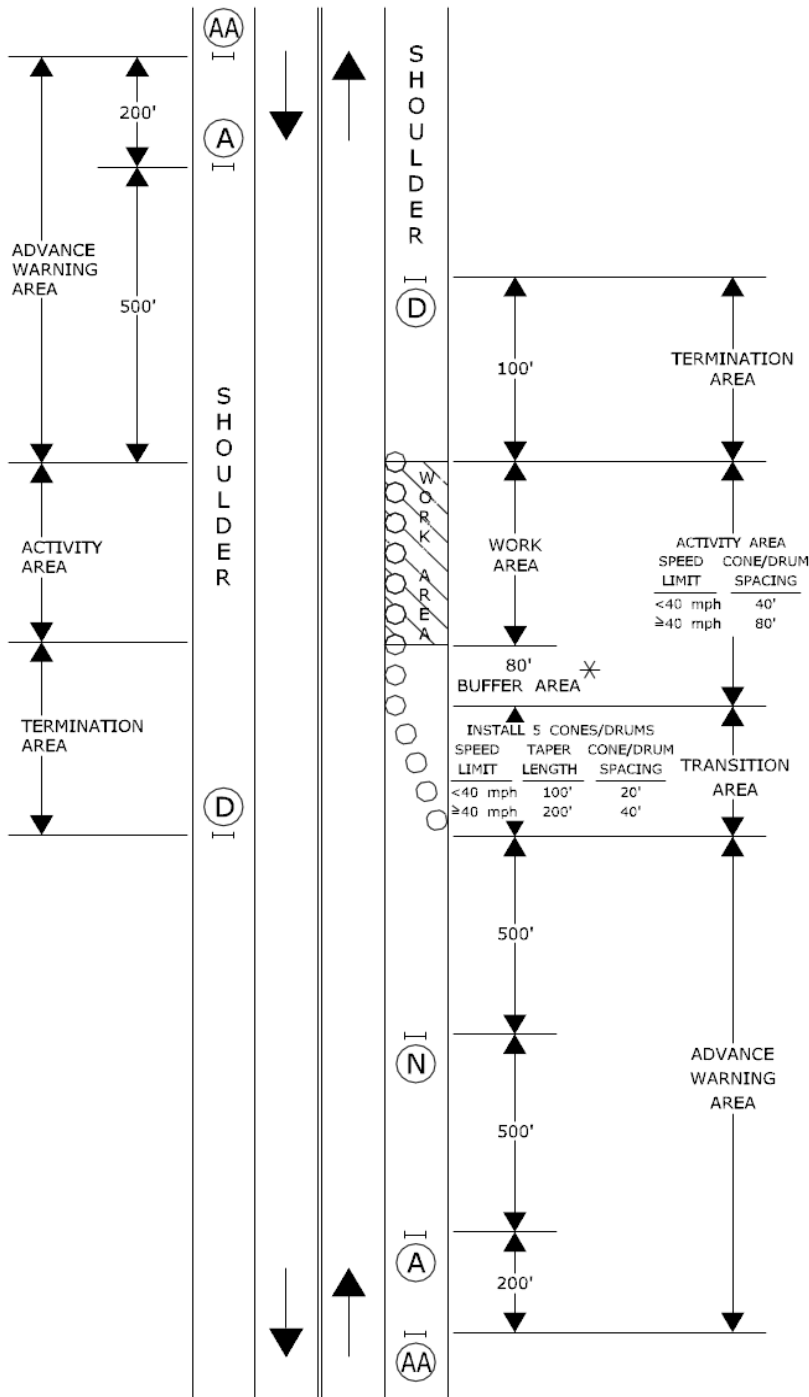
APPROVED

Charles S. Harlow
Charles S. Harlow
2012.06.05 15:55:45-04'00'
PRINCIPAL ENGINEER

ITEM#0971001A

WORK IN SHOULDER - TWO LANE HIGHWAY

SIGN FACE
71 SQ. FT (MIN.)



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



CONSTRUCTION TRAFFIC CONTROL PLAN

PLAN 14

SEE NOTES 1, 2, 4, 7, 8

CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION

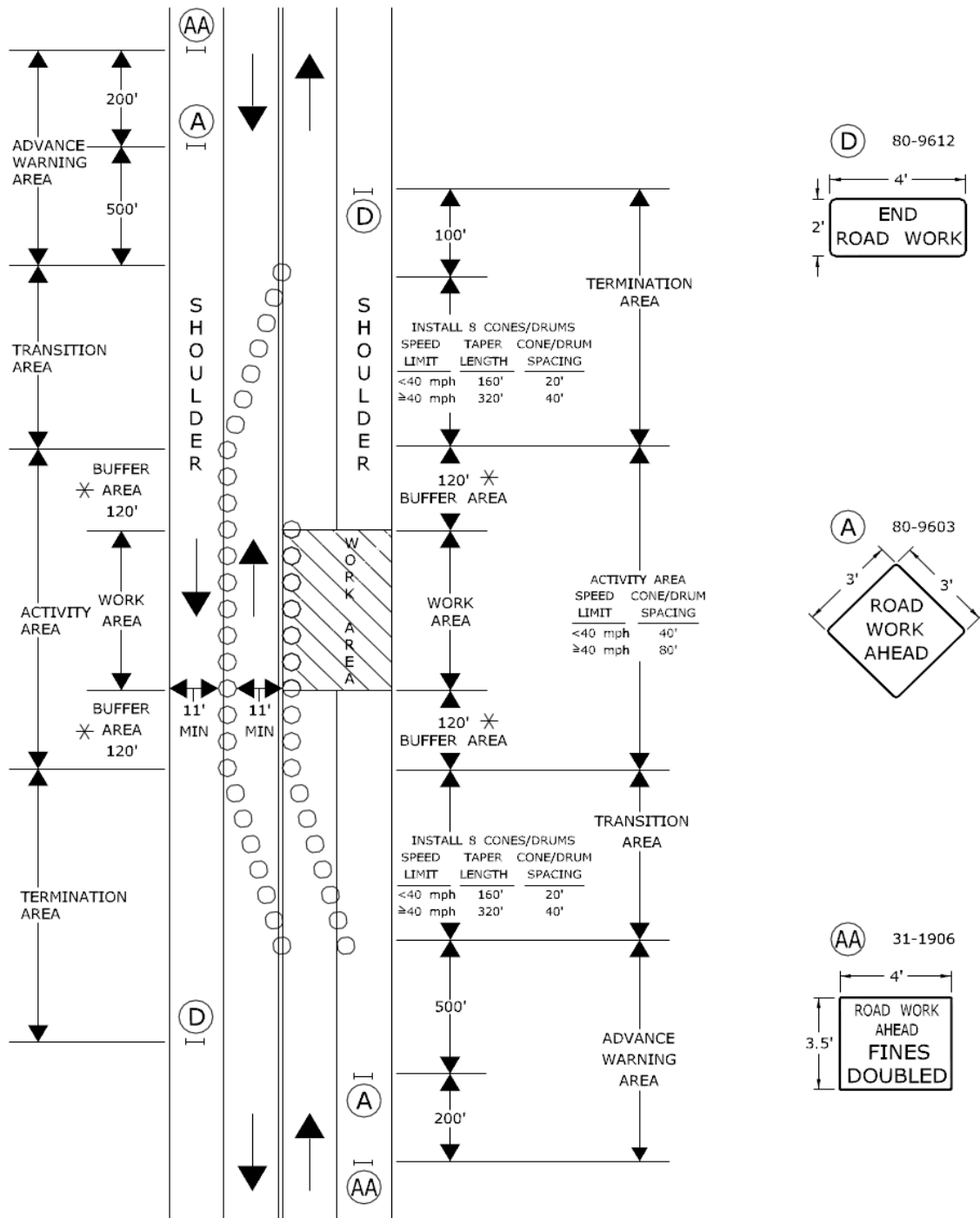
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Charles S. Harlow
Charles S. Harlow
2012.06.05 15:56:09-04'00"
PRINCIPAL ENGINEER

ITEM#0971001A

WORK IN TRAVEL LANE AND SHOULDER TWO LANE HIGHWAY

SIGN FACE
62 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 15

SEE NOTES 1, 2, 4, 6, 7, 8

CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION

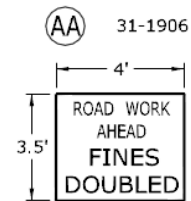
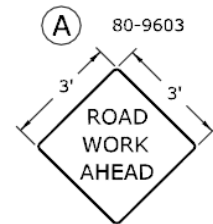
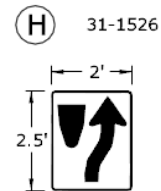
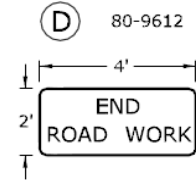
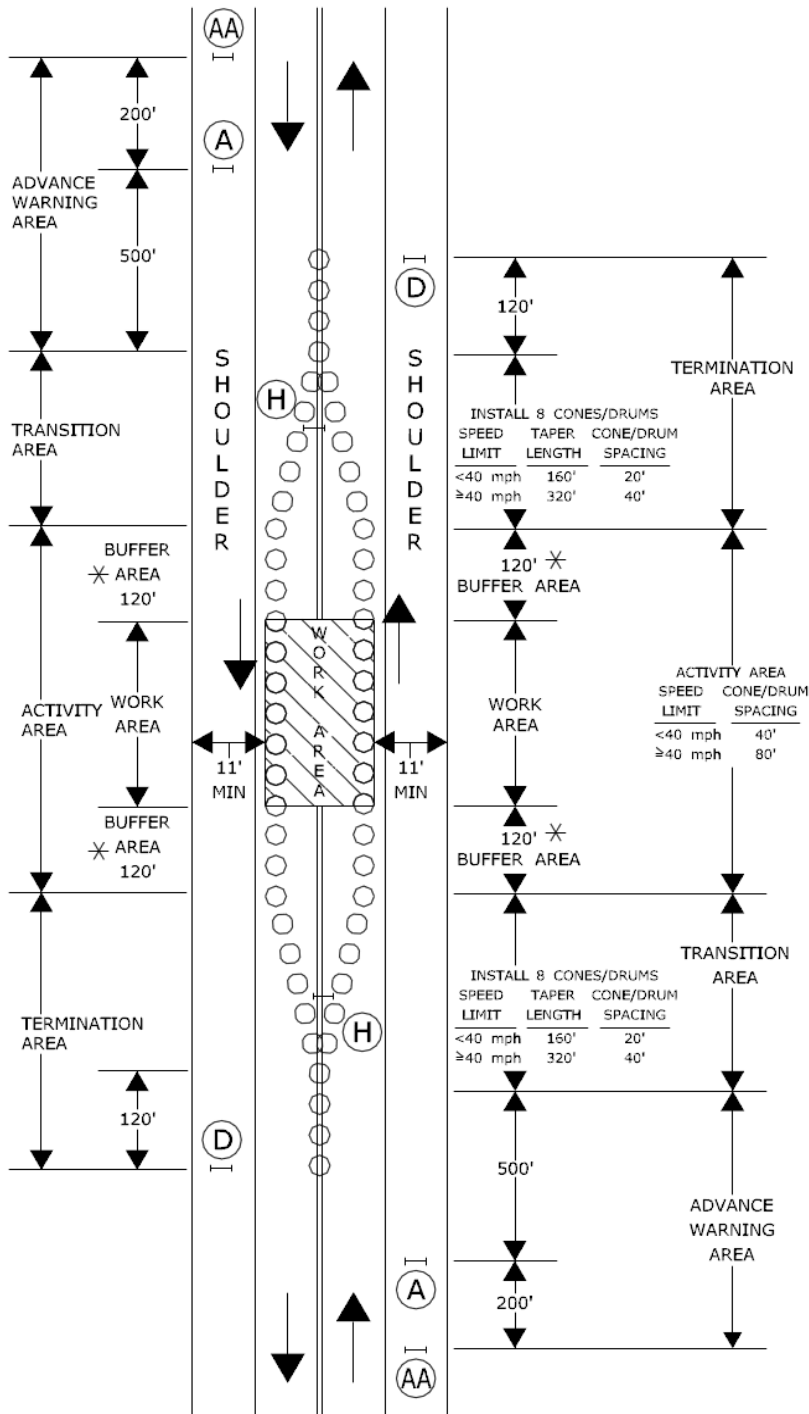
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Charles S. Harlow
Charles S. Harlow
2012.06.05 15:56:29-04:00
PRINCIPAL ENGINEER

ITEM#0971001A

WORK IN MIDDLE OF ROADWAY TWO LANE HIGHWAY

SIGN FACE
72 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 16

SEE NOTES 1, 2, 4, 6, 7, 8

CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION

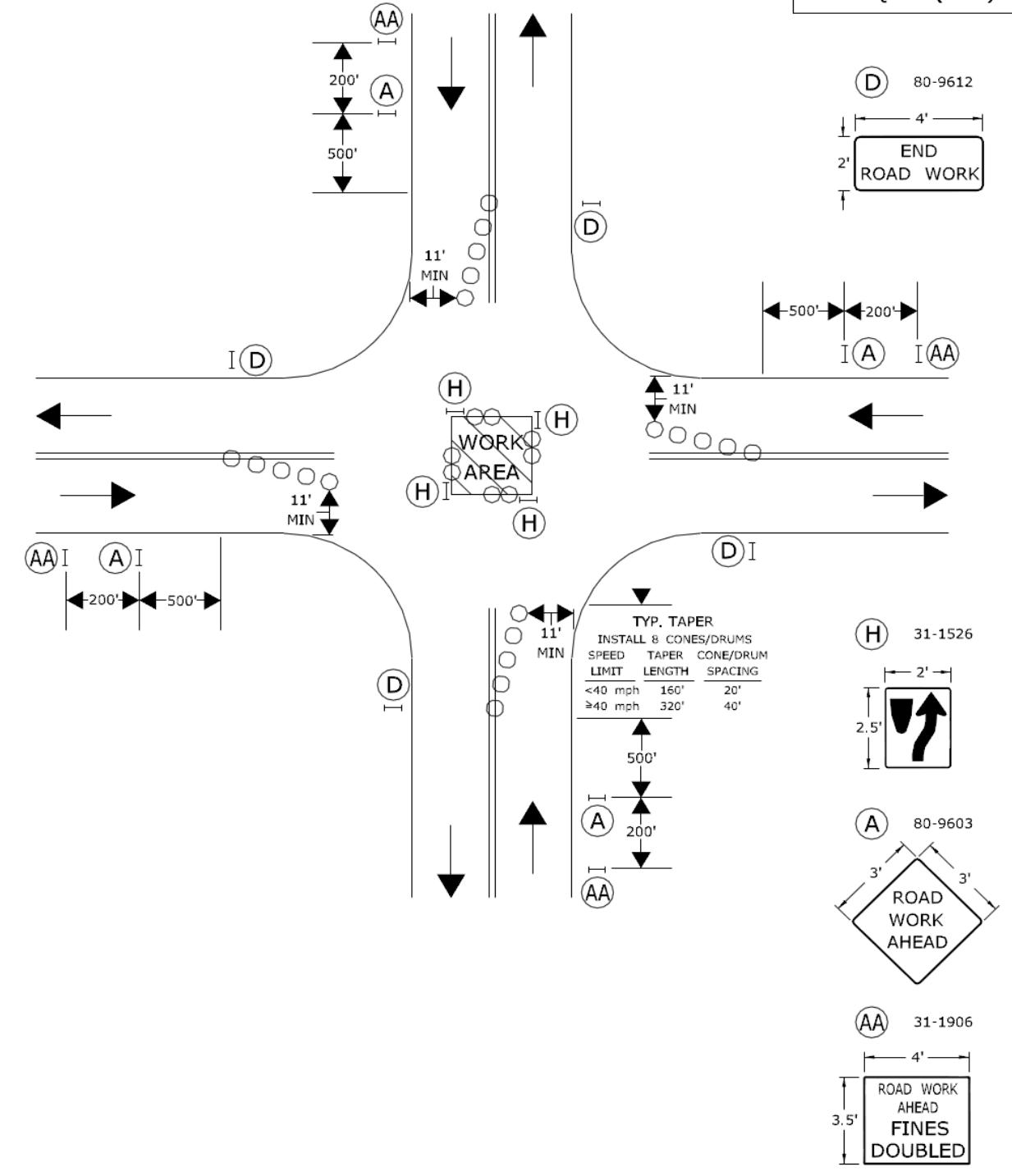
APPROVED

Charles S. Harlow
Charles S. Harlow
2012.06.05 15:56:51-04:00
PRINCIPAL ENGINEER

ITEM#0971001A

WORK IN MIDDLE OF ROADWAY AT INTERSECTION

SIGN FACE
144 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 17

SEE NOTES 1, 2, 4, 6, 7, 8

CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION

APPROVED

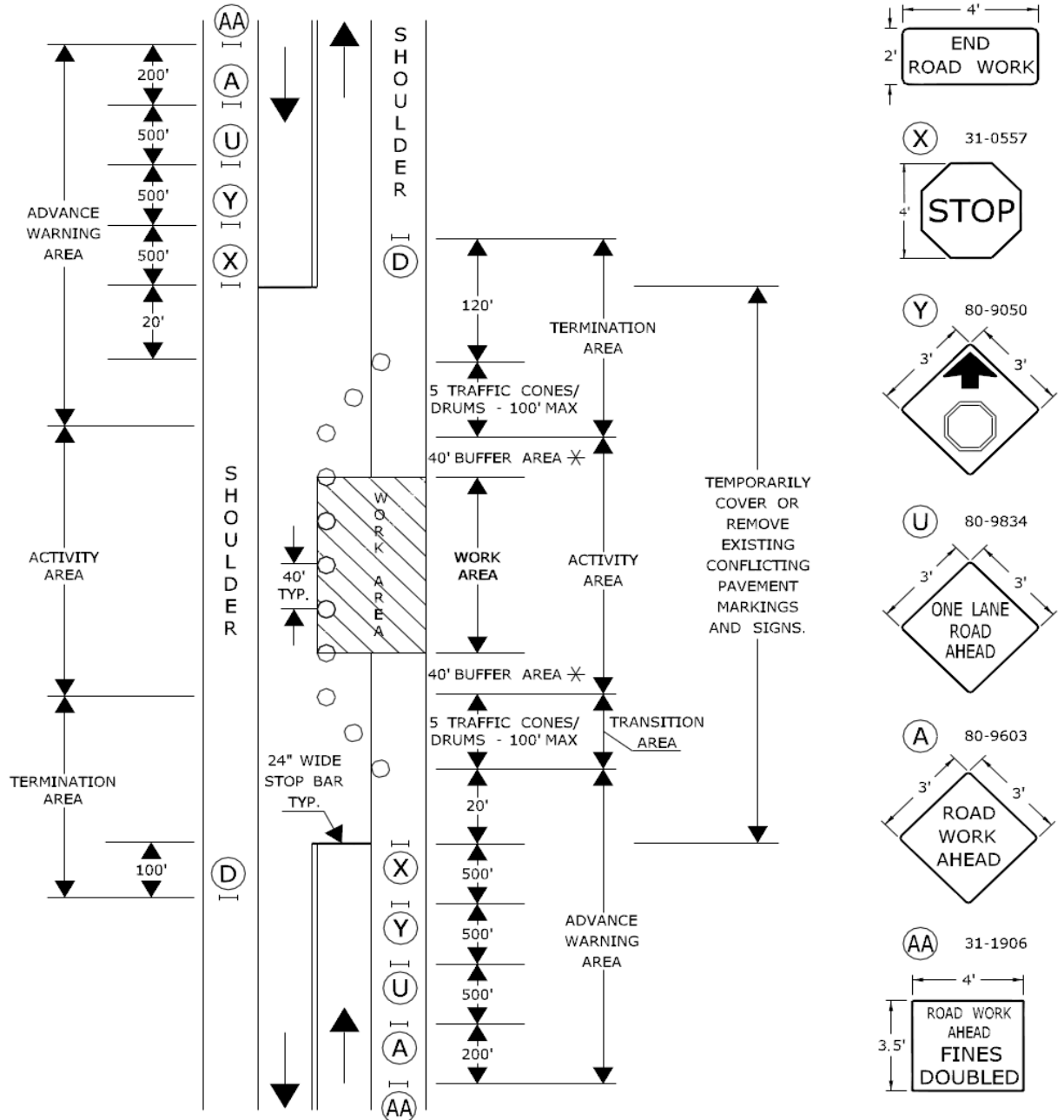
Charles S. Harlow
PRINCIPAL ENGINEER

Charles S. Harlow
2012.06.05 15:57:16-04'00"

ITEM#0971001A

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

SIGN FACE
125 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 18

SEE NOTES 1, 2, 4, 7, 8

CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION

APPROVED

Charles S. Harlow
Charles S. Harlow
2012.06.05 15:57:37-04'00'
PRINCIPAL ENGINEER

ITEM#0971001A

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”.

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.”

Pay Item

Maintenance and Protection of Traffic

Pay Unit

LS

ITEM #0980001A – CONSTRUCTION STAKING

Description: The work under this item shall consist of construction layout and reference staking necessary for the proper control and satisfactory completion of all work on the project.

Materials: All stakes used for control staking shall be of quality suitable for the intended purpose.

Construction Methods: The Town will furnish the Contractor such control points, bench marks, and other data as may be necessary for the construction staking and layout by qualified engineering or surveying personnel as noted elsewhere herein.

The Contractor shall be responsible for the placement and preservation of adequate ties to all control points, necessary for the accurate re-establishment of all base lines, center lines, and all critical grades as shown on the plans.

All stakes, references, and batter boards which may be required for construction operations, signing and traffic control shall be furnished, set and properly referenced by the Contractor. The Contractor shall be solely and completely responsible for the accuracy of the line and grade of all features of the work. Any errors or apparent discrepancies found in previous surveys, plans, specifications or special provisions shall be called to the Engineer's attention immediately for correction or interpretation prior to proceeding with the work.

