

TABLE OF CONTENTS OF SPECIAL PROVISIONS

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

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JUNE 25, 2014
FEDERAL AID PROJECT NO. 1036(005)
STATE PROJECT NO. 36-179

ROUTE 8 INTERCHANGE 18 NEW NORTHBOUND ON-RAMP

Federal Aid Project No. 1036(005)
Towns of Ansonia and Derby

The State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges and Incidental Construction, Form 816, 2004, as revised by the Supplemental Specifications dated January 2014 (otherwise referred to collectively as "ConnDOT Form 816") is hereby made part of this contract, as modified by the Special Provisions contained herein. . The State of Connecticut Department of Transportation's "Construction Contract Bidding and Award Manual" ("Manual"), May 14, 2010 edition or latest issue, is hereby made part of this contract. If the provisions of this Manual conflict with provisions of other Department documents (not including statutes or regulations), the provisions of the Manual will govern. The Manual is available upon request from the Transportation Manager of Contracts. The Special Provisions relate in particular to the Route 8 Interchange 18 New Northbound On-Ramp in the Towns of Ansonia and Derby

CONTRACT TIME AND LIQUIDATED DAMAGES

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

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

1. For this contract, an assessment per day for liquidated damages, at a rate of Two Thousand Three Hundred Dollars (\$2,300.00) per day shall be applied to each calendar day the work runs in excess of the Four Hundred Twenty (420) allowed calendar days for the contract.
2. For this contract, an assessment per hour for liquidated damages shall be applied to each hour, or any portion thereof, in which the Contractor interferes with normal traffic operations during the restricted hours given in Article 1.08.04 of the Special Provisions. The liquidated damages shall be as shown in the following tables entitled "Liquidated Damages Per Hour" for each hour, or any portion thereof, in

which the Contractor interferes with normal traffic operations during the restricted hours.

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

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

LIQUIDATED DAMAGES PER HOUR

Project No. 36-179 Route 8 Northbound 2 Through Lane Section		
If Working Periods Extends Into	A.M. 1 Lane Closure	P.M. 1 Lane Closure
1st Hour of Restrictive Period	\$ 500	\$ 1,000
2 nd Hour of Restrictive Period	\$ 500	\$ 10,000
3rd Hour or any Subsequent Hour of Restrictive Period	\$ 1,000	\$ 45,000

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

For each hour shown on the Limitation of Operations charts designated with an “E”, liquidated damages of \$500 shall apply for each hour, or part thereof, if all available shoulder widths are not available to traffic.

Liquidated damages in the amount of \$500 shall apply for each hour, or part thereof, that the Contractor interferes with existing traffic operations on any ramps during the non-allowable hours.

NOTICE TO CONTRACTOR – PRE-BID QUESTIONS AND ANSWERS

Questions pertaining to DOT advertised construction projects must be presented through the CTDOT Pre-Bid Q and A Website. The Department cannot guarantee that all questions will be answered prior to the bid date. **PLEASE NOTE - at 12:01 am, the day before the bid, the subject project(s) being bid will be removed from the Q and A Website, Projects Advertised Section, at which time questions can no longer be submitted through the Q and A Website. At this time, the Q and A for those projects will be considered final, unless otherwise stated and/or the bid is postponed to a future date and time to allow for further questions and answers to be posted.**

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

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

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

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

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

The Contractor shall contact the City of Derby's and the City of Ansonia's Fire Department, Police and Emergency Medical Services and School Bus Company prior to work and establish coordination necessary as to disruption of services during construction. Periodic meetings should be held to review any significant changes in the flow of traffic through the work area.

NOTICE TO CONTRACTOR – PROTECTION OF EXISTING UTILITIES

The Contractor shall notify “Call Before You Dig” (telephone: 1-800-922-4455) for the location of underground Utilities, in accordance with Section 16-345 of the Regulations of the Connecticut Department of 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. The Contractor is solely responsible for determining actual locations and elevations of all existing utilities.

The Contractor shall coordinate his work with work performed by utilities companies. The Contractor shall contact the various utilities (2) weeks prior to the start of any work to coordinate the adjustment and/or protection of their facilities. Existing surface structures may be adjusted or replaced by the utilities.

Excavation of any type shall be accomplished in such a manner that underground utilities or structures are not damaged. It shall be the Contractor’s sole responsibility for any damage incurred during excavation and paving operations. All costs related to the repair or damaged utilities shall be borne by the Contractor at no cost to the State (City).

The Contractor is hereby advised that placement of heavy equipment and materials or the traversing of heavy construction equipment over underground utilities which might damage utility shall be reviewed and approved by the Engineer.