During roadway construction (or site work), the Contractor shall provide and maintain for the periods needed, as determined by the Engineer, reference stakes at 100 foot intervals outside the slope limits. Further, the Contractor shall provide and maintain reference stakes at 50 foot intervals immediately prior to and during the formation of subgrade and the construction of all subsequent pavement layers. These stakes shall be properly marked as to station, offset and shall be referenced to the proposed grade, even if laser or GPS machine controls are used.

The Contractor shall provide and maintain reference stakes at drainage structures, including reference stakes for the determination of the structure alignments as may be needed for the proper construction of the drainage structure. The reference stakes shall be placed immediately prior to and maintained during the installation of the drainage structure. These stakes shall be properly marked as to station, offset and shall be referenced to the proposed grade.

The Contractor shall furnish copies of data used in setting and referencing stakes and other layout markings used by the Contractor after completion of each operation.

The Contractor shall provide safe facilities for convenient access to control points, batter boards, and references.

All staking shall be performed by qualified engineering or surveying personnel who are trained, experienced and skilled in construction layout and staking of the type required under the contract. Prior to start of work, the Contractor shall submit for review and comment the qualifications of personnel responsible for construction staking on the project. Surveying

shall be performed under the direct supervision of a Professional Surveyor licensed in the State of Connecticut. The submission shall include a description of the experience and training which the proposed staff possesses and a list of state projects the personnel have worked on previously. All field layout and staking required for the project shall be performed under the direct supervision of a person, or persons, of engineering background experienced in the direction of such work and acceptable to the Engineer. If the personnel responsible for construction staking change during the course of the project, then a revised submittal will be required.

The Department may check the control of the work, as established by the Contractor, at any time as the work progresses. The Contractor will be informed of the results of these checks, but the Department by so doing in no way relieves the Contractor of responsibility for the accuracy of the layout work.

The Contractor shall correct or replace, at the Contractor's own expense, any deficient layout and construction work which may be the result of the inaccuracies in the Contractor's staking operations or the failure to report such inaccuracies, or the Contractor's failure to report inaccuracies found in work done by the Town or by others. If, as a result of these inaccuracies, the Town is required to make further studies, redesign, or both, all expenses incurred by the Town due to such inaccuracies will be deducted from any monies due the Contractor.

The Contractor shall furnish all necessary personnel, engineering equipment and supplies, materials, transportation, and work incidental to the accurate and satisfactory completion of this work.

Method of Measurement: Construction staking will not be measured but shall be at the Contract lump sum for "Construction Staking".

Basis of Payment: Construction staking will be paid for at the Contract lump sum price for "Construction Staking," which price shall include all materials, tools, equipment, labor and work incidental thereto. A schedule of values for payment shall be submitted to the Department for review and comment prior to payment.

<u>Pay Item</u>	<u>Pay Unit</u>
Construction Staking	LS

ITEM #1003894A – ORNAMENTAL LIGHTING SYSTEM

Work under this item shall conform to the requirements of Section 10.00 and 11.13 of the Standard Specifications, amended and supplemented as follows:

Description: Work under this item shall consist of designing, furnishing and installing an ornamental street light system at the locations and to the dimensions and details shown on the plans or as directed by the Engineer and in conformity with these specifications. The work shall include furnishing and installing all necessary components of the system, including the pole, concrete foundation, fixture, accessories, conduit, power and control cable, lighting controller, controller foundation, metered service, bedding, backfill, and appurtenances, along with coordinating with local utility representatives. The work shall include furnishing mounting and assembling all components, receptacle installation, and wiring. The work shall also include verifying the proper operation of the pole, fixture(s) and GFI receptacle to the satisfaction of the engineer.

Materials:

General: The Ornamental Street Light Standards shall be installed at the locations shown on the plans. Four types shall be used – SL4, SL3C, SL5B and SL3D, as indicated on the plans.

SL4: 14' Pole, Type 4 Optics

SL3C: 12' Pole, Type 3 Optics, Dimming Resistor Board

SL5B: 12' Pole, Type 5 Optics, Dimming Resistor Board

SL3D: 12' Pole, Type 3 Optics w/ House Side Shield& Dimming Resistor Board

Pole: The pole and accessories shall be designed in accordance with AASHTO Standard Specification for Structural Support of Highway Signs, Luminaires and Traffic Signs. Wind pressures for design purposes shall be determined in accordance with the above AASHTO Standard utilizing a 93 mph wind speed. The pole shall be aluminum, one-piece construction with an 18" diameter cast aluminum fluted base, Sternberg Lighting Model #6200 (Oxford Series). The SL3a pole shall be a 12 foot tall smooth tapered shaft, made of ASTM 6063 extruded aluminum and tempered to a T6 condition, tapering from 5" to 4" in diameter (Part number 62 12 T5-4). The SL4a pole shall be a 14 foot tall smooth tapered shaft, made of ASTM 6063 extruded aluminum and tempered to a T6 condition, tapering from 5" to 4" in diameter (Part number 62 14 T5-4).

Anchor Bolts: All Light Standards shall use four ¾" diameter, hot-dipped galvanized "L" type anchor bolts in accordance with the requirements of ASTM A-153-03, Class C. Field welding and field bending of anchor bolts is prohibited.

Fixture: The fixture shall be designed in accordance with AASHTO Standard Specification for Structural Support of Highway Signs, Luminaires and Traffic Signs. Wind pressures for design purposes shall be determined in accordance with the above AASHTO Standard utilizing a 93 mph wind speed. The fixture shall meet the design requirements and style as shown on the plans.

The fixture shall be wired using No. 10 AWG stranded copper conductors with 600V, 167 degree F, type THHN/THWN insulation, or as required by the manufacturer. The luminaire

shall be connected to the wiring provided within the pole.

The fixture shall include:

- an individual photo cell
- Black Textured Finish
- Frosted Hurricane Chimney (not lighted)
- Clear Seeded Acrylic Lens
- Solid Roof

Optional Equipment: The Ornamental Lighting poles shall be supplied with the following options:

Double Banner Arms: The banner arms shall be part “DBA” as manufactured by Sternberg Lighting, and shall meet the style as shown on the details.

Single Planter Arm: The single planter arm shall be part “SPA” as manufactured by Sternberg Lighting, and shall meet the style as shown on the details.

Ground Fault Receptacle: The pole shall be equipped with a GFI duplex receptacle with a weatherproof cover. The receptacle shall be part “GFI” as manufactured by Sternberg Lighting, and shall meet the style as shown on the details.

Cable: The provisions of sections 10.12.02 and 10.15.02 shall apply.

Conduit: The provisions of sections 10.01.02 and 10.08.02 shall apply.

Concrete Handhole: The provisions of section 10.10.02 shall apply.

Light Pole Foundations: The provisions of section 10.02.02 shall apply.

Service Control Box: The provisions of section 10.17.02 shall apply.

Construction Methods: Construction methods for this work shall be in accordance with the manufacturer’s recommendations. The contractor shall be responsible for coordinating all necessary prerequisite work with the utility company. This shall include, but not be limited to de-energizing existing light poles, energizing new light poles, coordinating and verifying new conduit installations, and coordinating and verifying the location of the service control box. Eversource shall be responsible for pulling new wiring from energy source to service control box location and energizing new lighting system. The contractor shall be responsible for installing all underground conduit between the service control box and the service pole, in accordance with Eversource requirements.

The Contractor shall be responsible for all coordination with the Utility company that is required to obtain the required metered service connection to the lighting system. This includes any necessary computations, applications and fees paid on the behalf of the Town of Brookfield.

The contractor shall be responsible for installing the poles plumb, connection to the power supply, wiring, attaching the ground connection to the pole and all testing.

REQUIRED SUBMITTALS:

The contractor is responsible for providing the complete lighting design to provide an operational lighting system as shown on the plans and these specifications. The design will include selecting the appropriate load and service equipment to be installed in the service control box, selection of the control box and foundation, and design of all lighting circuits, including cable routing and sizing to supply the luminaires and GFI receptacles at each pole. Structural design computations are to be provided for each pole to demonstrate adequacy of the pole, foundation, and anchor bolt design, taking into account loading produced by the pole accessories, such as the banner arms, in accordance with AASHTO Standard Specification for Structural Support of Highway Signs, Luminaires and Traffic Signs. Wind pressures for design purposes shall be determined in accordance with the above AASHTO Standard utilizing a 93 mph wind speed. Details provided with the plans are for guidance only, and may be modified as necessary to provide adequate design to meet AASHTO requirements. Proposed modifications should be provided with the design submittal.

All electrical calculations, structural calculations, working drawings, shop drawings and catalog cuts shall be submitted to the Engineer in a single submittal package for review and approval. The submittal shall demonstrate the adequacy of the design and the adherence to the details provided. The assembly, in its completed form, shall meet the design requirements and style as shown on the plans.

Following approval of the design, the equipment can be ordered. Submit 5 copies of material certificates in accordance with the contract general requirements.

Method of Measurement: The Ornamental Lighting System will not be measured for payment and the cost thereof shall be included in the Lump sum cost of the item “Ornamental Lighting System”.

Basis of Payment: This work will be paid for at the contract Lump Sum price for “Ornamental Lighting System” which shall include poles, foundations, excavation, luminaires, appurtenances, designated optional equipment, service controller unit(s), cabinet(s) and foundation(s), trenching and backfilling, electrical conduits, cables, connectors and power supplies, service connections, permits, coordination, and all work required within the project limits. This price shall include all materials, labor and materials, material disposal and work incidental thereto.

PAY ITEM

PAY UNIT

Ornamental Lighting System

LS

ITEM# 1008908A - CLEAN EXISTING CONDUIT

Description:

Clean existing conduit as required, as shown on the plans or as directed by the Engineer to remove dirt and debris to facilitate the installation of new cable.

Construction Methods:

Where cable is to be installed in existing conduit the conduit may have to be cleared prior to the installation. Cleaning will only be necessary if the new cable cannot be easily installed in the existing conduit. By field inspection, and with the concurrence of the Engineer, determine the sections of conduit that require cleaning.

Remove all existing cable from conduit. Install temporary cable elsewhere, as necessary, to maintain normal signalization complete with vehicle & pedestrian detection, EVPS, and coordination. Clean the conduit by one of the following methods:

- 1) Rodding.
- 2) A high pressure jet spray, or air pressure.
- 3) By pulling a mandrel or ball through the conduit.

Submit in writing the anticipated method of cleaning the conduit to the Engineer for approval prior to cleaning any conduit.

If the conduit is found damaged to any extent that the cleaning process will not clear the obstruction, it will be the judgment of the Engineer whether to replace the entire conduit run or excavate and replace only the damaged section.

If the existing conduit is found to be missing hardware such as bonding bushings and bond wire, the missing material shall be provided and installed under this item prior to installation of the cable.

Method of Measurement:

This work shall be measured from termination point to termination point. This work shall be measured for payment on actual number of linear feet (meters)..

Basis of Payment:

The work under the Item "Clean Existing Conduit" shall be paid for at the contract unit price per linear foot (meters), which price shall include all material, tools, equipment, labor, and work incidental thereto. Work pertaining to temporary operation shall be paid for under Item 1108xxxA - Temporary Signalization (Site X). Replacement of any damaged conduit shall be paid for under the applicable conduit item.

Pay Item
Clean Existing Conduit

Pay Unit
l.f. (m)

ITEM #1010060A – CLEAN EXISTING CONCRETE HANDHOLE

DESCRIPTION:

Clean all debris from an existing concrete handhole where shown on the plans or as directed.

MATERIAL:

Insulated Bonding Bushings:
 Specification Grade
 Threaded
 Malleable Iron or Steel
 Galvanized
 UL listed
Bonding Wire:
 M.15.13
Grout:
 M.03.05

CONSTRUCTION METHODS:

Remove to a level even with the bottom of the handhole all sand, silt and other debris. Remove any material that is accessible from the ends of conduit. Additional conduit cleaning will be paid for under Item 1008908A-Clean Existing Conduit. Place approximately 4" (100) of ¾" (19) crushed stone in bottom of handhole using care not to allow crushed stone to enter conduits. Grout around conduits to prevent future entrance of dirt and silt. Properly dispose all removed debris. Inspect bonding bushings. Tighten loose bushings. Secure loose bond connections. Install new bonding bushings on spare conduits and bond to other conduits.

METHOD OF MEASUREMENT:

This work will be measured for payment by the number of concrete handholes cleaned, complete and accepted.

BASES OF PAYMENT:

This work will be paid for at the contract unit price each for "Clean Existing Concrete Handhole", which price shall include the removal and disposal of debris from handhole and associated conduit, crushed stone, grout, bonding bushings, bonding wire, and all equipment and work incidental thereto.

Pay Item
Clean Existing Concrete Handhole

Pay Unit
Each (Ea)

ITEM#1106001A- 1 WAY PEDESTRIAN SIGNAL POLE MOUNTED

ITEM#1106002A- 2 WAY PEDESTRIAN SIGNAL POLE MOUNTED

ITEM#1106003A- 1 WAY PEDESTRIAN SIGNAL PEDESTAL MOUNTED

ITEM#1106004A- 2 WAY PEDESTRIAN SIGNAL PEDESTAL MOUNTED

Section 11.06.02 Pedestrian Signal, Materials

Section 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.

Section M.16.07 F. Painting:

Third coat: Replace the first two sentences with the following:

All brackets and hardware shall be painted yellow by the manufacturer. The color shall be No. 13538, Federal Standard No. 595.

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 during the walk interval and is used where there is an exclusive pedestrian phase or ≥ 10 foot separation between APS&Ds.

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 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. Type A, Percussive Tone:

- 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.

F. Pushbutton Housing/Sign Frame/Sign

- One piece die cast aluminum meeting requirements of ASTM B85.
- Sign frame designed to accept 9" x 12" (230 x 300) 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 yellow No. 13538, Federal Standard No. 595.
- Finish: Housing/Frame and all mounting brackets either:
 1. Painted with 3 coats of infrared oven-baked paint before assembly.
 - Primer: Baked iron oxide which meets or exceeds FS TT-P-636.
 - Second coat: Exterior-baking enamel, light gray, which meets or exceeds FS TT-E-527.

- 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. 31-0845

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 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 #1111401A - LOOP VEHICLE DETECTOR

Replace Section 11.11.02, Article M16.12, with the following:

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.

Replace Section 11.11.03, Article 1. Loop Vehicle Detector, with the following:

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*

Replace Section 11.11.04, Article 1. Loop Vehicle Detector, with the following:

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.

Replace Section 11.11.05, Article 1. Loop Vehicle Detector, with the following:

11.11.05 – Basis of Payment:

1. Loop Vehicle Detector is paid at the contract unit price each of the type specified.

Pay Item
Loop Vehicle Detector

Pay Unit
ea. (ea.)

ITEM 1111407A – CAMERA VIDEO DETECTION SYSTEM

Description:

Furnish and install a Video Image Detection System (VIDS) as shown on the plans or as directed by the Engineer. The VIDS consists of a Camera Assembly (CA), Video Detection Processor (VDP), Video Detection Monitor (VDM) and Camera Cable. The Training and Extension Bracket will be included on a case-by-case basis.

Materials:

All hardware shall be new, corrosion resistant. All equipment shall be current production.

Camera Assembly:

Camera:

- Monochrome (Black and White) or Full Color camera.
- Fixed mount pan and tilt unit bracket.
- Image Sensor: 0.3-inch (7.62mm) to 0.5-inch (12.7mm), charge-coupled device (CCD).
- Sensitivity: Full peak-to-peak video with 2 lux 2854 K incandescent illumination on the image sensor faceplate.
- Active picture elements (pixels): 720(H) x 480 (V), minimum.
- Resolution: Minimum 470 lines horizontal and 330 lines vertical, NTSC equivalent.
- Automatic white balance: Automatic white balance sensor through the lens for color balancing.
- Video Signal format: EIA-170 composite video output at 1 Volt peak-to-peak.
- Output impedance: 75 Ohms nominal.
- Signal to noise ratio: Greater than 50dB.
- Lens mount – standard 16 mm C-mount and compatible with the camera.

Camera Enclosure:

- Tamper proof constructed of painted or powder coated aluminum of at least 0.06-inch (1.59-mm) thickness.
- Environmentally sealed housing.
- Adequate adjustable sunshield should be provided.
- Internal Heater, window defroster, and an adjustable thermostat to control both. Turn-on point from 0° to 5° C (32° to 41° F). Metal oxide varistor (MOV), or equivalent, surge suppression connected to ground, on the switched outputs of all thermostats. Prior approval by the VDP manufacturer and the Engineer is necessary for any deviations to the above specifications.

Extension Bracket:

- Single arm [10' (3.0m) or less], or Truss type [10' (3.0m) or greater].
- Length shown on plan.

- Clamp-on attachment to pole shaft 1' (300mm) from top of span 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.

Video Detection Processor:

Functional:

- Receive inputs from a minimum of two cameras.
- Sense vehicle activity from minimum eight detection zones per camera.
- Sense departing vehicle activity as well as approaching vehicle activity.
- Emulate minimum four (4) "contact closure" loop amplifier outputs in pulse, presence, delay, delay inhibit, and extend mode as specified in NEMA TS 1, Section 15.
- Include image stabilization that corrects for video movement caused by average wind speed of 20 mph (32 kph).
- Include automatic shadow cancellation of stationary shadows and moving shadows.
- Fail-safe in the event of loss of video from CA or loss of power to VDP.
- Accept standard analog NTSC color or monochrome video signal (1 volt peak to peak, 75 ohm) from the CA or a video recording device.
- Provide output of standard analog NTSC color or monochrome video signal through a video out female RCA/BNC style connector (1 volt peak to peak, 75 ohm) which may be switched to any video input.

Accuracy (Compared to actual vehicle observation of video over ½ hour time period).

- Occupancy: 20% true occupancy.
Example: If observed occupancy is 20%, reported occupancy must be between 16% and 24%.
- Volume: 95% true counts under normal weather conditions.
90% true counts under adverse weather conditions (rain, snow, fog).
- Demand (presence) at stop bar: 98 % under all weather conditions.
- Speed: 20% true speed as measured by radar gun.
- Maintain above accuracy throughout nighttime and day-night-day (dusk-dawn) transition.

Detection Zone Programming:

- Serial communication with the PC through front panel mounted EIA-232 port.
- Menu driven procedure on the PC, using Windows 95, 98, NT 4.0, or 2000 system.

- Configure and adjust the detection zone with the cabinet mounted Video Detection Monitor (VDM), using a standard detachable keyboard/mouse. Capable of displaying a NTSC or PAL formatted signal.
- Minimum data rate of 9600 bits/second.
- Detection zone data stored in non-volatile memory so that after recovery from power interruption, all parameters are returned to latest settings.
- Ability to upload and down load program database to notebook PC or remote desktop PC.
- Superimpose detection zone on real time video image from selected camera with time stamping capabilities.
- Ability to monitor real time video and adjust zones while VDP is actuating the traffic controller.
- Visual confirmation of detection by highlighting detection zone symbols.

Physical:

- Either shelf mounted, stand alone design or modular card rack design.
- Aluminum card rack frame capable of accepting four (4) VDP modules.
- Double row 22 pin (44 terminal) edge connector, Cinch Jones 50-44A-30M or equivalent, which mates with NEMA TS 1 detector rack system.
- Standard BNC connectors for video input and video output.
- Female metal shell connector with latching clamp for NEMA TS 1 detector outputs.
- LED indications to monitor all detector outputs.
- Side or rear mounted connectors and controls are not allowed on stand alone units.
- NEMA FR-4 glass epoxy or equivalent circuit boards.

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.

Video Detection Monitor:

Physical:

- Compact and easily accessible LCD Flat Panel Display.
- Diagonal screen size minimum 9" & maximum 14".
- Weigh <10 pounds (4.5kg).

- Withstand temperatures ranging from -30 to 74 degrees Celsius (-22 - 165 °F), 90% non-condensing.
- Withstand mechanical shock of 10 G's peak acceleration (11 ms, half sine wave).
- Accept vibrations of 20 to 500 Hz at 1 G RMS random vibration.

Functional:

- Compatible with Color or Monochrome Detection systems.
- Industrial grade (grade A) video panel employing thin film transistor (TFT) technology.
- ANSI contrast ratio of 300:1 minimum.
- Minimum brightness level: 300 candelas per square meter (300 lux).
- Computer resolutions: 720 (horizontal) x 480 (vertical) minimum, 1024 (horizontal) x 768 (vertical) maximum.
- Support 260,000 display colors.
- Support both NTSC and PAL video formats with auto-sensing.
- Pixel rise time: ≤ 5 milliseconds. Pixel fall time: ≤ 11 milliseconds.
- Minimum pixel pitch: 0.064 (horizontal) x 0.2025 (vertical) millimeters.
- Minimum viewing angle: 140 degrees horizontally, 120 degrees vertically.
- On-Screen Display (OSD) controls brightness, contrast, phase, clock, color as well as horizontal and vertical positioning.
- Compatible with processor output (VGA analog RGB, S-Video, male RCA connectors, male BNC connector and/or composite video interfaces)
- Operable on 110 VAC or 220 VAC, 50 or 60 Hz.
- Battery operation capabilities but not to require use of any batteries(s).
- FCC, VCCI, EMC, and CE approved. UL listed. Energy Star efficient.
- MTBF Rating: 50,000 hours minimum.

Peripherals:

- Separable Keypad & Joystick or Computer Mouse including all necessary cables for connectivity to VDP.

Camera Cable:

- Supply the CA power and return the video signal to the VDP.
- Siamese construction RG-59/U, or as recommended by camera manufacturer.
- Coaxial:
 - 20 AWG, solid conductor.
 - Polyethylene foam dielectric.
 - Bare copper braid shield.
- Twisted pair:
 - 18 AWG, 7 strand conductor.
 - Aluminum foil shield.

- Color code red and black.
- Polyethylene or polyvinyl chloride jacket.
- Other type cable may be substituted at the request of the VDP manufacturer.

Documentation: (VDP, VDM and CA)

Provide to the **Department of Transportation Office of Maintenance** 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.
- 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.

Site Survey:

Perform a site survey with the VDP manufacturer representative at all VIDS locations. The purpose of the survey is to optimize the performance from the VIDS equipment when it is installed and insure that it will meet the accuracy requirements specified previously. Submit the results of this survey to the Engineer in a report, which lists all VIDS locations with any recommended changes to camera locations, mounting adjustments, camera lens adjustments, and desired detection zone locations.

Warranties and Guarantees: (VDP and CA)

Provide warranties and guarantees to the **Department of Transportation Office of Maintenance** in accordance with Article 1.06.08 of the Standard Specifications. Warranties for all equipment furnished as part of this Contract are to cover a period of 24 months following successful completion of the entire intersection acceptance test.

Training:

Provide a minimum of six (6) hours of training for up to eight (8) representatives from the offices of District Maintenance and Traffic Engineering. Include three (3) hours classroom and three (3) hours hands-on instruction of the VIDS.

- Theory of operation; Program and operation instructions; Circuit description.
- Troubleshooting; Preventative maintenance; field diagnostics; and field adjustments.

Training sessions will be scheduled at a mutually agreed time and location after installation of VIDS.

Construction Methods:

Install VIDS equipment in accordance with the manufacturer instructions and recommendations to achieve the detection zones as shown in the plans and accuracy as described in these specifications. The location of the CA shown on the plan may be revised as a result of the Site Survey. VDM and 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.

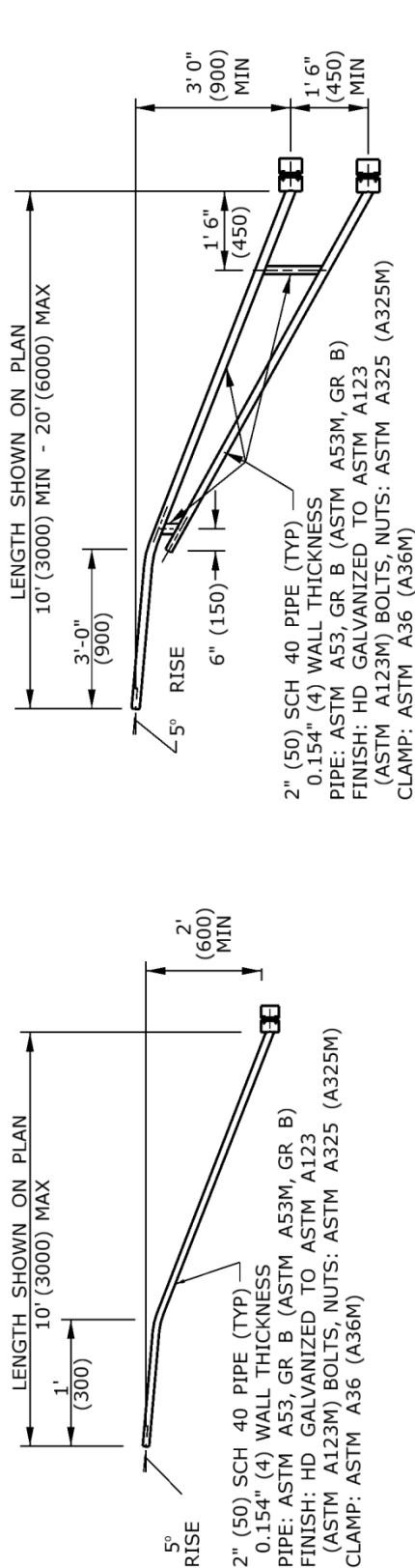
Method of Measurement:

The quantity to be paid for under this item will be the number of completed, installed and accepted Camera Video Detection Systems of the type specified. Each of the systems shall include all the listed components, cables, and connectors.

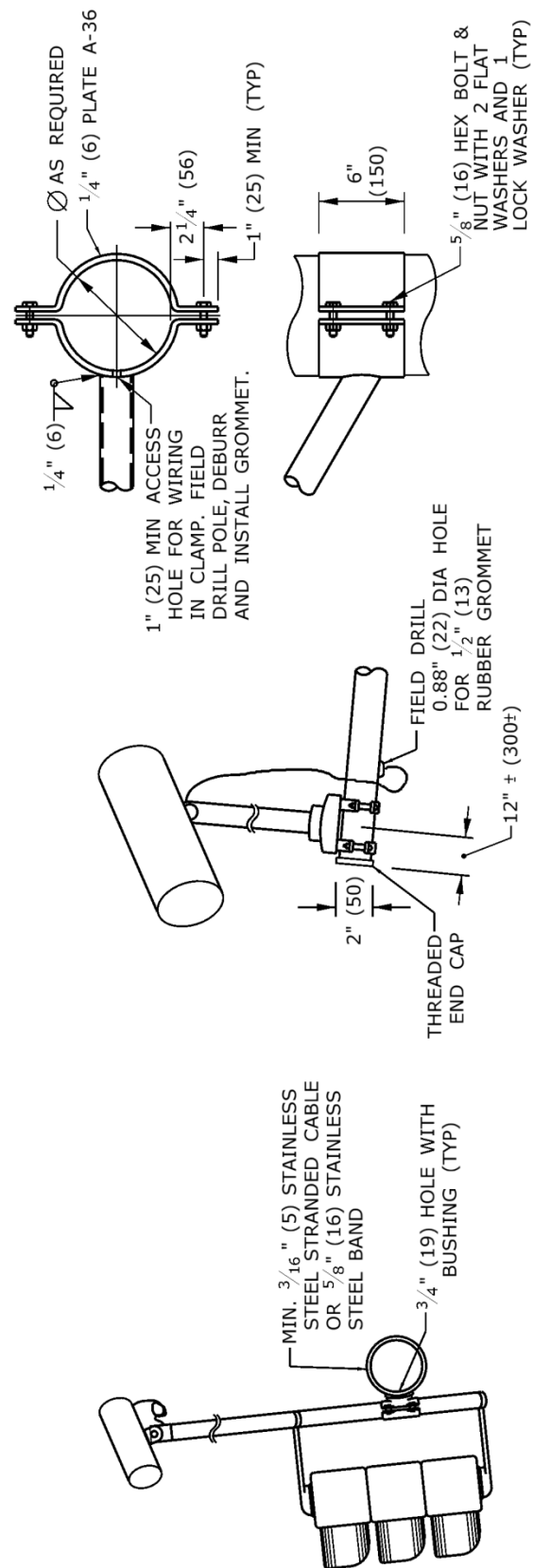
Basis of Payment:

This work will be paid for at the contract unit price each for "Camera Video Detection System" of the type specified, which price shall include all materials, connectors, cables, tools, labor, training and work incidental thereto.

<u>Pay Item</u>	<u>Pay Unit</u>
Camera Video Detection System	EA



POLE MOUNT EXTENSION BRACKET, SINGLE ARM



MAST ARM MOUNT EXTENSION BRACKET

VIDEO IMAGE DETECTION SYSTEM

ARM CLAMP DETAIL

ITEM #1111451A - LOOP DETECTOR SAWCUT

11.11.02 – Materials:

Replace Article M.16.12 with the following:

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) Elastomeric 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:

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:

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:

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>
Loop Detector Sawcut

<u>Pay Unit</u>
l.f. (m)

S:\traffic\1406\SIGNAL SPECS\SPECS\1111451A-LOOP DETECTOR SAWCUT only, rev 1-11, polyester compound

ITEM # 1117110A –RECTANGULAR RAPID FLASHING BEACON (RRFB) TYPE A

ITEM # 1117111A –RECTANGULAR RAPID FLASHING BEACON (RRFB) TYPE B

Description:

Furnish and install a pedestrian actuated rectangular rapid flashing beacon (RRFB) at the location indicated on the plan or where directed by the Engineer.

General Requirements:

Each RRFB will be a complete assembly, consisting of indications, controller cabinet (circuit breaker, timer or solid-state circuit boards etc.) or any electrical component hardware.

Type A: Single sided RRFB will contain three rectangular rapid flashing yellow LED indications, two on the side facing traffic, and one on the end facing pedestrians in the cross walk.

Type B: Two sided RRFB will contain six rectangular indications, two on each side facing traffic, and one indication on each end, visible to pedestrians in the cross walk.

Functional Requirement:

Each RRFB when activated shall flash the two indications in an alternating “wig-wag” sequence (left light on, then right light on).

Each of the two yellow indications of an RRFB shall have 70 to 80 periods of flashing per minute and shall have alternating, but approximately equal, periods of flashing light emissions and dark operation. During each of its 70 to 80 flashing periods per minute, the yellow indications on the left side of the RRFB shall emit two slow pulses of light after which the yellow indications on the right side of the RRFB shall emit four rapid pulses of light followed by a long pulse.

The rapid flash rate of each indication, as applied over the full on-off sequence of a flashing period of the indication, shall not be between 5 and 30 flashes per second, to avoid frequencies that might cause seizures.

The light intensity shall meet the minimum specifications of Society of Automotive Engineers (SAE) standard J595 (Directional Flashing Optical Warning Devices for Authorized Emergency, Maintenance, and Service Vehicles) dated January 2005.

Each RRFB indication will be activated by an ADA compliant (piezo) pedestrian Pushbutton and operation will cease after a predetermined time limit (based on MUTCD procedures).

All RRFBs associated with a given crosswalk (including those with an advance crossing sign, if used) shall, when activated, simultaneously commence operation of their alternating rapid flashing indications and shall cease operation simultaneously.

Mechanical and Electrical Requirements:

- a) Dimensions:
 - Type A:** - One sided/3 LEDs.....3.5”H x 20”W x 2.625”D
 - Type B:** - Two sided/6 LEDs.....3.25”H x 20”W x 8”D
- b) Power: - 120VAC
- c) Temperature: - All components will be capable of continuous operation over a temperature range of -30 DEG. F to 165 DEG. F
- d) Indications:
 - Daylight distance visibility.....> 1000 feet
 - Night distance visibility.....> 1 mile
 - Flash Pattern.....Wig-Wag
 - Optics.....Polycarbonate Lenses
 - Color.....Yellow
 - Body.....Powder Coated Federal Yellow
 - Size..... 5” wide x 2” high
- e) Housing: - Powder Coated Federal Yellow

Construction Method:

Each RRFB indication will be mounted horizontally to a standard 4 ½” diameter aluminum pedestal and in accordance with dimensions and details shown on the plan.

The two RRFB indications shall be aligned horizontally, with the longer dimension horizontal and with a minimum space between the two indications of approximately seven inches (7 in), measured from inside edge of one indication to inside edge of the other indication.

The outside edges of the RRFB indications, including any housings, shall not project beyond the outside edges of the sign.

Method of Measurements:

This work will be measured as the number of RRFBs furnished, installed and accepted in place.

Basis of Payment:

This work will be paid for at the contract unit price of each “Rectangular Rapid Flashing Beacon (RRFB)” of the type specified which will include the cost of conduit fittings, hardware, controller cabinet complete with all necessary equipment, ground rod, armored ground cable, paint and all materials, equipment, tools and labor included thereto.

Pay Item	Pay Unit
Rectangular Rapid Flashing Beacon (RRFB) Type A	ea. (ea.)
Rectangular Rapid Flashing Beacon (RRFB) Type B	ea. (ea.)

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 abandon traffic signal equipment. Restore the affected area. Where indicated on the plans remove and reinstall existing traffic signal equipment to the location(s) shown.

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.

Article 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 but is not limited to vehicle signals and detectors, pedestrian signals and pushbuttons, co-ordination, 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 Division of Traffic Engineering 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" (150mm) 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 pole and mast arm foundation to a depth of 2 feet (600mm) 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.

Scrap and Salvage Equipment

Scrap Material	Stock No.
Steel Mast Arm Assembly	N/A
Copper Cable	N/A
Pedestrian Pushbutton and Sign	N/A

Salvage Material	Stock No.	Value
Controller Cabinet, Complete including but not limited to the following: Conflict Monitor Coordination Equipment Vehicle Detection Equipment	330-03-7010	\$ 500.00
Controller Unit	330-03-7005	\$ 500.00
Aluminum Pedestal 8 foot (2.4 m) 4 foot, 4 inch (1.3 m)	330-16-7108 330-16-7112	\$ 100.00 \$ 100.00
Steel Span Pole, 30' (9.0 m)	330-16-7050	\$ 250.00
Steel Span Pole, all other lengths	330-16-7016	\$ 250.00

All material not listed as scrap or salvage, becomes the property of the Contractor. Properly handle, transport, then dispose in a suitable dump or recycle this material. Comply with all Federal and State hazardous waste laws and regulations.

In the presence of the Engineer, verify the condition and quantity of salvage material prior to removal. After removal transport and store the material protected from moisture, dirt, and other damage. Coil and secure copper cable separate from other cable such as galvanized support strand.

Within 4 working days of removal, return the State owned scrap and salvage material to the Department of Transportation Stores warehouse listed below. Supply all necessary manpower and equipment to load, transport, and unload the material. The condition and quantity of the material after unloading will be verified by the Engineer.

DOT Salvage Store #134
660 Brook Street
Rocky Hill, CT

Contact Materials Management Salvage Coordinator, at (860) 258-1980, at least 24 hours prior to delivery.

Municipal Owned Traffic Signal Equipment

Return all municipal owned material such as pre-emption equipment to the Town.

Article 11.18.04 – Method of Measurement:

This work will be measured as a Lump Sum.

Article 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, scrap, 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 or scrapped 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. (L.S.)

s:\traffic1406\signal specs\specs\1118012A-REMO & RELO T S EQUIP-Permits

ITEM NO. 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 # 1210101A – 4” (100 mm) WHITE EPOXY RESIN PAVEMENT MARKINGS

ITEM # 1210102A – 4” (100 mm) YELLOW EPOXY RESIN PAVEMENT MARKINGS

ITEM # 1210105A – EPOXY RESIN PAVEMENT MARKINGS, SYMBOLS AND LEGENDS

SECTION 12.10 – EPOXY RESIN PAVEMENT MARKINGS, SYMBOLS AND LEGENDS is amended as follows:

Delete “SYMBOLS AND LEGENDS” from the title of the section.

SECTION 12.10.03 – Construction Methods is amended as follows:

Delete the entire sections titled “3. Performance and Warranty:” and “WARRANTY:” and replace them with the following:

3. Initial Performance: The retroreflectivity of the markings applied must be measured by the Contractor three (3) to fourteen (14) days after installation. A Certified Test Report (CTR), in accordance with Section 1.06.07, must be submitted to the Engineer no later than ten (10) days after the measurements are taken using the procedures and equipment detailed below:

Test Lots - The following test lots shall be randomly selected by the Engineer to represent the line markings applied:

Table 3.1: Line Test Lots

Length of line	Number of Lots	Length of Test Lot
< 1.0 mi. (1.5 km)	1	1000 ft. (300 m)
≥ 1.0 mi. (1.5 km)	1 per 1.0 mi. (1.5 km)	1000 ft. (300 m)

Measurement Equipment and Procedure

Portable Retroreflectometer

1. Skip line measurements shall be obtained for every other stripe, taking no more than two readings per stripe with readings no closer than 20 in. (0.5 m) from either end of the marking.
2. Solid line test lots shall be divided into ten sub-lots of 100 ft. (30 m) length and measurements obtained at one randomly select location within each subplot.
3. For symbols and legends, 10 percent of each type shall be measured by obtaining five (5) measurements at random locations on the symbol or legend.

ITEM # 1210101A
ITEM # 1210102A
ITEM # 1210105A

4. The Apparatus and Measurements shall be made in accordance with ASTM E1710 (Standard Test Method for Measurement of Retroreflective Pavement Marking Materials with CEN-Prescribed Geometry Using a Portable Retroreflectometer) and evaluated in accordance with ASTM D7585/D7585M (Standard Practice for Evaluating Retroreflective Pavement Markings Using Portable Hand-Operated Instruments).

Mobile Retroreflectometer

1. Calibration of the instruments shall be in accordance with the manufacturer's instructions.
2. Retroreflectivity shall be measured in a manner proposed by the Contractor and approved by the Engineer. The basis of approval of the test method will be conformance to a recognized standard test method or provisional standard test method.

The measurements shall be obtained when the pavement surface is clean and dry and shall be reported in millicandelas per square foot per foot candle - $\text{mcd}/\text{ft}^2/\text{fc}$ (millicandelas per square meter per lux ($\text{mcd}/\text{m}^2/\text{lux}$)). Measurements shall be obtained sequentially in the direction of traffic flow.

Additional Contents of Certified Test Report

The CTR shall also list:

- Project and Route number
- 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.
- Grand Average and standard deviation of the retroreflectivity readings for each line, symbol or legend.

Initial Performance:

In order to be accepted, all epoxy resin pavement markings must meet the following minimum retroreflectivity reading requirement:

White Epoxy: minimum retroreflectivity reading of $400 \text{ mcd}/\text{ft}^2/\text{fc}$ ($\text{mcd}/\text{m}^2/\text{lux}$)

Yellow Epoxy: minimum retroreflectivity reading of $325 \text{ mcd}/\text{ft}^2/\text{fc}$ ($\text{mcd}/\text{m}^2/\text{lux}$)

At the discretion of the Engineer, the Contractor shall replace, at its expense, such amount of lines, symbols and legends that the grand average reading falls below the minimum value for retro-reflectivity. The Engineer will determine the areas and lines to be replaced. The cost of replacement shall include all materials, equipment, labor and work incidental thereto.

ITEM #1220013A - CONSTRUCTION SIGNS - BRIGHT FLUORESCENT SHEETING

Description: The Contractor shall furnish construction signs with bright fluorescent sheeting and their required portable supports or metal sign posts that conform to the requirements of NCHRP Report 350 (TL-3). The construction signs and their required portable supports or metal sign posts shall conform to the signing requirements stated in Article 9.71 "Maintenance and Protection of Traffic", as shown on the plans and/or as directed by the Engineer.

Materials: Prior to using the construction signs and their portable supports, the Contractor shall submit to the Engineer a copy of the Letter of Acceptance issued by the FHWA to the manufacturer documenting that the devices (both sign and portable support tested together) conform to NCHRP Report 350 (TL-3).

Portable sign supports shall be designed and fabricated so as to prevent signs from being blown over or displaced by the wind from passing vehicles. Portable sign supports shall be approved by the Engineer before they are used. Mounting height of signs on portable sign supports shall be a minimum of 1 foot and a maximum of 2 feet, measured from the pavement to the bottom of the sign.

All sign faces shall be rigid and reflectorized. Sheet aluminum sign blanks shall conform to the requirements of Article M.18.13. Metal sign posts shall conform to the requirements of Article M.18.14. Application of reflective sheeting, legends, symbols, and borders shall conform to the requirements specified by the reflective sheeting manufacturer. Attachments shall be provided so that the signs can be firmly attached to the portable sign supports or metal posts without causing damage to the signs. A Materials Certificate and Certified Test Report conforming to Article 1.06.07 shall be required for the reflective sheeting.

The following types of construction signs shall not be used: mesh, non-rigid, roll-up, corrugated or waffle board types substrates, foam core and composite aluminum sign substrates.

Reflective sheeting shall conform to the following:

The fluorescent orange prismatic retroreflective sheeting shall consist of prismatic lenses formed in a transparent fluorescent orange synthetic resin, sealed, and backed with an aggressive pressure sensitive adhesive protected by a removable liner. The sheeting shall have a smooth surface.

Physical Properties:

A. Photometric - Coefficient of Retroreflection R_A

When the sheeting applied on test panels is measured in accordance with ASTM E 810, it shall have minimum coefficient of retroreflection values as shown in Table I. The rotation angle shall be as designated by the manufacturer for test purposes, the observation angles shall be 0.2 degrees and 0.5 degrees, the entrance angles (component B_1) shall be -4 degrees and +30 degrees.

TABLE I

Minimum Coefficient of Retroreflection R_A
Candelas per footcandle per square foot

Observation Angle (deg.)	Entrance Angle (deg.)	R_A Orange
0.2	- 4	200
0.2	+ 30	90
0.5	- 4	80
0.5	+ 30	50

The rotation shall be as designated by the manufacturer.

B. Daytime Color

Color shall conform to the requirements of Table II. Daytime color and maximum spectral radiance factor (peak reflectance) of sheeting mounted on test panels shall be determined instrumentally in accordance with ASTM E 991. The values shall be determined on a Hunter Lab Labscan 6000 0/45 Spectrocolorimeter with option CMR 559 (or approved equal 0/45 instrument with circumferential viewing illumination). Computations shall be done in accordance with ASTM E 308 for the 2 degree observer.

TABLE II

Color Specification Limits** (Daytime)

Color	1		2		3		4		Reflectance Limit Y (%)	
	X	Y	X	Y	X	Y	X	Y	MIN	MAX
Orange (new)	.583	.416	.523	.397	.560	.360	.631	.369	28	-
Orange (weathered)	.583	.416	.523	.397	.560	.360	.631	.369	20	45

Maximum Spectral Radiance Factor, new: 110%, min.
weathered: 60%, min.

** The four pairs of chromaticity coordinates determine the acceptable color in terms of the CIE 1931 standard colorimetric system measured with standard illuminant D65.

C. Nighttime Color

Nighttime color of the sheeting applied to test panels shall be determined instrumentally in accordance with ASTM E 811 and calculated in the u' , v' coordinate system in accordance with ASTM E 308. Sheeting shall be measured at 0.33 degrees observation and -4 degree entrance at rotation as determined by the manufacturer for test purposes. Color shall conform to the requirements of Table III.