The Contractor shall consider in his bid any inconvenience and work required for this condition. The work to repair or replace any damage caused by the Contractor’s operations will be made solely at the Contractor’s expense.

NOTICE TO CONTRACTOR – PROTECTION OF EXISTING WATER MAINS

The Contractor is hereby notified of the presence of an asbestos-cement water main along Westfield Avenue. When excavating to subgrade in the vicinity of this water main, the use of heavy-duty bulldozers, scrapers or other types of heavy earth-moving equipment will not be allowed above water mains or within three feet from the water main measured horizontally. Small lightweight bulldozers or tractor pay loaders may be used, as determined by the engineer.

Vibratory rollers and compaction equipment shall not be used in the above the existing water main, or closer than a distance equal to the width of the roller drum from the centerline of the pipe. Static-type rollers are allowed. Non-vibratory rollers shall be utilized for installing bituminous pavement within the vicinity of the water main.

The contractor shall consider in his bid any inconvenience and additional work required to meet these conditions. The work to repair or replace any water mains damaged by the contractor's operations will be made solely at the contractor's expense.

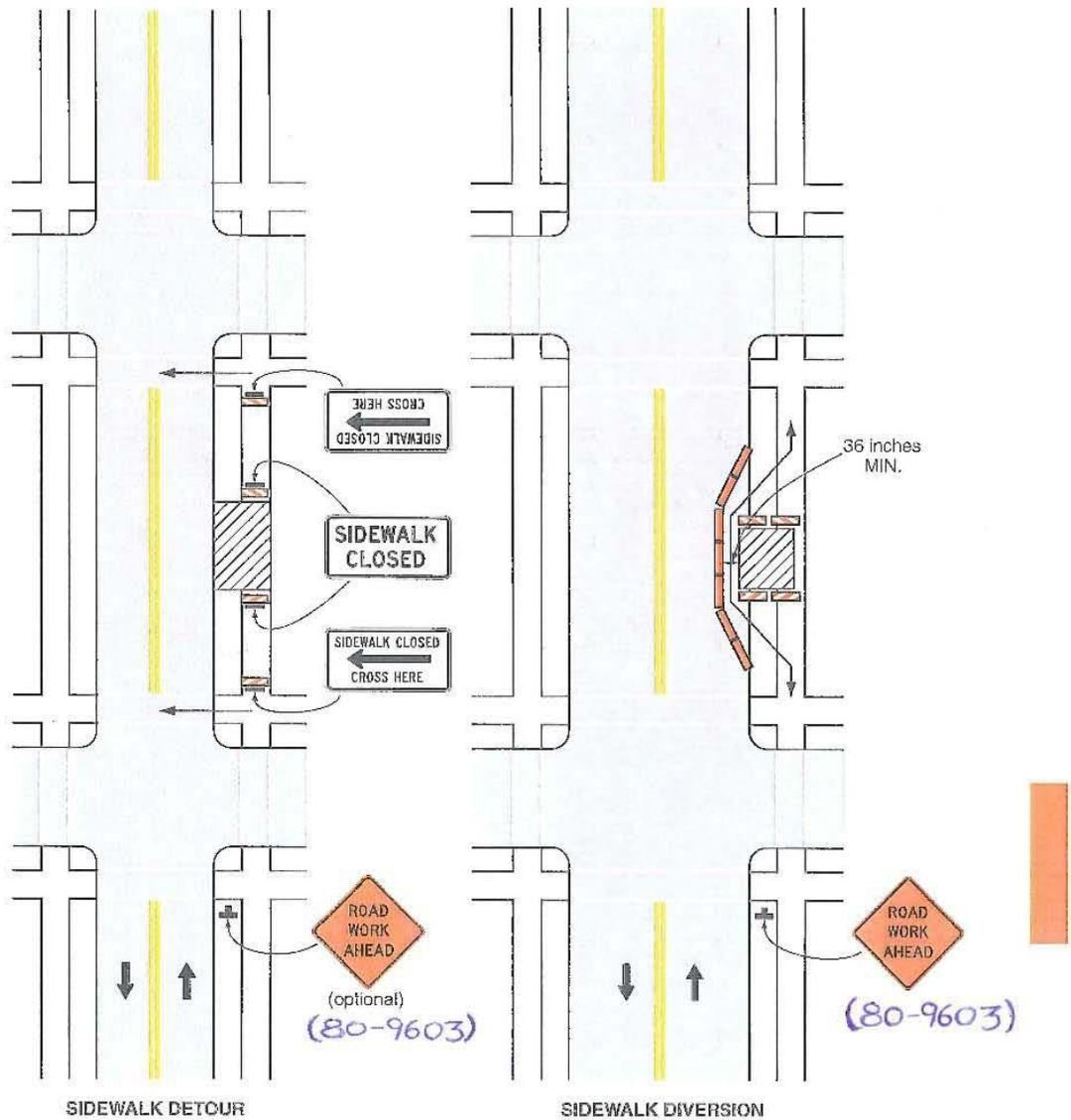
Note: Valve boxes will be furnished by the RWA for installation and adjustment to grade by the State Contractor.