TABLE III

Color Specification Limits ** (Nighttime)

Color	1		2		3		4	
	u'	v'	u'	v'	u'	v'	u'	v'
Orange (new and weathered)	.400	.540	.475	.529	.448	.522	.372	.534

D. Resistance to Accelerated Weathering

The retroreflective surface of the sheeting shall be weather resistant and show no appreciable cracking, blistering, crazing, or dimensional change after one year's unprotected outdoor exposure in south Florida, south-facing and inclined 45 degrees from the vertical, or after 1500 hours exposure in a xenon arc weatherometer in accordance with ASTM G26, Type B, Method A. Following exposure, panels shall be washed in a 5% HCL solution for 45 seconds, rinsed thoroughly with clean water, blotted with a soft clean cloth and brought to equilibrium at standard conditions. After cleaning, the coefficient of retroreflection shall be not less than 100 when measured as in D.2, below, and the color is expected to conform to the requirements of Tables II and III for weathered sheeting. The sample shall:

1. Show no appreciable evidence of cracking, scaling, pitting, blistering, edge lifting or curling or more than 0.031 inch shrinkage or expansion.
2. Be measured only at angles of 0.2 degrees observation, -4 degrees entrance, and rotation as determined by the manufacturer for test purposes. Where more than one panel of color is measured, the coefficient of retroreflection shall be the average of all determinations.

E. Impact Resistance

The retroreflective sheeting applied according to the manufacturer's recommendations to a test panel of alloy 6061-T6, 0.040 inch by 3 inches by 5 inches and conditioned for 24 hours, shall show no cracking outside the impact area when the face of the panel is subjected to an impact of 100 inch-pounds, using a weight with a 0.625 inch diameter rounded tip dropped from a height necessary to generate an impact of 100 inch-pounds, at test temperatures of both 32° F and 72° F.

F. Resistance to Heat

The retroreflective sheeting, applied to a test panel as in E., above, and conditioned for 24 hours, shall be measured in accordance with Paragraph A. at 0.2 degree observation and -4 degree entrance angles at rotation as determined by the manufacturer for test purposes and exposed to 170° ± 5° F for 24 hours in an air circulating oven. After heat exposure the sheeting shall retain a minimum of 70% of the original coefficient of retroreflection.

G. Field
Performance:

Retroreflective sheeting processed and applied to sign blank materials in accordance with the sheeting manufacturer's recommendations, shall perform effectively for a minimum of 3 years. The retroreflective sheeting will be considered unsatisfactory if it has deteriorated due to natural causes to the extent that: (1) the sign is ineffective for its intended purpose when viewed from a moving vehicle under normal day and night driving conditions; or (2) the coefficient of retroreflection is less than 100 when measured at 0.2 degrees observation and -4 degree entrance. All measurements shall be made after sign cleaning according to the sheeting manufacturer's recommendations.

Construction Methods: Ineffective signs, as determined by the Engineer and in accordance with the ATSSA guidelines contained in "Quality Standards for Work Zone Traffic Control Devices", shall be replaced by the Contractor at no cost to the State.

Signs and their portable sign supports or metal posts that are no longer required shall be removed from the project and shall remain the property of the Contractor.

Method of Measurement: Construction Signs - Bright Fluorescent Sheeting will be measured for payment by the number of square feet of sign face. Sign supports will not be measured for payment.

Basis of Payment: "Construction Signs - Bright Fluorescent Sheeting" required and used on the project will be paid for at the Contact unit price per square foot. This price shall include the furnishing and maintenance of the signs, portable sign supports, metal sign posts and all hardware. Each sign and support or posts will be paid for once, regardless of the number of times it is used.

<u>Pay Item</u>	<u>Pay Unit</u>
Construction Signs – Bright Fluorescent Sheeting	SF

ITEM #1303196A – RELOCATE FIRE HYDRANT

Description:

Work under this section shall consist of the removal and relocation of fire hydrant assemblies where shown on the plans in conformance with these specifications and requirements of Aquarion Water.

Materials:

Aquarion shall provide the materials necessary to replace the fire hydrant assembly between the 6 inch gate valve and the water main, including tees, the gate valve and the intervening 6 inch ductile iron pipe. The Contractor shall carefully remove the existing hydrant, elbow and the 6 inch restrained mechanical joint pipe beyond the Aquarion gate valve and modify/relocate them as necessary to the location shown on the plans. Any of the items between the gate valve and the hydrant damaged or determined to be unusable will be replaced in kind by the Contractor. Backfill material shall be of a quality satisfactory to the Engineer and shall be free from large or frozen lumps, wood and other extraneous material. It shall be free from stones larger than 4 inches.

Construction Methods:

Construction methods shall conform to the Aquarion Technical Specifications included below.

Method of Measurement:

This work shall be measured for payment by the unit each for “Relocate Fire Hydrant”, complete in place and ready for operation from the Aquarion gate valve. Measurement for payment shall be for each fire hydrant assembly relocated and accepted, including all materials, for a complete unit.

Basis of Payment:

Payment for “Relocate Fire Hydrant” shall be by the contract unit price each, complete in place, which price shall include all materials, equipment, tools and labor incidental thereto.

<u>Pay Item</u>
RELOCATE FIRE HYDRANT

<u>Pay Unit</u>
EA.

Aquarion Water Company of Connecticut
General Specifications

G.01 Scope of Work

The Contractor shall provide all the labor, superintendence, miscellaneous materials, plant, tools, and equipment necessary for properly constructing, within the time stipulated, the Water Main Installation and all other work necessary for the proper completion of the project as specified herein.

G.02 Standards

Wherever reference is made in this Contract to the standard of any technical society or other recognized organization, these shall be construed to mean the latest standard adopted and published at the date of advertisement for bids.

Abbreviations are defined as follows:

AWWA	- American Water Works Association
ASTM	- American Society for Testing and Materials
ANSI	- American National Standards Institute
ASA	- American Standards Association
ACI	- American Concrete Institute
AASHTO	- American Association of State Highway and Transportation Officials
ACPA	- American Concrete Pipe Association
ASME	- American Society of Mechanical Engineers
CIPRA	- Cast Iron Pipe Research Association
CISPI	- Cast Iron Soil Pipe Institute
DIPRA	- Ductile Iron Pipe Research Association
IEEE	- Institute of Electrical and Electronics Engineers
NCPI	- National Clay Pipe Institute
FMHA	- Farmers Home Administration
DOT	- Connecticut Department of Transportation
C.I.	- Cast Iron
D.I.	- Ductile Iron
V.T.	- Vitrified Tile
H.D.P.E	- High Density Polyethylene
R.C.P.	- Reinforced Concrete Pipe

G.03 Standard Details and Working Drawings

The Company's water main installation requirements are generally shown on the Standard Detail Sheets accompanying the Contract Documents. The location of water mains for specific water main extensions will be provided on working drawings by the Engineer or his authorized agent. The Engineer or his authorized agent will have the final decision as to location changes in the field.

G.04 Lines and Grades

Aquarion will establish the location of the centerline of the pipeline. The Engineer will also establish Bench Marks as required. The Contractor shall establish offsets, as necessary, a suitable distance from the work to be done so that proper lines and grades for the work may be maintained. The Contractor shall protect all survey points from damage insofar as possible.

The Contractor shall be responsible for placing the pipe accurately to the established lines and grades as shown on the plans or as directed.

G.05 Alterations

Aquarion may make alterations in the line, grade, plan, form, dimensions, or materials of the work, or any part thereof either before or after the commencement of the work. If such alterations increase the quantity or work, such increase will be paid for according to the quantity of such extra work actually done and at the prices stipulated for such work under unit price items of the Contract. In case no unit price is applicable, the alterations will be paid for as extra work defined in Section F.29 of the General Conditions.

G.06 Planimeter

The use of the planimeter shall be considered satisfactory for estimating quantities where geometric and analytic methods would be comparatively laborious.

G.07 Estimated Quantities

To aid Aquarion in determining quantities to be paid for, the Contractor shall, whenever requested, give the Engineer access to the proper invoice, bills of lading, or other pertinent documents and shall provide methods and assistance necessary for weighing or measuring materials.

G.08 Explosives and Blasting

Explosives for blasting shall be stored, handled and used in accordance with the laws, ordinances and regulations of the State of Connecticut, all local regulations, and with such additional regulations as the Engineer may require. Blasting shall be conducted so as not to endanger persons or property; and unless otherwise permitted, shall be covered or otherwise satisfactorily confined. The Contractor shall be responsible for and shall make good any damage of whatever nature caused by blasting or accidental explosions.

G.09 Storage of Materials

Materials shall be stored so as to insure the preservation of their quality and fitness for the work. When considered necessary, they shall be placed on wooden platforms and covered or stored in a suitable building, as directed by the Engineer. Stored materials shall be located so as to facilitate prompt inspection.

G.10 Removal of Condemned Materials

The Contractor shall remove from the site of the work, without delay, all rejected and condemned materials of any kind brought to or incorporated in the work. No such rejected or condemned materials shall again be offered for use by the Contractor.

G.11 Working Conditions

In prosecuting the work of this Contract, the Contractor shall provide working conditions on each operation that shall be as safe and healthful as the nature of the operation permits. He shall comply with all safety and sanitary rules, laws and regulations.

G.12 Deleted

G.13 Work in Inclement Weather

During freezing, stormy and inclement weather, no work shall be performed except such as can be done satisfactorily and in such manner as to secure first-class construction throughout.

G.14 Working Hours and Overtime Work

Working Hours: The Contractor's working schedule shall be confined to a five (5) day week, Monday through Friday, and an 8-hour working day confined between the hours of 8:00 a.m. and 4:30 p.m. current local time for all territories except, Greenwich. Greenwich normal working hours are from 7:00 a.m. to 3:30 p.m. Monday through Friday.

Unless otherwise especially permitted, no work shall be done between the hours of 4:30 p.m. and 8:00 a.m. except as necessary for the proper care and protection of the work already performed. If it shall become absolutely necessary to perform work at night, the Engineer shall be informed a reasonable time in advance of the beginning of the

performance of such work. Only such work shall be done at night as can be done satisfactorily and in a first-class manner. Good lighting and all other necessary facilities for carrying out and inspecting the work shall be provided and maintained at all points where such work is being done.

G.15 Water Supply, Electrical Energy, and Trailer

The Contractor shall make his own arrangements for providing a project trailer (if needed) and obtaining the electrical energy and water supply necessary for construction purposes. The cost of these items shall be included in the unit price bids.

G.16 Competent Person

The Contractor shall assign or designate a competent representative with authority to promote and enforce safety provisions and safe practices on or related to the project for the duration of the construction.

G.17 Safety Codes

The safety provisions of applicable laws building and construction codes and the latest edition of the code of Federal Regulations shall be observed. A copy of the latest edition and all supplements of the code of Federal Regulations pertaining to occupational Safety and Health (OSHA) for construction shall be available for reference at all times with the Contractor's competent representative on the job. Contractor's safety plan will be available so that it may be submitted to the Engineer on request.

G.18 Contract Limits

The Contractor shall confine his activities to within street lines, easements and rights-of-way.

The Contractor shall take particular care to protect trees and shrubs. He shall make good any damage to the satisfaction of Aquarion.

The Contractor shall not enter upon or make use of any private property along the line of work, outside the limits of the rights-of-way, except when written permission is secured from the owner of said property and a copy delivered to Aquarion. The Contractor will be held responsible for all damage or injury done by himself or those in his employ to any private or public property of any character during the prosecution of the work. The Contractor shall restore or repair at his own expense, in a manner satisfactory to Aquarion, such property as may be damaged by his operations during the prosecution of the work.

In case of failure on the part of the Contractor to restore or repair such property in a manner satisfactory to the Company, the Company may, upon 48 hours notice to the Contractor, proceed with such restoration or repair. The expense of such restoration or repair shall be deducted from any moneys which are due or may become due the Contractor under this Contract.

G.19 Work in Easements

(Deleted)

G.20 Soil and Groundwater Conditions

Soil borings have not been made for the work of this Contract.

In bidding on this Contract, each Bidder acknowledges that boring logs are not available and be aware of the general subsurface conditions of these areas.

G.21 Existing Structures

The Contractor shall abide by all updated State of Connecticut "Call Before You Dig" regulations. The Contractor shall call 48 hours in advance of commencement of construction and all excavations in existing streets shall be premarked showing the proposed trench widths for the entire water main extension.

If AQUARION WATER COMPANY provides drawings for a project and if these drawings show existing utilities, said utilities are shown for the convenience of the Contractor in accordance with the best information available, but are not guaranteed to be correct or complete. The Contractor shall explore the route ahead of trenching and shall uncover all known obstructing pipes sufficiently to determine their location. Necessary changes in location may be made by the Engineer to avoid unanticipated obstructions.

Wherever water or gas mains, electric or telephone ducts, electric, telephone or telegraph poles are encountered and may be in any way interfered with, the Contractor shall keep the utility company involved fully informed in advance. The Contractor shall cooperate with the utility company in the protection, removal, relocation and replacement of such structures.

The Contractor shall, at his own expense, sustain in their places and protect from direct or indirect injury all utilities, pipes, poles, conduits, walls, buildings and other structures, and property in the vicinity of his work. Such sustaining and supporting shall be done carefully by the Contractor and as required by the party owning or controlling the structure. Before proceeding with the work of sustaining and supporting the structure, the Contractor shall satisfy the Company that the methods and procedures to be used have been approved by the party owning said structure. The Contractor shall take all risks attending the presence or proximity of pipes, poles, conduits, walls, buildings, wires or other structures, utilities and property in the vicinity of his work, and he shall be responsible for all damage and assume all expense for direct or indirect injury, caused by his work, to any of the structures, or to any person or property – even if the Contractor believes that damage or injury created by the Contractor is the result of a mis-marked utility.

Guard rails, posts, guard cables, signs, poles, markers, etc., which are temporarily removed to facilitate installation of the piping shall be replaced and restored in their original condition to the satisfaction of the Company. If such items are removed because AQUARION WATER COMPANY has requested placement of the pipeline in close proximity to the item, AQUARION WATER COMPANY will pay the cost to restore the item.

The Contractor shall, at his own expense, retain the services of a licensed surveyor to replace property markers on or adjacent to privately owned property which have been disturbed during the course of construction. If a property marker is removed because AQUARION WATER COMPANY has requested placement of the pipeline in close proximity to the marker, AQUARION WATER COMPANY will pay the cost to replace the marker.

G.22 Accommodation of Traffic

During the progress of the work, all roads shall be kept open for the passage of traffic and pedestrians and shall not be unnecessarily obstructed unless authorized by the authority having jurisdiction over same. Driveways, sidewalks and crossings shall be closed as short a time as possible while pipe is being placed, and passage shall be restored as soon as possible thereafter by properly placed backfill or approved bridging. The Contractor shall take such measures at his own expense as may be necessary to keep the roads open for traffic, and shall give advance notice to the Department of Transportation (D.O.T.), town public works department, local police and state police as required.

Warning signs shall be provided along all roads where work is in progress. The Contractor shall notify and make all arrangements with the D.O.T., town public works department, local police and state police for direction of traffic past the equipment, machinery, or construction operations. Barricades and lights shall be provided to protect

traffic. Where trenches have been cut in road shoulders on which traffic may pass at times, warning signs shall be placed at frequent intervals and maintained until the shoulder is safe for travel. All such work and operations shall be in accordance with the requirements of the D.O.T., public works department, local police and state police.

Should the Contractor or his employees neglect to set out and maintain barricades or lights, as required in these Specifications, Aquarion may immediately and without notice, arrange for furnishing, installing and maintaining barricades or lights, and any other precaution deemed necessary. The cost thereof shall be borne by the Contractor and may be deducted from any amount due or to become due to the Contractor under this Contract.

The Contractor shall be held responsible for any damages that may have to be paid as a consequence of the Contractor's failure to protect the public.

G.23 Hauling Materials

Before starting any work, the Contractor shall arrange with the municipal or State officials having jurisdiction for the use of routes of travel for hauling materials, including surplus earth and rock, that will result in minimum inconvenience to the traveling public. Routes of travel so scheduled shall be adhered to throughout the course of the work, unless otherwise approved.

G.24 Emergency Work

The Contractor shall file with the first selectman, the director of public works, and police departments of the town involved, the name and telephone number of a person authorized by him who may be contacted regarding emergency work at the job site that may be required during non-working hours for reasons of public safety.

This person shall be readily available and have full authority to deal with any emergency that may occur.

G.25 Dust Control

The Contractor shall take all necessary precautions to prevent and abate nuisance caused by dust arising from his operations. Approved methods applicable to various parts of the work such as application of water spray or calcium chloride shall be employed. This also applies to maintaining temporary paving nuisance free until permanent paving is placed.

G.26 Cleaning Up Site

During progress of the work, the Contractor shall keep the construction areas in a neat condition, free from accumulations of waste material and rubbish.

On or before completion of the work and before acceptance and final payment shall be made, the Contractor shall clean and remove from the site and adjacent property, all surplus and discarded materials, rubbish and temporary structures, restore in an acceptable manner all property and leave the whole in a neat and presentable condition.

G.27 Sedimentation Control

All watercourses and wetlands shall be protected from sedimentation, both during and after construction. This provision applies particularly to dewatering activities, storage of excavated or stockpiled material, and trench or ditch excavation. The following best management practices for protecting the environment should be employed:

1. Where dewatering is necessary, the pump shall not discharge directly into the stream or river. Methods and devices such as pumping the water into a temporary sedimentation pool, providing surge protection at the inlet and outlet of pumps, or floating the intake of the pump, shall be used to minimize and retain the suspended solids. The pump may discharge into an

- area of the stream contained by curb or silt fence, if approved by Aquarion as the only feasible means of dewatering. Regardless of the method used, all affected areas shall be restored to their original condition.
2. Cofferdams, and other measures such as bank stabilization, shall be of minimal size necessary to carry out the project. In all cases, such installations shall not impede the normal flow of water or cause flooding.
 3. No construction shall proceed until the erosion and sedimentation control plans, prepared by the contractor, have been approved by the Engineer.
 4. All off-site locations for stockpiled material used or excavated during the progress of the project shall be indicated on a map. This map shall also show the location for final disposal of surplus excavated material.
 5. All temporary fill, such as that used for access roads and/or cofferdams, shall be properly stabilized during use to prevent erosion, and must be disposed of at an upland site, and suitably contained to prevent runoff from reentering a waterway or wetland. All areas affected by temporary fills must be restored to their original contours and revegetated with suitable hydrophilic vegetation. The area extent of temporary fill or excavation shall be minimized to that area determined by the Engineer as absolutely necessary to perform the required work.
 6. Excavated material from non-wetland areas associated with the activities in progress shall not be deposited in the surrounding wetlands or streams.
 7. During temporary diversion of a waterway, water shall be kept deep enough in the channel to allow for the passage of fish wherever necessary.
 8. Every precaution shall be used while working in the vicinity of a waterway to prevent and minimize degradation of the existing water quality. All activities shall conform and be at all times consistent with applicable water quality standards, and management practices of the CT Guidelines for Soil Erosion and Sediment Control, Federal Water Pollution Control Act (1988) and other applicable state laws, and as defined in the Form 814, Section 1.07.16, entitled "Pollution Control". Additionally, appropriate measures as detailed in Section 2.10 of the Form 814 shall be used, as approved by the Engineer.
 9. Fording of streams with equipment shall be avoided. Where necessary, such equipment travel shall be kept to a minimum. Where frequent equipment travel on stream banks and beds is necessary, washed stone or rip rap shall be placed to minimize erosion, scour, and turbidity. When appropriate, the Engineer may specify that such material may remain after completion of construction, provided no significant grade change or impact will result.
 10. All stumps, tree roots, matted roots, debris, and all other objectionable materials resulting from clearing the specified areas, shall be removed and disposed of outside of designated wetland areas.
 11. A method approved by Aquarion shall be used to prevent construction debris, paint or other materials from entering the waterway.
 12. The Contractor, when grit abrasive blast cleaning structures directly over water, shall prevent all spent blast materials, dust and removed material from entering the water.
 13. No equipment or machinery shall be stored, cleaned, or repaired within twenty-five (25) feet of a wetland or watercourse.

14. The dumping of oil or other deleterious materials on the ground is expressly forbidden. The Contractor shall provide a means of catching and retaining drained oil, removed oil filters, or other deleterious material, and of properly disposing of same, subject to the approval of the Engineer.
15. Work within and adjacent to watercourses shall be conducted during periods of low stream flow, whenever possible. The Engineer shall monitor stream flow conditions during the conduct of such work, and shall cause such activity to cease should stream flow conditions threaten to cause excessive erosion, siltation or turbidity. During storms, every effort shall be taken to secure the work site.

G.28 Work Within Areas Designated as Inland Wetlands

The Contractor shall adhere to all wetland permit requirements and wetland regulations of the town involved. See section G.27.

G.29 Work in Waterbodies

The Contractor's attention is directed to those portions of the work of this Contract which are in a brook or river bed. The Contractor shall operate all equipment and perform all construction operations so as to minimize pollution.

Care shall be taken to prevent or reduce to a minimum any damage to any waterbody from pollution by debris, sedimentation, or other material, or from the manipulation of equipment and/or materials in or near such waterbodies and on abutting property.

In all cases involving work in a waterbody, every effort should be made to return the waterbody to the highest possible standard for aesthetic value, water quality and fish habitat. Sufficient flow of water shall be maintained at all times to sustain aquatic life downstream. Refer to section G.27 for best management practices.

G.30 Operation of Valves

Unless otherwise permitted, existing valves shall not be operated by the Contractor.

Whenever the operation of a valve is necessary the Contractor shall make arrangements, a reasonable time in advance of the need, to have Aquarion Water Company forces perform the required operations.

G.31 Payment for Miscellaneous Work

No direct payment will be made to the Contractor for furnishing and providing miscellaneous temporary works, project signs, plant and services, permits, insurances, watchmen, cleanup, and the like, unless payment therefore has been definitely provided. Compensation for the same is understood to be included in the scheduled prices herein before given for the various kinds of work contemplated.

G.32 Guarantee

The Contractor hereby guarantees all the work and equipment furnished under this contract against any defects in workmanship or material for a period of **two (2) years** following the date of final acceptance of work by the Company. Under this guarantee, the Contractor agrees to make good, without delay, at its own expense, any failure of such parts due to faulty construction or installation or to the failure of any such equipment to successfully perform all the work put upon it within the limits of the specifications and further shall make good any damage to any part of the work caused by such failure.