NOTICE TO CONTRACTOR – SAFEGUARDING OF RESIDENCES AND PEDESTRIANS

The Contractor shall maintain and protect traffic operations at all driveways and provide adequate sightline. The Contractor shall not restrict sightline with construction equipment when not actively working. The Contractor shall provide and maintain safe pedestrian operation on new or existing sidewalk or temporary bituminous walks (minimum 4 feet wide) on at least one side of the Street at all times during and after construction hours. The Contractor shall provide adequate protective fence between work area and pedestrian sidewalk activities as directed by the Engineer. Replacement of temporary protective fence due to damage by the Contractor's operation or rendered inoperative by any cause, will not be measured for payment.

The Contractor shall submit plans and procedures in accordance and conforming with typical details (attached) of the Manual on Uniform Traffic Control Devices (MUTCD) for maintaining pedestrian sidewalk access during the reconstruction of the sidewalk to the Engineer for approval. When a sidewalk or pedestrian route has to be closed, pedestrians must be detoured or temporary sidewalk must be provided. The pedestrian detour and temporary walkway must meet ADA requirements. The appropriate signs for pedestrian detour shall be installed in accordance with MUTCD. Temporary bituminous sidewalk and ramps if required will be paid under Contract Item "Bituminous Concrete Sidewalk" and all necessary pedestrian detour signage will be paid under Contract Item "Construction Signs – Bright Fluorescent Sheeting".

Figure 6H-28. Sidewalk Detour or Diversion (TA-28)



Typical Application 28

Note: See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure.

Notes for Figure 6H-28 – Typical Application 28
Sidewalk Closures and Bypass Sidewalks

Standard:

1. When crosswalks or other pedestrian facilities are closed or relocated, temporary facilities shall be detectable and shall include accessibility features consistent with the features present in the existing pedestrian facility.

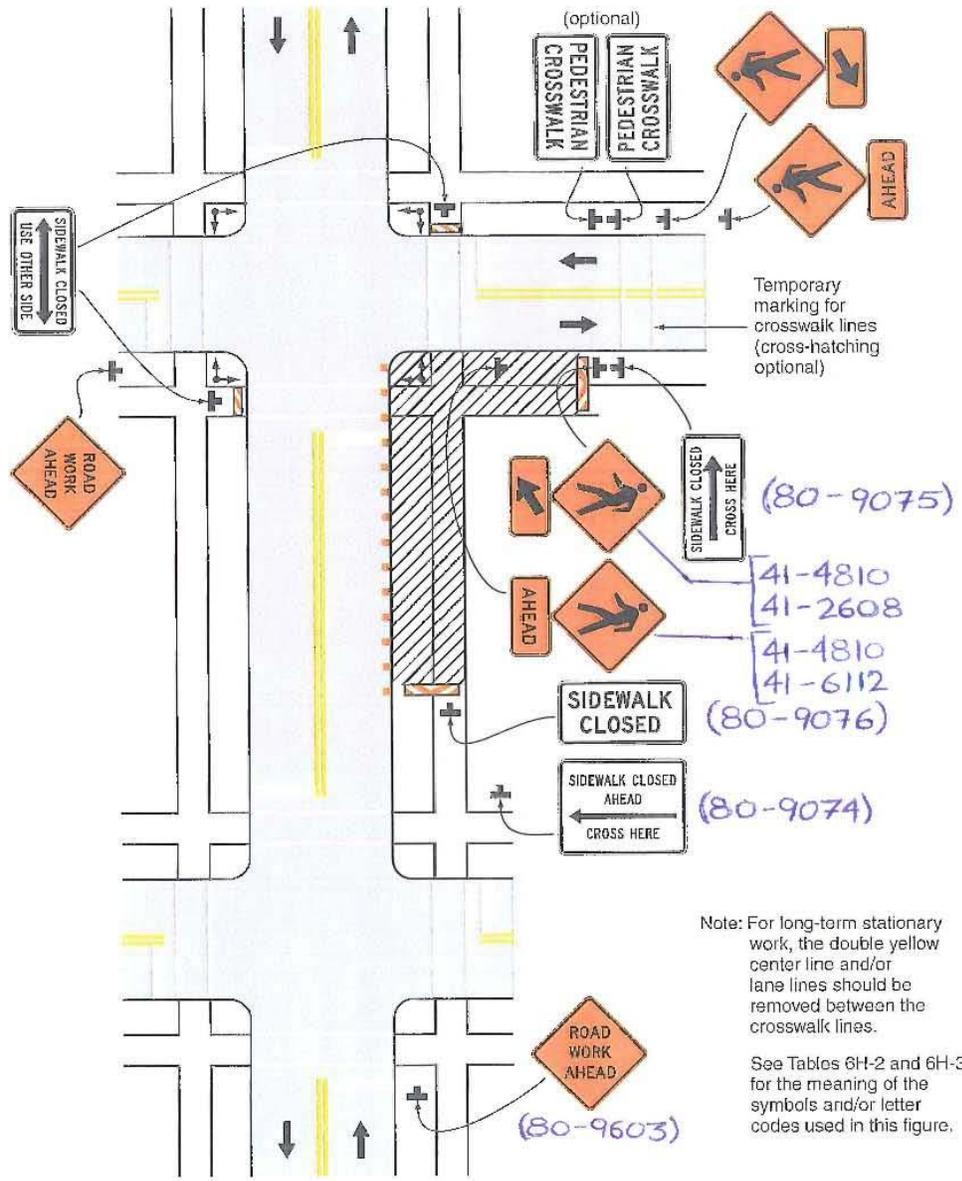
Guidance:

2. Where high speeds are anticipated, a temporary traffic barrier and, if necessary, a crash cushion should be used to separate the temporary sidewalks from vehicular traffic.
3. Audible information devices should be considered where midblock closings and changed crosswalk areas cause inadequate communication to be provided to pedestrians who have visual disabilities.

Option:

4. Street lighting may be considered.
5. Only the TTC devices related to pedestrians are shown. Other devices, such as lane closure signing or ROAD NARROWS signs, may be used to control vehicular traffic.
6. For nighttime closures, Type A Flashing warning lights may be used on barricades that support signing and closed sidewalks.
7. Type C Steady-Burn or Type D 360-Degree Steady-Burn warning lights may be used on channelizing devices separating the temporary sidewalks from vehicular traffic low.
8. Signs, such as KEEP RIGHT (LEFT), may be placed along a temporary sidewalk to guide or direct pedestrians.

Figure 6H-29. Crosswalk Closures and Pedestrian Detours (TA-29)



Note: For long-term stationary work, the double yellow center line and/or lane lines should be removed between the crosswalk lines.

See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure.

Typical Application 29

Notes for Figure 6H-29 Typical Application 29
Crosswalk Closures and Pedestrian Detours

Standard:

1. When crosswalks or other pedestrian facilities are closed or relocated, temporary facilities shall be detectable and shall include accessibility features consistent with the features present in the existing pedestrian facility.
2. Curb parking shall be prohibited for at least 15 m (50 ft) in advance of the midblock crosswalk.

Guidance:

3. Audible information devices should be considered where midblock closings and changed crosswalk areas cause inadequate communication to be provided to pedestrians who have visual disabilities.
4. Pedestrian traffic signal displays controlling closed crosswalks should be covered or deactivated.

Option:

5. Street lighting may be considered.
6. Only the TTC devices related to pedestrians are shown. Other devices, such as lane closure signing or ROAD NARROWS signs, may be used to control vehicular traffic.
7. For nighttime closures, Type A Flashing warning lights may be used on barricades supporting signs and closing sidewalks.
8. Type C Steady-Burn or Type D 360-degree Steady-Burn warning lights may be used on channelizing devices separating the work space from vehicular traffic.
9. In order to maintain the systematic use of the fluorescent yellow-green background for pedestrian, bicycle, and school warning signs in a jurisdiction, the fluorescent yellow-green background for pedestrian, bicycle, and school warning signs may be used in TTC zones.

NOTICE TO CONTRACTOR – SIGN INVENTORY

Prior to the commencement of construction, the Contractor and the Engineer shall conduct a joint inventory of signs, delineators and object markers. Signs, delineators or object markers that are knocked down or destroyed by the Contractor during the construction of the project shall be replaced by the Contractor at no cost to the State.

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 Contractor will also reimburse the utility company the full cost for the installation of the anchor and guy.

This project includes countdown pedestrian signals. The countdown display is allowed only during the flashing don't walk time of the pedestrian movement.

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, www.ct.gov/dot/.

Under Maintenance and Protection of Traffic (M&PT) and Temporary Signalization the Contractor is required to keep in operation the following: all vehicle and pedestrian signals including necessary support structures; all vehicle and pedestrian detection; the pre-emption system; and coordination to the master, if in a system.