In addition, if any settlement of the trench is observed within a period **two (2) years** from the date of final acceptance of the work, the necessary repairs, as determined by the

Engineer, shall be made by the Company or by the Contractor at the discretion of the Engineer and the cost therefore shall be borne by the Contractor. Such repairs shall include, but not be limited to, the necessary replacement of any pavement that may have been placed over the trench, which replacement is required as a result of such settlement. Contractor shall be responsible for maintenance of temporary pavement for up to **one (1) calendar year**.

ATTACHMENT T

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ITEM 3	ROCK EXCAVATION
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**Aquarion Water Company of Connecticut
Service Agreement Between
Owner and Contractor**

**Attachment T
Technical Specifications**

INSTALL WATER MAIN AND APPURTENANCES

Item 1

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1.1 Work Included

Under this item, the Contractor shall do all necessary work to install ductile iron pipe or HDPE in those projects as selected by AQUARION WATER COMPANY. AQUARION WATER COMPANY will normally provide and deliver all fittings, appurtenances, and other pipe materials to each project.

This item includes all labor, tools, materials, and equipment necessary for clearing and grubbing; excavation and backfill; furnishing and installing pipe, fittings, meter vaults, and valves; making connections to existing pipelines; pavement removal (**including necessary saw cutting**); walls, fences, signs and any other structures which must be removed to carry out the work; removing topsoil and sod; care and protection of existing pipes, utilities, and

other structures; dust control; piling and storing of unexcavated materials; disposing of excess materials; sheeting and shoring; dewatering; stream crossings; furnishing and placing gravel or screened granular bedding; and all other work shown or specified for furnishing and installing the water main, except that which is specifically included for payment under other items of the Contract.

1.2 Ductile Iron Pipe

1.2.1 Pipe, Fittings, and Specials

Pipe shall be of domestic ductile iron. Pipe joints may be either mechanical joint or push-on joint. Fittings shall be ductile iron with mechanical or restrained joints to match the pipe.

Ductile iron pipe shall conform in all respects, except for ends, to ANSI A21.51 (AWWA C151), latest editions. Ductile iron pipe shall be class 52, double tar coated and double cement lined. Ductile iron pipe is to carry a 10 year manufacturer's warranty from date of installation.

Pipe ends shall conform to ANSI A21.11 (AWWA C111), latest editions.

Fittings shall conform to ANSI A21.10 (AWWA C110) and ANSI A21.11 (AWWA C111), latest edition.

The manufacturer's certifications specified in Sections 51.4, 51.7, 51.9, and 51.14 of Specification ANSI A21.51 (AWWA C151) shall be furnished for ductile iron pipe. A statement shall also be furnished stating that the coating and lining have been installed in accordance with ANSI A21.4 (AWWA C104).

All pipe and fittings shall be furnished with a bituminous seal coat, standard thickness, cement mortar lining in accordance with ANSI A21.4 (AWWA C104), latest revision, and an exterior bituminous coating. Coating that is damaged during shipment or placement shall be touched up in the field with two (2) coats of an asphaltic coating fully resistant to water and chemicals. Materials used for interior surfaces shall be acceptable for use in a potable drinking water supply and shall not impact any odors to the pipe and water.

All bolts, nuts, glands, gaskets, and other jointing materials are included under this Item.

Before any pipe is shipped to the job site, the manufacturer shall furnish the Engineer with details of his proposed joint, giving manufacturer's tolerances. Each shipment of pipe shall be accompanied by a certification from the manufacturer that the pipe and the joints

meet the Specifications and, in particular, the joint tolerances. Each piece of pipe and each fitting shall be plainly marked at the foundry with class number and weight.

At all reducers and changes in direction, an approved restrained joint will be required utilizing the following chart for determining the number of joints to be restrained:

NUMBER OF RESTRAINED JOINTS AND LENGTHS (D.I.P. OR P.V.C.)

(100 psi, Cohesive Granular Soils, 18-foot lengths)

<u>Pipe Size</u>	<u>90° Bend</u>	<u>45° Bend</u>	<u>22 1/2° Bend</u>	<u>11 1/4° Bend</u>	<u>Dead End</u>
6"	F(11)	F(5)	F(2)	F(1)	F+1(32)
8"	F(14)	F(6)	F(3)	F(1)	F+2(42)
10"	F+1(17)	F(7)	F(3)	F(2)	F+3(50)
12"	F+1(21)	F(9)	F(4)	F(2)	F+3(60)
16"	F+1(27)	F(11)	F(5)	F(3)	F+4(78)
24"	F+2(38)	F+1(16)	F(8)	F(4)	F+6(112)

Notes:

1. F+1 - Means fitting plus 1 joint either side of fitting.
2. (11) - Means 11 feet either side of fitting must be restrained, i.e. no short pieces.
3. For pressure greater than 100 psi., Aquarion will determine the number of restrained joints.

1.2.2 Laying Ductile Iron Pipeline

All pipe installation shall conform to AWWA Standard C600, latest revision, unless otherwise modified by these Specifications.

Ductile iron pipe shall be laid to a minimum depth between 4'-0" to 5'-0" to the top of pipe unless otherwise directed. Where the pipeline crosses existing utilities, a vertical clearance of twelve inches (12") minimum shall be maintained, except for sanitary sewers where if the water main is within ten (10) horizontal feet of the sewer, the water main must be at least eighteen inches (18") above the sewer. The pipe between bell holes shall bear continuously on clean fill. If the Contractor excavates below the required limit, the trench bottom shall be brought to the required grade with an approved backfill of gravel, sand or

crushed stone at the Contractor's expense. In laying pipe, the deflections given in AWWA Standard C600 latest revision shall not be exceeded.

All pipe fittings and valves shall be lowered carefully into the trench by means of mechanical equipment in such a manner as to prevent them from being damaged. The insides of all bells and outsides of spigots shall be wiped clean and dry and shall be free from oil or grease. During the laying of the pipe, extra care shall be taken to see that no dirt, debris, tools, clothing, or other illicit materials are allowed to be left in the pipeline.

After the pipe is laid in the trench, the spigot end shall be centered in the bell and forced home. Under no circumstances shall pipe be laid where there is water in the trench. The Contractor shall install and joint the pipe in accordance with the manufacturer's instructions. The joints shall be made continuous by the installation of metal wedges per the manufacturer's instructions.

When necessary to cut pipe in the field, the cutting shall be done such that neither the pipe nor the lining shall be damaged and such that a smooth, right angle to axis cut is made. A machine designed for this purpose shall be used for the cutting.

1.3 High Density Polyethylene (HDPE) Pressure Pipe

1.3.1 Pipe, Fittings, and Specials

Pipe shall be of HDPE DR-11. Pipe joints may be either mechanical joint or fusion joint as per AWWA Standards C906, or latest revision. Fittings shall be ductile iron with mechanical or restrained joints to match the pipe.

1.3.2 Laying High Density Polyethylene (HDPE) Pipeline

All pipe installation shall conform to AWWA Standards C906, or latest revision, unless otherwise modified by these Specifications.

HDPE pipe shall be laid to a minimum depth between 4'-0" to 5'-0" to the top of pipe unless otherwise directed. Where the pipeline crosses existing utilities, a vertical clearance of twelve inches (12") minimum shall be maintained, except for sanitary sewers where if the water main is within ten (10) horizontal feet of the sewer, the water main must be at least eighteen inches (18") above the sewer. The pipe between bell holes shall bear continuously on clean fill. If the Contractor excavates below the required limit, the trench bottom shall be brought to the required grade with an approved backfill of gravel, sand or crushed stone at the Contractor's expense.

All pipe fittings and valves shall be lowered carefully into the trench by means of mechanical equipment in such a manner as to prevent them from being damaged. The insides of all bells and outsides of spigots shall be wiped clean and dry and shall be free from oil or grease. During the laying of the pipe, extra care shall be taken to see that no dirt, debris, tools, clothing, or other illicit materials are allowed to be left in the pipeline.

After the pipe is laid in the trench, the spigot end shall be centered in the bell and forced home. Under no circumstances shall pipe be laid where there is water in the trench.

The Contractor shall install and joint the pipe in accordance with the manufacturer's instructions. The joints shall be made continuous by the installation of metal wedges per the manufacturer's instructions.

When necessary to cut pipe in the field, the cutting shall be done such that neither the pipe nor the lining shall be damaged and such that a smooth, right angle to axis cut is made. A machine designed for this purpose shall be used for the cutting.

1.4 Line Valves

1.4.1 Work Included

The Contractor shall install all line valves as shown.

1.4.2 Butterfly Valves – 12-inch and Larger

Butterfly valves shall be of the rubber seat, tight closing type. They shall meet or exceed all strength and performance requirements of AWWA Standard C504, latest revision, for Class 150B.

Butterfly valves shall be AWWA rubber seat butterfly valves with the seat mounted in the body of the valve.

Valves shall have mechanical joint ends.

Valve shafts shall be 316 stainless steel Type 507.

Exterior steel or cast iron surfaces of valves, except finished or bearing surfaces, shall be shop painted with two coats of asphalt varnish in accordance with AWWA Standard C504. Interior surfaces shall be painted with AWWA approved epoxy paint.

All valves shall be a product of a manufacturer having units of similar type, size, and service requirements successfully operating in municipal waterworks projects for a period of not less than five (5) years. The manufacturer, if requested by the Engineer, shall furnish torque design calculations.

The valve shaft shall be horizontal and the operator shall be on the side of the pipeline shown on the plans.

Valve seats for water service shall be natural rubber. Seats shall be replaceable. The mating material for the resilient seal shall be No. 18-8 stainless steel. The resilient seat shall be recess mounted, bonded and mechanically retained in the valve body and shall not be penetrated by the valve shaft in sizes 12-inch and larger and shall be completely adjustable around the full 360 circumference.

The method used for bonding the valve seat in place shall be approved by ASTM D429, Method A.

Valve shaft bearings shall be sleeve type, of self-lubricated, woven-oriented Teflon, non-cold-flowing, and shall be contained in reinforced phenolic cylinders through 2-3/4 inch diameter shafts and bronze cylinders on 2-7/8-inch and larger diameter shafts.

The valve operator shall be the traveling-nut type, sealed, gasketed, and lubricated for underground service. It shall be capable of withstanding an overload input torque of 450 foot/lbs. at full-open or closed position without damage to the valve or valve operator. It shall be designed to resist submergence in water to 25 feet of head pressure. Operator nut (crosshead) shall be made of high-strength manganese bronze.

Valve shall be easily operable by one man using standard valve key, even under emergency line-break conditions as severe as those causing a valve torque requirement of as much as two times AWWA Class 150B. Operator shall produce full class 150B output torque requirement throughout entire travel with an input torque no greater than 100 foot-pounds.

All valves shall open to the direction shown on the table *Gate & Hydrants by Town* at the end of this section and be equipped with a 2-inch AWWA operating nut.

All valves shall be tested bubble-tight air-under-water by the manufacturer as follows: 4-inch through 12-inch at 175 psi and 14-inch and up at 150 psi.

In addition, a 300 psi hydrostatic test shall be given to the assembled valve. The 300 psi pressure shall also be applied against the fully closed valve to prove structural soundness and assure compatibility with field-line test procedures.

1.4.3 4", 6", and 8" Gate Valves

The gate valves shall be Resilient - Seated Gate Valves (RSV) AWWA Standard C515, non-rising stem, zinc coated bolts and nuts, mechanical joint ends, "O" ring stem seal, iron full body valves. The valves will be installed vertically in horizontal pipelines and shall open to the direction shown on the table *Gate & Hydrants by Town* at the end of this section and shall be furnished with 2-inch operating unit.

Exterior ductile iron surfaces of valves shall be shop painted with two coats of asphalt varnish in accordance with AWWA Standard C515. Interior surfaces shall be painted with AWWA approved epoxy paint.

All valves shall be a product of a manufacturer having units of similar type, size, and service requirements successfully operating in municipal waterworks projects for a period of not less than five (5) years.

1.4.4 Valve Boxes

Valve boxes shall be cast iron or ductile iron, 48 inches long, 5-1/4-inches diameter shaft with sliding type adjustable top.

Covers shall be cast iron and shall have "WATER" cast on them. Valve boxes shall be set carefully, truly vertical, and accurately centered over the operating nut with the top set at roadway or existing ground surface grade.

If valve boxes are not centered over the valve the Contractor will be responsible to re-excavate and repair at their own expense.

1.4.5 Insertion Valves

Insertion valves shall be Team Insert Valve RW-Gate as manufactured by Team Industrial Services, Alvin, TX. No acceptable equivalent. Valve must be installed by the Jack Farrelly Co. (800) 423-0012.

1.5 Connection to Existing Water Mains

The Contractor will be required to connect to the existing mains as directed by the Engineer. The following connections may be requested and are included as pay item in the special provisions

Tapping Sleeves and Valves

Tapping sleeve and valve units (furnished by the Company) shall be installed when directed by Aquarion and will be Stainless Steel tapping sleeve with MJ outlet.

Cutting and Installation of Branch and Connection to Existing Water Main

When ordered by Aquarion, connection to an existing main shall be made by cutting such main in the manner herein before specified and installing a branch or cross as directed together with a nipple piece and sleeve to complete the closure. The use of cold chisel and striking hammer shall not be permitted. Payment for installation of branch laterals shall be per the Contractor's unit price bid... However, if the Contractor cannot install the lateral or make the connection at the time that he installs the Tee for the lateral and thus must return at a later date to install the lateral or make the connection, payment for installation of the lateral shall be per the unit price in Section A. The branch installation or connection to the existing water main shall be made by cutting such main in the manner herein before specified and installing fittings on the branch and existing water main, along with a nipple piece and sleeve to complete the closure. This unit price bid shall cover the following work related to installation of a branch lateral or connection to existing water main and: removal of pavement, disposal of pavement, excavation, installation of lateral, connection to existing water main and backfill, shall be paid under this item. Additional items required with a branch lateral installation or connection, including temporary paving, traffic control, and rock removal, shall be paid for using the Contractor's unit bid price for these items.

Pipe, and fittings required for making connection or branch installation to existing water main shall be furnished by Aquarion Water Company for installation by the Contractor.

The required shutdown shall be scheduled with Aquarion Water Company; so that affected customers may be notified of the shutdown. The shutdown shall not be made until all materials for making the connection or branch installations have been secured and approved. As the connection or branch installation will not be disinfected with the new piping installed, the interior of all piping shall be swabbed or sprayed with a 1% hypochlorite solution in accordance with Section 10 AWWA C651 prior to installation. After the connection is made, the piping shall be thoroughly flushed and subjected to the normal working pressure with all joints being checked for leaks prior to backfilling.

Tapping Saddles and Valves

Tapping saddles, furnished by the Company will be with flanged outlet and shall be installed in accordance with the manufacturer's specifications. Payment will be made on hole size rather than on pipe size.

1.6 Hydrants

Installing hydrant assemblies is specified under Item 5.

1.7 Handling and Distribution of Pipe, Specials, and Valves

The pipe, specials, and valves shall be handled and protected during loading, transporting, and unloading operations in such manner as to avoid damage. Pipe, specials, and valves shall be unloaded by lifting with hoists or skidding so as to avoid shock or damage. Under no circumstances shall they be dropped nor shall they be permitted to roll against pipe already on the ground. Insofar as practicable, each piece of pipe shall be delivered and unloaded near the place where it is to be installed and where it will not interfere with excavation operations, traffic, or adjacent property owners and may be readily inspected by the Engineer. If this is not possible, the pipe, specials and valves shall be stored in a safe area as close to the job site as possible. The Contractor is responsible for identifying a location for storage of pipe, fittings, valves, excavated material, and borrow material. AQUARION WATER COMPANY is responsible for delivering "AQUARION WATER COMPANY-provided" materials to said location. The contractor is responsible for stringing pipe along the intended pipeline route. All damaged pipe, specials, and valves will be rejected and such rejected pipe, specials, and valves shall be removed from the site. In the event of slight damage to the coating or lining, Aquarion may permit the damage to be repaired at the site. Such repairs shall be made at the Contractor's expense.

1.8 Bedding

There shall be a minimum four inch (4") base of bank run gravel, dead sand, stone fill (as specified under Item 4), or clean backfill under the pipe when necessary. The material shall be spread in layers and shall be compacted in place at the proper grade to

provide a solid uniform bed for the pipe or structure for the full width and length of the bottom of the excavation. The bedding shall extend four inches (4") up the pipe as shown on the plans or as directed by the Engineer. Bell holes shall be carefully dug at the ends of the pipe to provide ample room for properly making and checking of joints and providing room for four inches (4") of compacted bedding material under the bell when necessary.

When the pipe has been bedded satisfactorily and the joint made, the recess under the bell shall be refilled and tamped on each side of the pipe to hold it securely in place, care being taken not to disturb the position of the pipe during the process, and in such a manner that the bearing is distributed evenly over the entire length of pipe.

Bank run gravel, dead sand or stone fill necessary for bedding is included with the various pipe installation items in Section A.

1.9 Cleaning and Inspection of Pipe, Specials, and Valves

The insides of the pipes, specials, and valves shall be thoroughly cleaned before laying and shall be kept clean until accepted in the completed work. Whenever the work is interrupted, all open ends of pipe shall be temporarily closed by watertight plugs. No trench water shall be permitted to enter the pipe. All pipe and special castings shall be carefully examined for defects and no pipe or special casting shall be laid which is known to be defective. If any such pipe or casting is discovered to be defective after placement, it shall be removed and replaced with a sound pipe or casting by the Contractor at his own expense.

1.10 Existing Utilities

The Contractor shall abide by current State of Connecticut "Call Before You Dig" regulations. The Contractor shall call 48 hours in advance of commencing any construction. All excavations in existing streets shall be pre-marked showing the proposed trench width for the entire water main extension.

1.11 Clearing and Grubbing

The Contractor shall remove all trees, brush, shrubs, and debris where encountered in the line of work only to the extent necessary for the prosecution of the work.

Unless otherwise specified, all brush and trees shall be cut within six inches (6") of the ground.

Cutting and removal of cleared materials shall be carried out in such manner as to avoid injury to other trees and structures.

Burning shall not be permitted on the site.

Trees, stumps, brush, and debris shall be disposed of away from the site by the Contractor at no additional cost to the Owner.

1.12 Excavation

The excavation defined herein shall be deemed earth excavation, which shall include the removal of all material other than rock. Rock excavation shall consist of solid ledge rock or boulders, which require drilling and blasting for removal. Rock excavation is specified under Section T-3.

Excavation shall be made in such a manner and to such widths as will give ample room for properly installing and inspecting the pipe or structures that they are to contain and for such sheeting and bracing, pumping and draining as may be necessary. The Contractor shall not use excavating equipment that requires the trench to be excavated to an excessive width. The width of the trench for pipe shall be sufficient to allow thorough compacting of earth or granular refill adjacent to the bottom half of the pipe. Enlargements of the trench shall be made to give ample space for required operations at the pipe joints. The depth of trench in general shall be as described in Item 1.3.2, but if approved by the Engineer, the depth shall be increased or, decreased as required to avoid obstructions. Hand excavation shall be employed whenever, in the opinion of Aquarion, it is advisable to increase the depth more than twelve inches (12") below the bottom of the pipe or structures, or below the limits on the Plans or laying schedule.

The Contractor's attention is directed to the fact that pipe must be bedded as described in Item 1.8 herein. Special care shall be taken to excavate accurately to grade. If the trench is over-excavated, it shall be brought to grade, at the Contractor's expense, by refilling with suitable material in compacted layers, each layer not to exceed six inches (6") in thickness.

Where the bottom of the trench at sub grade is found to be unstable or to contain material which, in the judgment of the Engineer, should be removed, the Contractor shall excavate and remove such material to the width and depth ordered. Before pipe is laid, the sub grade shall be made by refilling with bedding material conforming to Item 1.8, in compacted layers, each layer not to exceed six inches (6") in thickness. The layers shall be thoroughly compacted so as to provide a uniform and continuous bearing for the pipe. Extra excavation and backfill material ordered by the Engineer will be paid for under Section A.

1.13 Rock Excavation

Rock excavation and granular refill including bedding is specified under Section T-3.

1.14 Test Pits

Test pits are specified and paid for as described in the Special Provisions.

1.15 Unauthorized Excavation

All unauthorized excavations outside the lines and grades shown and specified shall be at the expense of the Contractor and he shall refill them with suitable material, in a manner as shown, specified, or approved at his own expense.

1.16 Sheeting and Bracing

Where necessary, the sides of the trenches and excavations shall be supported by adequate sheeting and bracing. The Contractor shall be held accountable and responsible for the sufficiency of all sheeting and bracing used and for all damages to persons or property resulting from the improper quality, strength, placing, maintaining, or removing of the same. When sheeting is removed, care shall be taken not to disturb the new work or existing utilities and structures.

No sheeting is to be left in place unless expressly permitted by the Engineer. Steel and wood sheeting is described in Item 14.

1.17 Dewatering

The Contractor shall provide all necessary pumps, drains, well point systems, and other means for removing water from the trenches and other parts of the work. Before pipes are laid or structures built, the trenches and excavations shall be free from water and, if necessary, suitable drainage facilities shall be provided and maintained. Any drainage system used by the Contractor shall be subject to the approval of the Engineer.

Subgrade damaged by failure to properly dewater will be repaired at the Contractor's expense.

Water from the trenches and excavations shall be disposed of in such a manner as will neither cause injury to public health nor to public or private property, nor to the work completed or in progress.

No direct payment will be made for removal of water, but compensation for such work and all expenses incidental thereto shall be considered as part of the price bid for this Item.

1.18 Erosion Control and Restoration of Grassed Areas

When the trenches cross or disturb grass plots along streets, in open areas, and on slopes or embankments, the disturbed areas shall be fertilized, seeded, mulched, watered, and maintained until a permanent stand of grass is developed. Areas to be seeded shall be raked and rolled to an even grade with all stones and debris removed. All areas disturbed by construction shall be similarly seeded.

Drainage swales or berms shall be constructed as necessary and maintained until such time as an adequate formation of sod is obtained.

1.19 Backfilling

Unless otherwise specified or directed, all trenches and excavations shall be backfilled immediately after installation and inspection of the pipe.

Selected material from excavation shall be used for backfilling trenches along and over the pipe to a level twelve inches (12") above the top of the pipe and shall be earth, sand, or well-graded gravel with a maximum size of four inches (4"). The Contractor shall use suitable material from excess excavation from other portions of the work or from approved gravel pits. It shall be carefully deposited in uniform layers not exceeding twelve inches (12") in depth, and unless otherwise permitted, each layer shall be carefully and solidly tamped with appropriate tools in such a manner as to avoid disturbing the completed work.

Backfilling for the remainder of trenches and excavations shall be approved material free from organic matter. No large stones shall be used in the trench until there is at least two feet (2') of fill over the top of the pipe or around the structure and, in depositing stone, care must be taken not to injure the pipe or structure. Stones which are used in backfilling shall be so distributed through the mass that all interstices are filled with fine material. Backfill shall be deposited in layers and solidly compacted.

Rock and miscellaneous materials from trenches and excavations may be used in the fill, provided individual pieces are not larger than one-half cubic foot in volume and that they are placed so that voids are filled with sand, gravel, and earth.

Backfilling within two feet (2') of structures shall be uniformly deposited on all sides and, unless otherwise permitted, solidly compacted in such manner as to avoid injuring the structure or producing unequal pressures thereon.

When sheeting is drawn, all cavities remaining in or adjoining the trench shall be solidly filled. When sheeting is permitted left in place, all cavities behind such sheeting shall be solidly filled.

If the material from trench excavation is considered, in the opinion of the Engineer, to be unsuitable for use in backfill, the Engineer shall order the Contractor to furnish suitable and approved material for fill.

1.20 Storage and Disposal of Excavated Materials

Materials removed from the trenches shall be stored in such a manner that they will not interfere unduly with pedestrian or vehicular traffic. Sufficient material suitable or backfill shall be stored and hauled as necessary to replace excavated material that is unsuitable for backfill. Materials unsuitable for replacement in the utility trench shall be removed to the City's on-site Waste Stockpile Area for City disposal. All other excess excavated material shall be removed and disposed of away from the site by the Contractor immediately after backfill has been placed.

1.21 Clean-Up

Periodically, as the work progresses and immediately after the work has been completed, the Contractor shall remove all excess materials from the area of the work. The area, in general, shall be kept clean and orderly and returned to a neat condition. The area of construction along roadways shall be broom swept each day after completion of the day's work.

Trees, stumps, brush, and debris shall be disposed of by the Contractor off the site. Burning shall not be permitted.

1.22 Approved List of Manufacturers

List will be provided by Aquarion at the Contractor's request.

ADDITIONAL EARTH EXCAVATION

Item 2

2.1 (Deleted)

2.2 (Deleted)

2.3 (Deleted)

2.4 (Deleted)

2.5 (Deleted)

2.6 (Deleted)

ROCK EXCAVATION

Item 3

- 3.1 Scope of Work
- 3.2 Definition of Rock
- 3.3 Limits of Rock Excavation
- 3.4 Blasting
- 3.5 Backfill
- 3.6 Mechanical Removal of Rock
- 3.7 Measurement
- 3.8 Frost Excavation
- 3.9 Payment

3.1 Scope of Work

This work shall include removal and disposal by hand or mechanical means of all boulders, ledge formations, cement masonry or concrete structures to be removed from within the payment lines.

This work shall include removal, by hand labor, if required, of ledge rock, boulders, masonry or concrete structures in the vicinity of gas mains or other utilities.

3.2 Definition of Rock

Rock, insofar as it applies to trench excavation, shall be defined as rock in definite ledge formation, boulders, or portions of boulders, cement masonry structures, concrete structures, Portland cement pavement or base, of ½ cubic yard or more in volume, removed as indicated or directed from within the payment lines for trench excavation.

3.3 Limits of Rock Excavation

Rock shall be excavated so that generally there will be clear space of at least twelve inches (12") from the outside of the structure or barrel of the pipe to the vertical side of the excavation. Isolated points of rock shall not come nearer than four inches (4") to the outside of the structure or pipes and at joints there shall be sufficient room for properly making the joint. At the bottom, no rock shall come nearer than four inches (4") to the outside barrel of the pipe. Rock in miscellaneous excavations shall be excavated in accordance with the directions and to the limits directed by the Engineer.

The surface of the rock shall be stripped in sections satisfactory to the Engineer before the rock is excavated so that the proper measurements may be made.

3.4 Blasting

Explosives for blasting shall be stored, handled, and used in accordance with the laws, ordinances, and regulations of the State of Connecticut and all local regulations and with such additional regulations as the Engineer may require. Blasting shall be conducted so as not to endanger persons or property and, unless otherwise permitted, shall be covered or otherwise satisfactorily confined. The Contractor shall be responsible for and shall make good any damage of whatever nature caused by blasting or accidental explosions. If rock removal is required near existing utility pipes, cables, or structures, the Contractor may be required to remove such rock without blasting.

3.5 Backfilling

Where pipe is laid in rock excavation, clean backfill or bank run gravel refill as specified under Item 4, it shall be placed over the rock and tamped to sub grade. The minimum of six inches (6") of clean backfill or bank run gravel bedding is specified under Item 4 and paid for under Section C. Excess rock, which cannot be used with earth to provide satisfactory fill in the upper portions of the trench, shall be disposed of the same as excess earth excavation. No pieces of rock in excess of one-half cubic foot in volume shall be used in backfilling.

The Contractor shall place backfill material obtained from excess material from other portions of the work or from additional backfill material as specified under Item 4.

3.6 Mechanical Removal of Rock

Mechanical removal of rock shall include removal by hoe ram. AQUARION WATER COMPANY will pay the unit bid price for mechanical removal of rock when mechanical methods are used (1) due to the proximity of the pipeline route to existing structures or (2) due to restrictions against blasting set by federal, state, or local officials, or (3) at the request of AQUARION WATER COMPANY. If mechanical methods are used for any other reason, AQUARION WATER COMPANY will pay the unit bid price that applies to blasting.

3.7 Measurement

For excavation in rock for pipe trenches, the trench will be computed as having a width as shown in the table below, vertical sides, a flat bottom, and a depth from the surface of the rock to a plane six inches (6") below the invert of the pipe. For excavation in rock for structures, the pay line shall be computed as having a width of one-foot (1') outside the structure, vertical sides, a flat bottom, and a depth from the surface of the rock to a plane six inches (6") below the underside of the structure. Typical trench details and payment limits are shown in the Water Relocation Plans and Details. No payment will be made for additional width in pipe trenches at field joints or beyond the lines described above.

For boulders and all rock excavated for purposes other than above described, measurement for payment will be made of the amount of rock actually removed as ordered.

DIMENSION LINES FOR ROCK EXCAVATION IN TRENCHES

<u>PIPE SIZE</u>	<u>TRENCH WIDTH</u> (w/o Trench Box)	<u>TRENCH WIDTH</u> (w/ Trench Box)
6 Inch Pipe	3.00 Feet	6 Feet
8 Inch Pipe	3.00 Feet	6 Feet
10 Inch Pipe	3.00 Feet	6 Feet
12 Inch Pipe	3.00 Feet	6 Feet
16 Inch Pipe	3.33 Feet	6 Feet
20 Inch Pipe	3.67 Feet	6 Feet
24 Inch Pip	4.00 Feet	6 Feet
30 Inch Pipe	4.50 Feet	6 Feet
36 Inch Pipe	5.00 Feet	6 Feet

3.8 Frost Excavation

Frost excavation shall mean removal of frozen earth exceeding twelve (12) inches in depth which, in the opinion of Aquarion, requires for its removal, drilling and blasting or breaking with specialized power operated frost removal equipment. No frost exceeding the payment limits designated for rock excavation in Section 3.6 will be measured or allowed.

3.9 Payment

The unit price bid per cubic yard shall include payment for all labor, tools, materials, and equipment necessary to excavate and dispose of all rock necessary to complete the work as specified herein. The unit price bid for rock excavation shall include the cost of backfilling and the cost of any borrow material needed to replace the rock. AQUARION WATER COMPANY will not pay any cost beyond the unit price bid for rock excavation for laborers and equipment that are idle during periods of rock removal.

Clean backfill or bank run gravel bedding for refill required to bring the excavation to sub grade or for bedding is specified under Item 4. The unit price for mechanical rock removal (i.e., hoe ram) shall not include the cost of any borrow material needed to replace the rock.

ADDITIONAL BACKFILL MATERIAL

Item 4

- 4.1 Work Included
- 4.2 Bank run Gravel
- 4.3 Dead Sand Fill
- 4.4 Stone Fill
- 4.5 Clean Backfill
- 4.6 Placing
- 4.7 Measurement Payment

4.1 Work Included

This Item includes all bank run gravel, dead sand, or stone fill as ordered by Aquarion or others, which is not specifically included under other Items of this Contract. Materials ordered for refill of rock removal, frost removal, unsuitable material, bedding or pavement granular base are specified under this Item but paid for under those individual items.

4.2 Bank run Gravel

Bank run gravel, as defined herein, shall be gravel of such size that one hundred percent (100%) passes a sieve having two inch (2") square openings and shall be reasonably uniform, graded down to one-quarter inch (1/4") size. It shall not contain vegetation or masses of roots and shall be substantially free from loam and other organic matter, clay, and other fine or harmful substances.

4.3 Dead Sand Fill

All sand used for backfill shall be a natural bank sand, graded from fine to coarse, not lumpy or frozen and free from slag, cinders, ashes, rubbish, or other material which, in the opinion of Aquarion is objectionable or deleterious. It shall not contain a total of more than 10 per cent by weight of loam and clay and all material must be capable of being passed through a three-quarter inch sieve. Not more than 5 per cent shall remain on a No. 4 sieve.

4.4 Stone Fill

Stone fill shall consist of sound, tough, durable particles of crushed or uncrushed gravel free from soft, thin, elongated or laminated pieces and vegetable or other deleterious matter. It shall meet such graduation requirements as specified by the Engineer.

4.5 Clean Backfill

The material used shall be of a quality satisfactory to the Engineer and shall be free from large or frozen lumps, wood and other extraneous material. It shall be free from stones larger than 4 inches. All backfill shall be placed in a manner acceptable to the Engineer. Unless otherwise ordered by the Engineer, the backfill shall be brought to the surface of the

surrounding ground and neatly graded. Backfilling will only be done under the supervision of the Engineer or his representative.

4.6 Placing

Bank run gravel, dead sand, clean backfill, or stone fill shall be placed to the lines and grades ordered. Fill shall be placed in layers not exceeding twelve inches (12") in thickness and shall be well compacted in place by hand and/or by mechanical tamping devices.

4.7 Measurement and Payment

The quantity of bank run gravel, dead sand, or stone fill required under this Item will not be measured for separate payment.

Clean backfill required to replace material determined to be unsuitable for replacement in the utility trench will be measured for payment by the cubic yard compacted in place, which price shall be considered payment in full for all labor, materials and equipment necessary to complete the installation in accordance with these technical specifications.

The cost of bank run gravel, dead sand and stone fill will be included for payment as part of the cost bid for installing DIP pipes of various sizes and service installations/adjustments under Section A, which price shall include payment in full for all labor, materials, and equipment necessary to complete the installation as specified.

INSTALL HYDRANT ASSEMBLIES

Item 5

- 5.1 Work Included
- 5.2 Materials
- 5.3 Installation of Hydrant Assemblies
- 5.4 Measurement and Payment

5.1 Work Included

Under this Item the Contractor shall supply all labor, tools and equipment necessary for installing hydrant assemblies, complete as shown and specified. Material to be supplied by AQUARION WATER COMPANY unless otherwise specified.

5.2 Materials

Hydrant assembly shall include tee, elbow fitting, 6-inch gate valve, 6-inch ductile iron pipe, and a hydrant.

5.2.1 Tees

Tees shall have 6-inch outlet and shall be ductile iron with mechanical joint ends.

5.2.2 6-inch Gate Valves

Gate valves shall be as specified under Section 1.5.3 of Item 1.

5.2.3 6-inch Piping

The 6-inch piping shall be cement lined ductile iron pipe, Class 52, conforming to ANSI A21.51, latest revision.

5.2.4 Hydrants

See Aquarion hydrant detail in Attachment W.

Hydrants shall be with 5-1/4 inch valve opening, unless otherwise specified by the Town. Hydrants are to be factory painted "VALDURA YELLOW" WITH REFELCTIVE SILVER BONNETS.

Hydrants shall open to the direction shown on the table *Gate & Hydrants by Town* at the end of this section and shall have a pumper and double hose nozzles.

Threading of hose and pumper nozzles shall be "National Standard" or "Bridgeport Thread" as required by Aquarion.

Connection to main shall be 6-inch mechanical joint.

Hydrants shall be suitable for five-foot (5') burial.

5.2.5 Retainer Glands

Mechanical joint retainer glands shall be megalug design type. Set screw type retainer glands will not be accepted.

5.3 Installation of Hydrant Assemblies

Hydrant installations shall conform to the detail drawings (See Attachment W).

After excavation and grade is determined, the proper buried depth hydrant should be used if an offset is needed. This is the time to make the decision if an offset is needed. After 6-inch valve is installed using retaining glands (Mega Lugs), offset/lateral and valve should be blocked. Lateral is now connected to hydrant with retaining gland. After hydrant is plumb and level/blocked bottom, check the weep/drain holes on sides to make sure they are clean and clear of any obstructions. Next, dig back to good virgin material for blocking the bottom ball with solid cement blocks (as many as needed), oak blocks and wedges to get a tight fit. Back-fill the ball of the hydrant with 1 ¾-inch or 1 1/4 -inch trap stone 1-foot above the bottom flange. Place a layer of filter fabric on top of trap rock. With silt cloth on top of stone, vent fill and flush hydrant (**Make sure hydrant drains**). Back-fill with process tamp and lifts. Make sure operating nut for valve is in the center of the gate box and keep top section set to finished grade. Area must be restored to original condition.

5.4 Measurement and Payment

The unit price bid for this Item shall be full payment for all labor, tools, equipment, and materials necessary for each hydrant assembly installed, complete as shown and specified. The hydrant branch lateral (including all pavement removal, pavement disposal, excavation, lateral installation, and backfill) shall be paid for under this item.

In addition, **Hydrant Checklist (Attachment W) must be completed and signed by a Contractor's representative and attached to invoice. Hydrant related invoice will not be paid until all required paperwork is completed and properly submitted with the invoice.**

CLASS "B" CONCRETE

Item 6

6.1 Work Included

6.2 Concrete

6.3 Measurement and Payment

6.1 Work Included

Under this Item, the Contractor shall furnish and place all concrete ordered by the Engineer which is not included under other Items of this Contract. Concrete used for thrust blocks, concrete encasement, and fill concrete is included and will be paid for under this Item.

6.2 Concrete

Portland cement shall conform to ASTM C150, latest revision, for Type I cement. Aggregate for concrete shall conform to ASTM C33, latest revision. Coarse aggregate shall be size no. 67 per Conn DOT, Form 816, M.01.01.

Concrete shall contain at least 4.7 bags of cement per cubic yard. The amount of water used shall not be more than 7.0 gallons per bag of cement and less shall be used if required, depending upon the character of the aggregates, the proportion of coarse to fine materials in the aggregates, and the consistency desired for the moisture content in the aggregates. The exact proportions of water, cement, sand, and coarse aggregates shall be varied as ordered to give the best results for the aggregate used. The minimum 28-day compressive strength shall be 2,500 lbs. per square inch.

Concrete shall be mixed in an approved rotating type of mixer at least one and one-half (1-1/2) minutes after all ingredients are combined. It shall be deposited immediately after mixing in a manner to avoid separation and shall be compacted through spading and by use of approved mechanical vibration devices. No concrete shall be placed in freezing weather.

Transit mix concrete may be used providing it meets all of the requirements specified above and the transit mix company and its equipment are approved by the Engineer. Concrete shall be discharged from the mixer not more than sixty (60) minutes after cement is added to the other ingredients.

6.3 Measurement and Payment

The unit price bid for this Item shall be full payment for all labor, equipment, and materials required for each cubic yard of concrete measured in place to the size, which is ordered by the Engineer.

HYDROSTATIC AND LEAKAGE TESTING

ITEM 7

7.1 Work Included

7.2 Description of Work

7.1 Work Included

Under this Item the Contractor shall supply all labor, materials, tools, and equipment necessary for performing the Hydrostatic and Leakage Testing as specified in AWWA C600 latest revision. The Contractor will be responsible for making sure the new main passes the Hydrostatic and Leakage Testing.

7.2 Description of Work

After the completion of the water main installation and upon adequate notice to the AQUARION WATER COMPANY, the main will be Chlorinated by AQUARION WATER COMPANY and allowed to stand for forty-eight (48) hours. After flushing and a satisfactory test by AQUARION WATER COMPANY's Water Quality Department, the Contractor may be required to perform a hydrostatic and leakage test on the new main. AQUARION WATER COMPANY personnel must be on-site to witness the test. Pressure in the main will be brought to a point equal to 150 psi if the normal operating pressure is 100 psi or less and 200 psi if the operating pressure is over 100 psi. Allowable leakage in the new installation shall be determined by the following formula:

$$L = \frac{ND\sqrt{P}}{7400}$$

In which "L" is the allowable leakage in gallons per hour; "N" is the number of joints in the length of pipe tested; "D" is the nominal diameter of the pipe; and "P" is the average test pressure in pounds per square inch gauge.

For purposes of the hydrostatic and leakage test, test pressure in the main shall be maintained for a period of two (2) hours.

All visible leaks shall be made tight by the Contractor and, if the line does not meet the above leakage test, it shall be repaired by the Contractor and retested until the leakage requirement is met.

AIR VENT ASSEMBLY

Item 8

8.1 Work Included

8.2 Materials and Method of Construction

8.3 Measurement and Payment

8.1 Work Included

Under this Item the Contractor shall furnish all labor, tools, miscellaneous materials, and equipment necessary to furnish and install the air vent assembly, complete as shown and specified by the Engineer.

8.2 Materials and Method of Construction

The air vent assembly shall be installed where called for on the drawing or as directed by the Engineer. Air vent assembly installations shall conform to the detail drawings (See Aquarion Water Details). Materials to be supplied by the Company.

8.3 Measurement and Payment

The unit price for this item shall be full payment for the complete assembly, with tap, shut-off valve, blow-off, and piping with valve, fittings, and union all complete and ready for operation.

INSTALLATION OF POLYETHYLENE ENCASEMENT ON
WATER MAINS AND APPURTENANCES

Item 9

9.1 Work Included

9.2 Description of Work

9.1 Work Included

Under this Item the Contractor shall supply all labor, materials, tools, and equipment necessary for installing the Polyethylene Encasement on the water main and appurtenances as specified in ANSI/AWWA C105/A215, latest edition and as ordered by the Engineer.

9.2 Description of Work

The installation of the encasement shall prevent contact between the pipe and the surrounding backfill and bedding material but is not intended to be a completely airtight and watertight enclosure. Overlaps shall be secured by the use of adhesive tape, plastic string or any other material capable of holding the polyethylene encasement in place until backfilling operations are completed. Any rips, punctures or damage during installation shall be repaired prior to backfilling.

Care shall be taken during backfilling to prevent damage to the polyethylene encasement. Backfill material shall be free of cinders, refuse, boulders, rocks, stones or other materials that could damage polyethylene.

The material to be used will be sheet type and supplied by AQUARION WATER COMPANY along with the necessary fastening materials.

PAVEMENT RESTORATION

Item 10

- 10.1 General
- 10.2 Work Included
- 10.3 Temporary / Permanent Pavement
- 10.4 Processed Aggregate – Rolled Granular Base
- 10.5 Permanent Pavement
- 10.6 Bituminous Concrete Resurfacing Course
- 10.7 Bituminous Concrete Sidewalks and Driveways
- 10.8 Bituminous Concrete Lip Curbing
- 10.9 Reinforced Concrete Base
- 10.10 Concrete Sidewalks and Driveways
- 10.11 Concrete Curbing
- 10.12 Asphalt Milling
- 10.13 Measurement
- 10.14 Payment

10.1 General

10.1.1 Limits of Responsibility

If AQUARION WATER COMPANY decides to have one contractor install pipeline and temporary paving and another contractor install permanent paving, the contractor who installed the pipeline will be responsible for any pavement failure that results from settling of the trench. This responsibility shall include replacement of the failed portion of pavement. In addition, the contractor who installed the pipeline and temporary paving will be responsible for maintaining the temporary paving for a period of four (4) months from the date of installation of the temporary paving.

10.1.2 Service Connection Contract – N/A

10.2 Work Included

Under Item 10.3-10.11, the Contractor shall furnish all labor, materials, tools, and equipment necessary for pavement, granular base and curbing restoration of Town and State roads disturbed by his operations. AQUARION WATER COMPANY will be responsible for all restoration within the limits specified below. The Contractor will be responsible for granular base and temporary /permanent pavement outside the specified limits. Add 2 feet to each width below if a trench box is used.

PAVEMENT AND GRANULAR BASE LIMITS

<u>Pipe Size</u>	<u>Temporary Pavement Width Limit</u>	<u>Permanent Pavement Width Limit</u>
6"	4.00 feet	6.00 feet
8"	4.00 feet	6.00 feet
10"	4.00 feet	6.00 feet
12"	4.00 feet	6.00 feet
16"	4.00 feet	6.00 feet
20"	5.00 feet	7.00 feet
24"	5.00 feet	7.50 feet
30"	6.00 feet	8.00 feet
36"	6.00 feet	8.50 feet

10.3 Temporary/Permanent Pavement

In pavement, the Contractor shall, immediately after back filling, place temporary or permanent trench pavement as directed by AQUARION WATER COMPANY. In town roads, the base thickness shall be ten inches (10"). The processed aggregate base shall meet the requirements of the State of Connecticut Department of Transportation Specifications, form 816, Section 3.04 and the requirements of Item 4 herein. In State Highways, the base thickness shall be ten inches (10"). The processed aggregate base and bituminous surfacing are included for payment under this Item. AQUARION WATER COMPANY will define at the commencement of the project whether the trench repair will be temporary or permanent.

Aquarion will determine the type of material to be used as temporary/permanent pavement. The temporary material will be either "cold patch" or "hot patch". Cold patch shall only be used under extreme cold weather conditions.

Hot patch shall be a Class 1 material as per the requirements of the Connecticut Department of Transportation Specification Form 816, Section 4.06, and Section M.04, Bituminous Concrete Mix. The permanent material under this item will be a Class 4 Binder as per the requirements of the Connecticut Department of Transportation Specification Form 816, Sections 4.04, 4.07, and Section M.04, Bituminous Concrete mix. During the progress of the work and until construction of the final surface, the Contractor shall maintain the surface of the streets in good and safe condition. He shall frequently inspect and promptly fill all depressions over and adjacent to trenches caused by settlements. The contractor is responsible for maintaining the trench for a period of one (1) year at their own cost, from the date of installation of the temporary or permanent hot patch. AQUARION WATER COMPANY will not pay for any leveling course.

Generally, in town roads, the pavement shall consist of a four (4) inch Class 4 base course and a two (2) inch surface course as directed by Aquarion. In state roads the pavement shall consist of a five inch (5") HMA S1 course and a four inch (4") HMA S0.5 course placed in two equal lifts. All stated pavement thickness are compacted and rolled into place.

The bituminous concrete shall meet the requirements of the State of Connecticut Department of Transportation Specification Form 816, Section 4.06, and Section M.04, Bituminous Concrete Mix.

Payment for permanent pavement shall not exceed the pay limits as in the table in Section 10.2.

Where existing pavement is disturbed at the intersection of driveways and street line, replacement of permanent pavement shall be "lipped".

Pavement in state highways shall meet the approval of the Connecticut Department of Transportation.

10.4 Processed Aggregate - Rolled Granular Base

Under this item, and after formation of sub grade under other items of these specifications has been substantially completed, the Contractor shall prepare the sub grade and construct a processed aggregate or rolled granular base course, as directed, in conformity with the line, grade, dimensions and compacted thickness shown on the drawings, or as directed.

Materials and construction methods shall conform to applicable provisions of CONN-DOT Specifications, form 816, Section 2.09 for Sub grade, Section 3.04, Processed Aggregate Base and Section 3.02 Rolled Granular Base.

10.5 Permanent Pavement

Contractor shall be responsible for coordinating with local and/or state authorities to define when permanent paving can be performed. Upon completion of main installation, the Contractor shall inform AQUARION WATER COMPANY in writing of the anticipated date of paving.

In preparation for the permanent pavement, the remaining edges of the existing pavement shall be cut back a minimum of twelve inches (12") from the edges of the trench. If required, the temporary pavement shall be removed and the sub grade formed to the required line, grade, and cross-section and properly compacted.

Throughout the work of this Section, the Contractor shall exercise care so as not to damage the cut edge of the existing pavement.

When the base is in proper condition, subject to the approval of Aquarion, a final two course bituminous concrete pavement shall be constructed. Immediately prior to laying the binder and wearing courses, the trimmed edges shall be stable and unyielding, free of loose or broken pieces and edges and shall be thoroughly broomed and coated with an approved tack coat. The binder course shall be tack coated prior to placing the wearing course.

10.6 Bituminous Concrete Resurfacing Course

Scope of Work

Under this Item, the Contractor shall construct bituminous concrete pavement of two inch (2") compacted thickness. This work shall be performed in conformity with the line, grade and dimensions shown on the plans or as directed.

Materials and Method of Construction

Materials and method of construction shall conform to applicable provisions of CONN-DOT Specifications, Form 816, Section 4.06, Bituminous Concrete, Class 2.

All edges of pavement along the existing roadway which shall be cut vertically straight and in a neat and workmanlike manner and shall receive a tack coat of bituminous material prior to constructing the new pavement.

Paving Equipment

Paving equipment shall be of the self-powered type with an adapter to provide guidance of the screeding action. The screed or strike-off member shall be adjustable to the shape of the cross-section of the finished pavement. Some method shall be provided for the tilting of the screed while in operation to secure the proper "drag" and to provide the compressive screeded surface required. The machine shall have a sufficient number of driving wheels so there will be no undue amount of slippage. Whenever the design of the equipment and plan of operation are such that the driving wheels travel on the finished surface of a completed pavement, said wheels shall be equipped with rubber tires or other means to protect the finished surface. Screeding members shall be preheated, and means shall be provided for heating the screeding members by some method that will prevent accumulation of bituminous material.

Automatic Grade and Slope Control

All paving equipment used on divided highways of four or more lanes in excess of one thousand feet long, shall be equipped with automatic grade and slope screed controls with sensors for either or both sides of the paver. These systems shall be capable of overriding the normal function of the self-leveling screed and maintain screed deviation relative to an external reference. This reference may be an existing grade, mat, slab, or curb.

The grade sensor shall react from a reference line or a floating beam or shoe (ski) traveling over the reference plans.

The transverse slope controller shall be capable of maintaining the screed at the desired slope within +/- 0.1 percent.

10.7 Bituminous Concrete Sidewalk and Driveway

This item shall consist of two-inch bituminous concrete surfaced sidewalk or driveway constructed on a five-inch granular base course in the locations shown on the plans or as ordered.

Materials for this work shall conform to CONN-DOT Specifications, Form 816, Section 9.22.02, and Article .02.01 for granular fill and Article M.04, Class 2 Bituminous Concrete Surface Course.

Construction methods shall conform to CONN-DOT Specifications Form 816, Article 9.22.03.

10.8 Bituminous Concrete Lip Curbing

Materials for this work shall conform to the requirements of Article M.04.01, Class 3, of the State of Connecticut Department of Transportation Form 816.

Prior to the arrival of the mixture on the work, the surface of the pavement where the curbing is to be constructed shall be cleaned of all loose and foreign material. The surface, which shall be perfectly dry and clean at the time the mix is placed, shall be coated with an RC-2 or other approved bitumen just prior to placing the mixture.

Bituminous concrete lip curbing shall be machine formed with an approved mechanical curbing machine.

The surface of the curbing shall be tested with a ten-foot (10') straightedge and any variation from a true line exceeding one-quarter of an inch (1/4") shall be satisfactorily corrected. The only compaction required shall be that obtained by the approved mechanical curbing machine.

Where machine work is impractical, the Engineer may permit hand laid curbing to be constructed.

After the completion of curbing, traffic shall be kept at a safe distance for a period of not less than twenty-four (24) hours and until the curbing has set sufficiently to prevent injury to the work.

10.9 Reinforced Concrete Base

The base shall consist of concrete composed of Portland cement and fine and coarse aggregates, mixed in the hereinafter specified proportions and constructed on the prepared sub base, to the form and dimensions shown on the plans, and in accordance with these specifications. The base shall be reinforced with 6 x 6 – W4.0 x W4.0 Welded Wire Fabric.

All material for this work shall conform to the requirements of Article M.03.01 for Concrete Pavement and Article M.06.01 for Reinforcing Steel, CONN-DOT specifications, Form 816.

The construction methods for the base shall conform to the applicable requirements given in Article 4.01.03 for Concrete Pavement. The operation of placing and spreading shall be continuous during any working period. At the end of any working period, a bulkhead of steel or 2 inch plank conforming to the cross-section of the base course shall be placed at right angles to the centerline and perpendicular to the surface, and the concrete shall be finished to it. When work is resumed, the bulkhead shall be removed and the surface roughened and wetted before concrete is placed against it. Cutback shall be a minimum of six inches (6") to eliminate irregular edges and shall be made at the time of repairing and not when trench is excavated.

10.10 Concrete Sidewalks and Driveways

This item shall consist of concrete sidewalks and driveways constructed on a granular base course in the locations and to the dimensions and details as directed by the Engineer.

Materials for this work shall conform to the requirements of Article M.03.01 State of Connecticut, Department of Transportation, Form 816 for Class "C" Concrete.

Excavation, including removal of any existing sidewalk, shall be made to the required depths below the finished grade. All soft and yielding material shall be removed and replaced with suitable material.

The granular base shall be placed in layers not over 6 inches in depth and to such a depth that after compaction it shall be at the specified depth below the finished grade of the walk. The base shall be wetted and rolled or tamped after the spreading of each layer.

Forms shall be of metal or wood, straight, free from warp and of sufficient strength to resist springing from the pressure of the concrete. If of wood, they shall be of 2 inch surfaced plank except that at sharp curves thinner material may be used. If of metal, they shall be of approved section and shall have a flat surface on the top. Forms shall be securely staked, braced and held firmly to the required line and grade and shall be sufficiently tight to prevent leakage of mortar. All forms shall be cleaned and oiled or wetted before concrete is placed against them. Sheet metal templates 1/8 inch in thickness, of the full depth and width of the walk, shall be spaced at intervals of 12 feet, or as directed. If the concrete is placed in alternate sections, these templates shall remain in place until concrete has been placed on both sides of the template. As soon as the concrete has obtained its initial set the templates shall be removed.

The surface of the concrete shall be finished with a wood float or by other approved means. The outside edges of the slab and all joints shall be edged with a 1/4-inch radius edging tool. Each slab shall be divided into two or more sections by forming dummy joints with a jointing tool as directed. The walks and ramps shall be mesh reinforced.

The sides of the sidewalk or driveway shall be backfilled with suitable material thoroughly compacted and finished flush with the top of the sidewalk or driveway. All surplus material shall be removed and the site left in a neat and presentable condition to the satisfaction of the Engineer.

10.11 Concrete Curbing

This item shall consist of concrete curbing constructed on the prepared sub-base in accordance with the dimensions and details as directed by the Engineer in conformity with these specifications.

The concrete for cast-in-place curbing shall be Class "C" Concrete conforming to the requirements of Article M.03.01 State of Connecticut, Department of Transportation, Form 816.

Construction method for concrete curbing shall conform to the requirements of Article 6.01.03 for concrete structures, as supplemented by the following requirements:

1. Excavation shall be made to the required depth, and the base upon which the curbing is to be set shall be compacted to a firm, even surface.
2. Concrete shall be placed only on a moist base. Concrete shall not be placed on a soft, muddy or frozen base. The concrete curbing shall be constructed in sections having a uniform length of approximately 10 feet, unless otherwise directed, so arranged that a joint in the curbing shall come opposite a joint in the adjoining concrete pavement slab and be similar to it. The length of these sections may be varied slightly where necessary for closure, but no sections less than 6 feet in length will be permitted. These sections shall be separated by an approved method at the time of placing of the concrete.
3. Forms shall be so constructed that the form for exposed faces may be removed before concrete has taken final set in order to permit correction of surface irregularities.
4. Concrete curbing shall be cured and protected in conformity with the requirements of Article 4.01.3 for concrete pavement.
5. After concrete has set sufficiently, the grading shall be completed, as directed by the Engineer, by refilling to the required elevation with approved material which shall be placed in layers of not over 6 inches in depth and compacted until firm and solid.

10.12 Asphalt Milling

1. When called for by the Contract or by the Engineer, the Contractor shall mill, profile, or remove existing asphalt as required in preparation of overlaying the roadway. The milling shall be performed by machinery specifically designed and constructed for this purpose and in good operating conditions. All milled areas shall be swept by the Contractor prior to commencement of overlay. All millings shall be removed and disposed of by the Contractor.

2. Keys shall be milled at all starting and ending points of the work. Further, keys shall be milled around all structures which are not to be raised to proposed road elevation such as catch basins, manholes, and other structures as necessary. All transition areas between new and existing asphalt shall be as smooth as possible. All keys shall be 1 1/2" deep and a maximum of 3' wide or as directed by the Engineer.

10.13 Measurement

The quantity paid for under Item 10.3 shall be measured in square yards as actually placed.

The quantity paid for under Item 10.4 shall be measured in cubic yards as actually placed.

The quantity paid for under Item 10.5 shall be measured in square yards placed.

The quantity paid for under Item 10.6 shall be measured in tons in place.

The quantity paid for under Item 10.7 shall be measured in square feet placed.

The quantity paid for under Item 10.8 shall be measured in linear feet.

The quantity paid for under Item 10.9 shall be measured in square yards placed.

The quantity paid for under Item 10.10 shall be measured in square feet placed.

The quantity paid for under Item 10.11 shall be measured in linear feet.

The quantity paid for under Item 10.12 shall be measured in square yards milled.

10.14 Payment

Under Item 10.3, the unit price bid per square yard shall be full payment for all labor, materials including tack coat cost, tools, and equipment necessary to place temporary/permanent pavement on town and state roads, complete as shown and specified. For work measuring less than 9 square yards, AQUARION WATER COMPANY will pay for 9 square yards of work.

This work will be measured for payment under Item 10.4, by the actual number of cubic yards of completed and accepted processed aggregate or rolled granular base and will be paid for at the contract unit price per cubic yard for "Processed Aggregate Base--Rolled Granular Base," which price shall include all work described above, and for all labor, materials, equipment, tools and incidentals necessary to complete this item.

Under Item 10.5, the unit price bid per square yard shall be full payment for all labor, materials including tack coat and joint seal costs, tools, and equipment necessary to place

permanent pavement on town and state roads, complete as shown and specified. For work measuring less than 9 square yards, AQUARION WATER COMPANY will pay for 9 square yards of work.

Under Item 10.6, the unit price bid per ton shall be full payment for all labor, materials including tack coat cost, tools, and equipment necessary to place permanent pavement on town and state roads, complete as shown and specified.

This work will be measured under Item 10.7, by the actual number of square feet of bituminous sidewalk and driveway completed and accepted and shall conform to CONN-DOT Specifications Form 816, Article 9.22.04. All excavation and granular base shall be included in the price bid for sidewalk and driveway.

The work will be paid for at the contract unit price per square foot for "Bituminous Concrete Sidewalk and Driveway" and shall include all excavation, backfill, disposal of surplus material granular base, and all equipment, tools, labor and materials incidental thereto.

Under Item 10.8 the unit price bid per linear foot shall be full payment for all labor, materials, tools and equipment necessary to install the bituminous concrete lip curbing on town and state roads, complete as shown and specified.

The method of measurement under Item 10.9, for the materials entering into the construction of the base shall be as described in Article 4.01.04 for Concrete Pavement. Payment for the concrete pavement will be paid for at the contract unit price per square yard, complete in place, which price shall include all materials, tools and equipment incidental thereto.

This work will be paid under Item 10.10, for at the contract unit price per square foot for "Concrete Sidewalk or Driveway, complete in place, which price shall include all excavation as specified above, backfill, disposal of surplus material, granular base, equipment, tools, materials and labor incidental thereto.

There will be no separate unit price submitted for per linear foot for "Concrete Curbing" of the type specified, complete in place, which price shall include all materials, equipment, tools and labor incidental thereto; also all excavation, backfilling, disposal of surplus material and drainage openings.

There will be no separate unit price submitted for per unit (that is, manhole or catch basin) to raise the unit to grade using adapters or bricks to excavate the manhole to grade. Cost includes labor, materials, asphalt or concrete repairs, traffic control, equipment, and adapters.

There will be no separate unit price submitted for Removal & Disposal of Asphalt Paving in excess of 4-inch thick and Removal & Disposal of Concrete Pavement.

There will be no separate unit price submitted for per gate box to raise the box to grade. For example, the bid unit price will apply to boxes that are buried 2 inches deep on an unpaved road and to boxes that are buried 4 feet deep under paved roads. The bid unit price shall include labor, materials, asphalt or concrete repairs, equipment, and adapters.

TOPSOIL AND SEED

Item 11

- 11.1 Scope of Work
- 11.2 Materials and Method of Construction
- 11.3 Measurement and Payment

11.1 Scope of Work

The work under this item shall consist of furnishing, placing and shaping topsoil in the areas shown on the drawings or where directed by the Engineer. The work shall also consist of furnishing and placing seed on all areas to be seeded.

11.2 Materials and Method of Construction

Topsoil shall be placed to a depth of two inches (2"). Topsoil shall conform to Connecticut Department of Transportation Specifications, Form 816, Article M.13.01.-1. Topsoil which has been stripped under other items of this contract and which meets the latter specifications may be used.

Construction methods shall conform to Connecticut Department of Transportation Specifications, Form 816, Section 9.44.03 and 9.45.03, where applicable.

The Contractor shall restore disturbed lawn areas with topsoil and seed as soon as practical after backfilling. Contractor shall be obligated to place topsoil and seed within 48 hours if requested by AQUARION WATER COMPANY.

11.3 Measurement and Payment

This work will be measured for payment by the number of square yards of surface area shown on the plan, or directed to be covered and actually covered with two inches (2") of topsoil and seeded, as specified and shall be paid for at the contract unit price per square yard for "Topsoil and Seed". For work that measures less than 9 square yards, AQUARION WATER COMPANY will pay for 9 square yards of work.

SODDING

Item 12

12.1 Scope of Work

12.2 Materials and Methods of Construction

12.1 Scope of Work

Work under this item shall consist of furnishing and placing of live sod and also the furnishing and prepared a sodbed composed of four (4") inches, after tamping, of approved topsoil in the areas designated by the Engineer and in conformance with these specifications.

12.2 Materials and Methods of Construction

The materials for this work shall conform to the requirements of Article M.13.01 for Topsoil, Article M.13.02 for Agricultural Ground Dolomitic Limestone, Article M.13.08 for Sod. Stakes for pegging sod shall be of wood, approximately 1" x 2" and of sufficient length to penetrate the sod, the topsoil and to a minimum depth of two (2) inches of subsoil.

The method of construction consisting of season, procuring sod, ground preparation, planting sod, pegging, finishing, care during construction, shall conform to the requirements of Article 9.53.03 State of Connecticut, Department of Transportation, Form 816.

EQUIPMENT AND LABOR RATES FOR EXTRA WORK

Item 13

13.1 General

13.2 Downtime resulting from DOT or town time restrictions

13.1 General

For Section H, the Contractor will submit a list of his equipment available for rental. The list of equipment will consist of the size, type, and model of the equipment. The rental rate will include the cost of the operator, driver, taxes, benefits, overhead, and profit. The unit price will be separated by hour, day, week, and month. The labor rates will include taxes, benefits, overhead, and profit, the unit price per hour.

For Section H the Contractor will submit a list of rates for laborers, drivers, operators, foremen, and supervisors.

13.2 Downtime resulting from DOT or town time restrictions

Working Hours: The Contractor's working schedule shall be confined to a five (5) day week, Monday through Friday, and an 8-hour working day confined between the hours of 8:00 a.m. and 4:30 p.m. current local time for all territories except, Greenwich. Greenwich normal working hours are from 7:00 a.m. to 3:30 p.m. Monday through Friday.

Unless otherwise especially permitted, no work shall be done between the hours of 4:30 p.m. and 8:00 a.m. except as necessary for the proper care and protection of the work already performed. If it shall become absolutely necessary to perform work at night, the Engineer shall be informed a reasonable time in advance of the beginning of the performance of such work. Only such work shall be done at night as can be done satisfactorily and in a first-class manner. Good lighting and all other necessary facilities for carrying out and inspecting the work shall be provided and maintained at all points where such work is being done. If AQUARION WATER COMPANY, DOT, or town officials restrict work during these work hours, the Contractor will incur downtime (for example, if DOT indicates that the Contractor can only work on the roadway from 9 am to 4 PM, the Contractor will incur 1-1/2 hours of downtime). AQUARION WATER COMPANY will pay for that percentage of the Contractor's downtime period based on an equivalent percentage of the daily crew rate bid in Section A for the appropriate size. Only laborers and equipment that are idle during this time period will be included in the downtime charge. Only laborers and equipment that work on the roadway during a specific day will be included in that day's downtime charge. Downtime charges will only be applicable during pipeline installation and for paving jobs in excess of 100 square yards.

AQUARION WATER COMPANY periodically has the need for a construction crew for miscellaneous water work. The contractor shall include all tools and equipment necessary for installing pipe including: all hand tools, wrenches etc., pipe saws and blades, dewatering pumps, tapping machines 3/4" to 12" taps, generator, safety equipment shoring box, air compressor, compaction equipment, roller, state highway signs and cones. In Section C, the Contractor shall provide a daily rate that covers the cost for a crew of 3 workers along with a backhoe, dump truck, and crew truck with tools. In Section C, the Contractor shall provide a daily rate that covers the cost for a crew of 4 workers, including a foreman, operator(s), driver and laborer(s), along with a 3 cyd loader, 18 cyd dump truck, 3/4 cyd excavator and utility truck with tools. In Section C, the Contractor shall provide a daily rate that covers the cost for a crew of 5 workers, including a foreman, operator(s), driver and laborer(s), along with a 3 cyd loader, 18 cyd dump truck, 3/4 cyd excavator and utility truck with tools. The contractor shall provide all tools that would be needed for the work described in the bid documents; Aquarion will not pay any tool rental fees. Saw cutting shall be included in day rate.

TRENCH BRACING

Item 14

- 14.1 General
- 14.2 Trench Bracing
- 14.3 Continuous Sheet Piling

14.1 General

Where trench conditions are found to consist of material which is unstable to such a degree that it cannot be removed and replaced with an approved material without creating an occupational hazard, the Contractor shall utilize trench bracing, sheeting or trench braces to support the trench. The Contractor must conform to all applicable state and OSHA standards for trench conditions.

14.2 Trench Bracing

Trench bracing is defined as planks placed against opposite sides of the excavation and held in place by timber struts or some extendable brace.

14.3 Continuous Sheet Piling

Sheeting is defined as continuous sheet piling of either steel or wood with walers or shoring.

TRAFFICMEN & FLAGMEN

Item 15

- 15.1 General
- 15.2 Work Included
- 15.3 Measurement and Payment

15.1 General

Traffic men shall mean uniformed policemen of the town or uniformed State Troopers.

Flagmen shall mean properly trained and protected employees of the Contractor utilized solely to direct traffic in areas where traffic men are not available or required.

The intent of this Item is to provide vehicular and pedestrian traffic direction and traffic men are not to serve as watchmen to protect the Contractor's equipment and materials.

Nothing contained herein shall be construed as relieving the Contractor of any of his responsibility for the safety and protection of persons and property under the terms of this Contract.

15.2 Work Included

The Contractor shall furnish traffic men and/or flagmen for each location of the work of this Contract where construction operations are underway in State highways and Town Street, and the Contractor shall notify and make all arrangements with, and in accordance with the requirements of the Chief of Police of the town or the Special Duty Coordinator of the State Police for uniformed policemen to direct vehicular and pedestrian traffic.

15.3. Measurement and Payment

Services of traffic men and/or flagmen will be measured for payment on the basis of 8-hour man-days; fractions of man-days and overtime will be converted to equivalent man-days. This shall include, however, only such traffic men as are employed in the work of this Contract or upon a detour ordered or approved by the chief of police of the town or the State Police. Traffic men, traffic directors and/or flagmen furnished by the Contractor for continued use of a detour or bypass beyond the period for which the Chief of police deems traffic men necessary will not be measured for payment.

The use of flagmen and/or traffic directors by the Contractor to control the movements of his own vehicles (owned, hired or contracted for, or those delivering materials and equipment), for the protection of said vehicles, workmen or other traffic, shall not be measured for payment and costs shall be included in the unit prices bid for the various Items of this Contract.

The percentage markup for "Traffic men" shall include a 5 percent markup of the billed rate provided by the municipality. The unit price bid for flagmen shall be the hourly rate for such employees.

SERVICE CONNECTION SWITCHOVERS

Item 16

- 16.1 General
- 16.2 Work Included
- 16.3 Materials
- 16.4 Payment

16.1 General

This item applies to service connection switchovers required as part of the water main replacement for this project. Routine service connection work such as new services associated with extensions, service connection replacements or discontinued service connections will be handled under a separate service connection contract.

16.2 Work Included

Contractor shall furnish all supervision, labor, tools, excavation, backfill and equipment as needed to install service line switchovers for all existing AQUARION WATER COMPANY customers along the route of the water main improvement. Temporary pavement replacement and traffic control associated with service line switchovers are included in other Items in the special provisions.

In instances where the existing service connection is copper and in good condition and the new main is in close proximity to the existing main, AQUARION WATER COMPANY may direct the contractor to tie the new service connection into the existing service connection leaving the existing curb box and valve in place. Should the Contractor encounter difficulty in making a temporary connection to the existing service through no fault of his own, he shall stop work after examining six feet (6') of the existing service line and seek direction from the Aquarion Representative as to how to proceed. In instances where the existing service connection is lead, iron, galvanized, or plastic, the contractor shall install new service connection consisting of a tap (water main sizes will be from 4" to 36"), corporation valve, service connection pipe (Type K copper tubing), curb box and curb valve. When it is required to replace the curb box and valve, connection of the customer's service line to the curb valve is included in this item. The method of service line switchover shall be open cut or pulled method as directed by the engineer. In all cases, the contractor shall excavate and close the corporation valve on the existing main. Shutdown of the service connection and service line shall be coordinated with AQUARION WATER COMPANY and the customer.

The contractor shall provide assistance to Aquarion's Project Representative, who will be responsible to provide a sketch on AQUARION WATER COMPANY tap card forms of the location of the tap showing dimensions and swing ties. In addition, the contractor shall provide a list of all materials installed. Standard detail drawings of service lines are shown in the Water Relocation Plans and Details.

16.3 Materials

All materials shall be AWWA and AQUARION WATER COMPANY approved. Corporation valves shall be brass with Mueller (CC) threads.

16.4 Payment

The unit price bid for this item shall include full payment for all supervision; labor, tools, excavation, backfill and equipment required to complete each service line switchover complete as specified. Payment for pavement and traffic control is included in other Items in the Special Provisions.

Each service line switchover will be paid for under Item #1303395A – Relocate Service Connection.

ABANDONMENT

Item 17

17.1 General

17.2 Work Included

17.1 General

This item applies to abandonment necessary as a result of a plant improvement, water main replacement or other special project.

Unless otherwise specified, "abandonment" implies abandoned-in-place and will generally involve cutting and plugging or capping an existing main.

17.2 Work Included

Contractor shall furnish all supervision, labor, tools, excavation, backfill and equipment as may be needed to cut and plug or cap an existing water main.

The contractor shall cut out a section of the existing main located as directed by AQUARION WATER COMPANY. The cut section shall be large enough to allow the contractor to install a restrained mechanical plug on the "live" end of the remaining pipe. Shutdown of the main shall be coordinated with AQUARION WATER COMPANY.

17.3 Payment

Payment for abandonment shall be made only under the specific bid item(s) involved, i.e. "Cut and Cap".

REPAIR SEWER SERVICES

Item 18

- 18.1 General
- 18.2 Work Included
- 18.3 Payment

18.1 General

Under this Item the Contractor shall supply all labor, materials, tools, and equipment necessary for repairing unmarked existing sewer services that are damaged by the Contractor, the Contractor shall repair the existing sewer connection.

18.2 Payment

Repairing sewer service connection will not be measured for payment. All costs associated with sewer repair shall be borne by the Contractor.

CONTROL BACKFILL MATERIAL

Item 19

- 19.1 Work Included
- 19.2 Materials
- 19.3 Installation
- 19.4 Measurements

19.1 Work Included

Under this item the Contractor shall furnish control backfill material (K-Crete) as backfill material where ordered by the Engineer.

19.2 Material

Control Backfill Material shall be in accordance with NYSDOT Item 08502.95, Option B

The material supplied shall be a low-strength concrete slurry commonly known as K-Crete. In the State of New York, any material supplied under this item shall be acceptable to the New York State Department of Transportation for use within state highway rights-of-way. This material shall have a minimum compressive strength of 50 psi.

19.3 Installation

The material shall be deposited into the trench from transit mix trucks. Care shall be taken to assure that the material fills in all the voids.

19.4 Measurements

Measurements shall be by the cubic yard of material placed within the following pay limits upon the specific order of the Engineer. No deduction will be made for the volume of the pipe.

1. Length – The length measurement shall be the actual length of trench ordered to be filled by the Engineer.
2. Width – The width measurement shall be one foot on each side, outside the pipe or structure being installed irrespective of actual width of trench excavated.
3. Depth – The depth measurement for material placed shall be the depth of the excavation to the invert of the pipe or bottom of a structure as ordered by the Engineer. In no case shall payment be made to depths excavated below those ordered by the Engineer. No payment shall be made for using Control Backfill Material to fill undercuts below the required grade when not ordered by the Engineer.

Gate & Hydrants by Town
Aquarion Water Company of CT

Town	Gate Valve Direction	Hydrant Spec
Beacon Falls	OTL	NST Spec 2
Bridgeport	OTL	Provided by Fire Department
Canaan	OTL	NST Spec 2
Cornwall	OTL	NST Spec 2
Darien	OTL	NST Spec 2
East Granby	OTL	NST Spec 2
East Hampton	OTL	NST Spec 2
Easton	OTR	NST Spec 2
Fairfield	OTR	NST Spec 2
Georgetown	OTR	NST Spec 2
Goshen	OTL	NST Spec 2
Granby	OTL	NST Spec 2
Greenwich	OTR	NST Spec 2
Groton	OTL	NST Spec 2
Kent	OTL	NST Spec 2
Lebanon	OTL	NST Spec 2
Litchfield	OTL	NST Spec 2
Monroe	OTR	NST Spec 2
New Canaan	OTR	NST Spec 2
New Fairfield	OTR	NST Spec 2
Newtown	OTR	NST Spec 2
Norfolk	OTL	NST Spec 2
North Canaan	OTL	NST Spec 2
Norwalk	OTR	NST Spec 2
Oxford	OTL	NST Spec 2
Ridgefield	OTR	NST Spec 2
Salisbury	OTL	NST Spec 2
Seymour	OTL	NST Spec 2
Shelton	OTR	NST Spec 2
Sherman	OTL	NST Spec 2
Simsbury	OTL	NST Spec 2
Southbury	OTR	NST Spec 2
Stamford	OTR	Provided by Fire Department
Stonington	OTL	NST Spec 2
Stratford	OTR	Bpt Thread Spec 1
Torrington	OTL	NST Spec 2
Trumbull	OTR	Bpt Thread Spec 1
Weston	OTR	NST Spec 2
Westport	OTR	NST Spec 2
Wilton	OTR	NST Spec 2

ATTACHMENT W- ATTACHMENTS TO CONTRACT DOCUMENTS

- W-1 MAPPING REQUIREMENTS
- W-2 ILLEGAL USE OF FIRE HYDRANTS NOTICE
- W-3 HYDRANT INATALLATION CHECKLIST

OBJECTIVE: Supply accurate information to support all GIS documentation

PURPOSE: Accurate completion of Sketch Form allows for temporary record of locations until GPS and permanent documentation can be created

1. Mandatory Sketch showing location of Valve, Blow-off, etc. must be made by installer after paving to insure everything is up to grade and not paved over. See sheet #5 for Sketch Form

<p>Example:</p> <p>STREET: CLOVER HILL RD</p> <p>TOWN: STAMFORD</p> <p>SIZE & TYPE: 12"x8"TS&V</p> <p>MAKE: US PIPE</p> <p>STATUS:(OPEN CLOSED) OPEN</p> <p>DIRECTION TO OPEN:(OTL OTR) OTR</p> <p>ENCLOSED TYPE:(BO BOX - BURIED) GATE BOX</p> <p>GATE BOX - MANHOLE - PIT</p> <p>INSTALLATION DATE: 7-30-1993</p> <p>REMARKS: @ LONG RIDGE RD 35' EAST OF CLOVER HILL RD</p> <p>DEPTH OF MAIN: 4'6"</p> <p>M & M CONSTRUCTION</p> <p>SAME</p>	<p>For Valve</p> <p>LONG RIDGE RD</p> <p>SAME</p> <p>2" T</p> <p>MUELLER</p> <p>N/A</p> <p>N/A</p> <p>BO BOX</p> <p>SAME</p>
---	--

NOTE:

SKETCH DOES NOT HAVE TO BE TO SCALE

AQUARION
Water Company

Capital and Planning Department
600 Lindley Street
Bridgeport, CT. 06606 - 5243

FIELD MAPPING

SCALE: NOT TO SCALE DRAWING NO. _____ SHEET: 1 OF 1

DRAWN BY: KMC DATE: 9/21/2013

APPROVED BY: RP DATE: _____

JOB NO. _____

FILE NO. _____

HYD. #1234

8"x8"TEE

STONE WALL

BRIDGE

12" DIP

41'

60'

20'

33'6"

15'6"

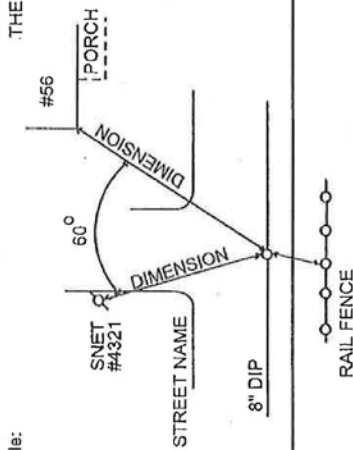
27'

27'

27'

2. When possible, a minimum of three locating dimensions approx. 60 degrees apart, must be taken.

NOTE: WHEN USING BUILDINGS FOR DIMENSIONS.
THE BUILDING NUMBER MUST BE SHOWN



4. Dimensions must be converted to nearest foot or foot and a half

Example:	Actual Dimension	Converted Dimension
	39' 0"	39'
	39' 1"	39'
	39' 2"	39'
	39' 3"	39'
	39' 4"	39' 6"
	39' 5"	39' 6"
	39' 6"	39' 6"
	39' 7"	39' 6"
	39' 8"	39' 6"
	39' 9"	40'
	39' 10"	40'
	39' 11"	40'

3. Locating dimensions should be taken from any fixed objects except trees.

Example:

- Poles
- Telephone - Street Light - Traffic Light etc
- Man Hole
- Sewer - Telephone etc.

Catch Basin Corner

Building

Indicate street number or lot number

Indicate Hydrant Number along with dimensions Hyd. to Gate, - Gate to main

Indicate Stone - Brick - Block etc.

Indicate Wood - Chain Link etc.

Indicate Water - Gas - Curb Box

Bridge

NOTE: when possible use
fixed objects visible in snow.



AQUARION
Water Company

Capital and Planning Department
600 Lindley Street
Bridgeport, CT. 06610-5243

FIELD MAPPING

DRAWN BY _____ DATE 9-30-2010
APPROVED BY _____
JOB NO. _____
FILE NO. _____

SCALE NOT TO SCALE

DRAWING NO.

SHEET 1 OF 1

5. North must be indicated as shown. (North at top of Sketch)

Example:

6. When Bends, Reducers etc. are used, a sketch showing their location must be made
Dimensions should be left as taken and not converted. See sheet #5 for sketch form.

Example:

STREET:

TOWN:

NOTE: ONLY FILL IN STREET - TOWN - INSTALLATION DATE

SIZE & TYPE:

MAIN DEPTH

MAKE:

STATUS: (OPEN CLOSED)

DIRECTION TO OPEN: (OTL OTR)

ENCLOSURE TYPE: (BO BOX - BURIED

GATE BOX - MANHOLE - PIT)

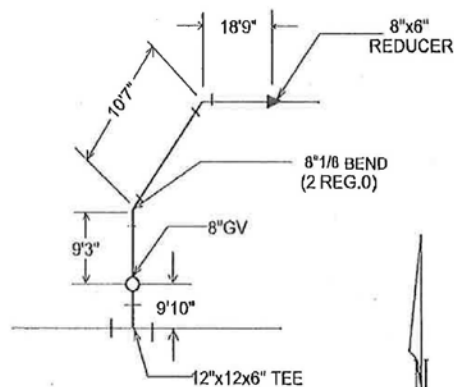
INSTALLATION DATE:

REMARKS:

DEPTH OF MAIN:

BY:

SKETCH



NOTE: SKETCH DOES NOT HAVE TO BE SCALE



AQUARION
Water Company

Capital and Planning Department
600 Lindley Street
Bridgeport CT 06606-5243

FIELD MAPPING

DRAWN BY: KMC. DATE: 9/21/2010
APPROVED BY: JSP. DATE: _____
JOB NO. _____
FILE NO. _____

SCALE: NOT TO SCALE

DRAWING NO. _____

SHEET 1 OF 1

7. Symbols

GATE VALVE

BUTTERFLY VALVE

AIR VENT

CHECK VALVE

TAPPING SLEEVE & VALVE

BLOW OFF

BEND

REDUCER

331

SOLID SLEEVE / COUPLING

HYDRANT
(INCLUDE DIMENSIONS HYD TO GATE
- GATE TO MAIN)

CHAIN LINK

BRIDGE

12ⁿX8^uTS&V

2" BO

6" X 1/4" BEND

12" 6" 12"X12"X6" REDUCER

12" 12" 12"X12"X6" TEE

$$\frac{8'' \text{ DRE}}{8'' \text{ CI}} = \frac{8'' \text{ DI}}{8'' \text{ DI}}$$

HYD. #334

FENCE

WALL

BRIDGE

CATCH BASIN

MAN HOLE

308

SNET
#5678

STREET
LIGHT

TRAFFIC
LIGHT

AQUARION
Water Company

Capital and Planning Department
600 Lindley Street
Bridgeport, CT 06606-5243

DRAWN BY _____ KMC _____ 10/7/2010
 APPROVED BY _____ DATE _____
 JOB NO. _____
 FILE NO. _____

STANDARD SYMBOLS

SCALE - 3745

DRAWING NO. 1

SHSE: — O₂ —

STREET:
 TOWN:
 SIZE & TYPE
 MAKE:
 STATUS: (OPEN CLOSED)
 ENCLOSURE TYPE: (BO BOX - BURIED
 DIRECTION TO OPEN: (OTL OTR)
 GATE BOX - MANHOLE - PIT)
 INSTALLATION DATE:
 REMARKS:
 DEPTH OF MAIN:
 BY:
 SKETCH



AQUARION
Water Company

Capital and Planning Department
 600 Lindley Street
 Bridgeport, CT 06606 - 5243

FIELD MAPPING

DRAWN BY: KMC DATE: 8/21/2010
 APPROVED BY: RP DATE: _____
 JOB NO. _____
 FILE NO. _____

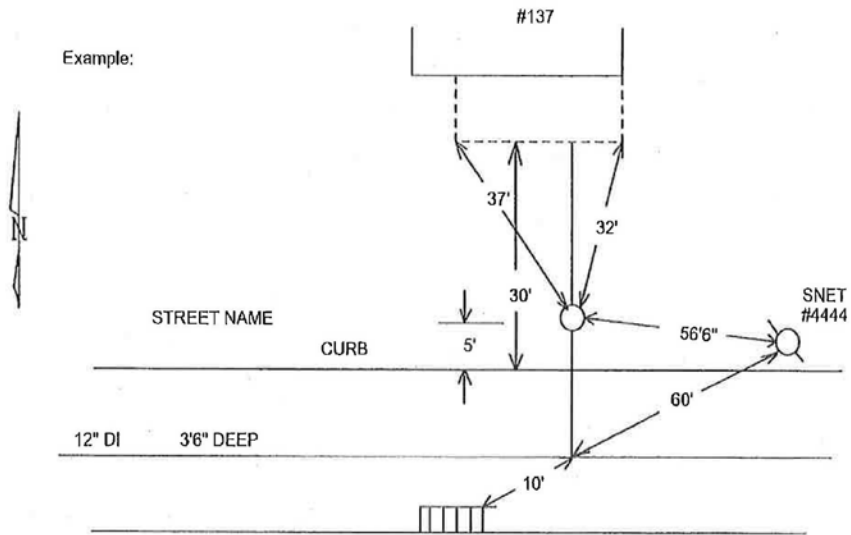
SCALE: NOT TO SCALE

DRAWING NO. _____

SHEET 1 OF 1

8. Service Sketch drawn on Tap Card

Example:



INFORMATION REQUIRED

DATE OF TAP

OWNER

ADDRESS

TAPPED BY

KIND AND SIZE OF SERVICE

DEPTH



AQUARION
Water Company

Capital and Planning Department
600 Lindley Street
Bridgeport, CT. 06610-5243

FIELD MAPPING

DRAWN BY KMC DATE 10/14/2010
APPROVED BY BP DATE
JOB NO.
FILE NO.

SCALE NOT TO SCALE

DRAWING NO.

SHEET 1 OF 1

NOTICE
ILLEGAL USE OF FIRE HYDRANTS

Please be advised that it is illegal and potentially dangerous for any person to use a fire hydrant owned or operated by Aquarion Water Company (Aquarion) for any purpose other than firefighting without first obtaining a permit. Connections to hydrants must be carefully controlled by Aquarion due to water quality, pressure and flow considerations. The unauthorized use of a fire hydrant is an extremely serious offense!

1. The use of water without permission is theft of service that Aquarion water customers must ultimately pay for through higher rates.
2. Connecting to a hydrant without an approved backflow prevention device is an illegal cross connection that may allow contaminated water to flow into the distribution system where it is a threat to drinking water quality and public health.
3. Tampering with a fire hydrant may be considered by law enforcement agencies as a threat to critical infrastructure and an act of terrorism.

Aquarion will aggressively pursue any person who illegally uses a fire hydrant and will prosecute them to the fullest extent of the law. Aquarion Water Company Police Officers have full arrest powers within the State of Connecticut and are working in cooperation with both state and local law enforcement to eliminate the illegal use of fire hydrants. Violators will, at a minimum, be subject to criminal charges for trespassing, larceny and criminal mischief. More serious criminal and civil penalties may be pursued depending on the severity of the violation.

If you intend to use an Aquarion Water Company hydrant, it is your responsibility to obtain a permit and a backflow prevention device (hydrant rig) from Aquarion. To do so, please contact one of the following:

Al Hildred by email at ahildred@aquarionwater.com or by phone at (203) 337-5932

Sincerely,

Howard J. Dunn, P.E.
Vice President, Operations & Technology

Ralph Fensore
Chief, Aquarion Police



AQUARION

Hydrant Installation Checklist (One per hydrant)

Contractor _____

Job Site & Town _____

Hydrant Location _____

Hydrant Number, if existing _____

(Initial Each Box)

☐ Received Aquarion Water Company Installation Instructions and Sketch.

☐ Hydrant drains properly installed before backfilling hole.

☐ Dry Well – Place 1 ¼" – 1 ¾" trap rock filling hole to at least 1' above lower hydrant flange. Filter fabric covering trap rock, per Aquarion specs.

☐ Hole was backfilled in 12"-18" lifts.

☐ Hydrant flange is 4" (±2") Above final grade.

Foreman Name _____
(Please print)

Signature _____ Date _____

Please contact Aquarion with questions regarding hydrant installation procedures.

ITEM # 1407001A – ADJUST UTILITY GATE

Description:

This item shall consist of adjusting existing water and gas gates to the new grades as proposed based on plan typical sections, grading plans and or profiles. The work will also include extension of the existing gate riser with existing material or new material. New materials, if needed, to be supplied by the individual utility company.

Construction Methods:

The Contractor shall remove and adjust the valve box adjustable riser to the new grades. If the existing material is not sufficient to accommodate the new grades, the Contractor shall utilize new adjustable risers or other materials supplied by the utility. The area shall be protected from traffic during the construction process until the valve box can support traffic without damage. Any material damaged as a result of the contractor's activity will be replaced at no cost to the project.

Method of Measurement:

Adjust Utility Gate will be measured for payment by the actual number of gates that are adjusted and accepted. No measurement will be made for needed to adjust the gate valves. Material needed for the valves shall be measured as part of the item "Adjust Utility Gate". Water gate or gas gate adjustment will be measured once for a specific location any additional adjustment that may be needed will be considered part of the measurement each.

Basis for Payment:

This work shall be paid for at the Contract Unit Price each for "Adjust Utility Gate" which price shall include all equipment, tools, materials and labor incidental to the completion of the work.

Pay Item

Adjust Utility Gate

Pay Unit

Each