Existing or new span poles or 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.

The following notes apply to projects which include Optical or Siren Pre-emption:

- Pre-emption is to operate through the internal pre-emption of the signal controller.
- If not present in a controller cabinet the contractor shall install the following items:
 - Pre-emption disconnect switch.
 - Pre-emption termination panel with "D" harness.
 - Pre-emption test pushbuttons.
- Contractor must provide a chart, or print out of the program steps and settings.
- Detector locations are for illustration only. Exact locations shall be determined by the Manufacturer or his designated representative. Detector cables are to be installed continuous between each detector and the auxiliary equipment cabinet.

NOTICE TO CONTRACTOR – SIDEWALK FREE PATH

The clearance of traffic signal appurtenances (mast arms, span poles, and pedestals) when in or adjacent to sidewalks was recently revised to require a free path of not less than 4 feet (1.2 m.) Locations where the 4 foot (1.2 m) free path cannot be met are noted on the plan. All other locations where the 4 foot (1.2 m) free path cannot be met require the Contractor to notify the Engineer and contact the Division of Traffic Engineering.

NOTICE TO CONTRACTOR – STEEL SPAN POLES

The steel span pole and steel span pole foundation design criteria were recently revised. Refer to the special provisions and guide sheets contained elsewhere in this Contract.

NOTICE TO CONTRACTOR – USE OF STATE POLICE OFFICERS

The Department will reimburse services of State Police Officers as a direct payment to the Department of Emergency Services and Public Protection. Payment for State Police Officers utilized by the Contractor for its convenience, not approved by the Engineer, is the responsibility of the Contractor. No separate payment item for State Police Officers is included in this contract.

Any costs associated with coordination and scheduling of State Police Officers will be included under the cost of Item No. 0971001A – Maintenance and Protection of Traffic.

NOTICE TO CONTRACTOR - VOLUNTARY PARTNERING

The Connecticut Department of Transportation (ConnDOT) intends to encourage the foundation of a cohesive partnership with the Contractor and its principal subcontractors on this project. This partnership will be structured to draw on the strengths of each organization to identify and achieve reciprocal goals. The objectives are effective and efficient contract performance and completion within budget, on schedule, and in accordance with plans and specifications.

This partnership will be bilateral in makeup, and participation will be totally voluntary. Any cost associated with effectuating this partnering will be agreed to by both parties and will be shared equally.

To implement this partner initiative, the Contractor and ConnDOT will meet and plan a partnering development seminar/team building workshop. At this planning session arrangements will be made to determine attendees at the workshop, agenda of the workshop, duration and location. Persons required to be in attendance will be the ConnDOT District Engineer and key project personnel, the Contractor's on-site project manager and key supervision personnel of both the prime and principal subcontractors. The project design engineers and key local government personnel will also be required to have Regional/District and Corporate/State level managers on the project team.

Follow-up workshops will be held periodically throughout the duration of the Contract as agreed by the Contractor and ConnDOT.

The establishment of a partnership charter on a project will not change the legal relationship of the parties to the Contract nor relieve either party from any of the terms of the Contract.

ConnDOT and the Contractor will jointly select a facilitator to conduct the partnering workshops. The Contractor will obtain the services of the chosen facilitator and ConnDOT will reimburse the Contractor for fifty percent (50%) of the costs agreed to between ConnDOT and the Contractor.

NOTICE TO CONTRACTOR - UTILITY SPECIFICATIONS

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

NOTICE TO CONTRACTOR – UTILITY GENERATED SCHEDULE

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

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

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

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

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

rev. 5/20/2013		UTILITY WORK SCHEDULE	
CTDOT Project Number: 36-179		Town: Derby	
Project Description: RT 8 exit ramp addition on Wakefield Av			
CTDOT Utilities Engineer: Xiuyun Cai			
Phone: 860-594-3269		Email: xiuyum.cai@ct.gov	
Utility Company: AT&T - East			
Prepared By: Gary Swanson		Date Prepared: 5/6/2014	
Phone: 203-383-6572		Email: gs5253@att.com	
Scope of Work			
The following is a description of all utility work planned to be completed in conjunction with the CTDOT project. The narrative describes all work to be carried out by the utility or its contractor, including temporary and permanent work required by the project as well as any additional utility infrastructure work the utility intends on performing within the project limits during the construction of the project.			
The widening of Division will cause AT&T to replace cross box at pole 1367 and bring underground conduit to new P1367. The cables crossing Division St at #201 & #219 will need to be replaced. Cables will be shifted to the new poles placed by UI. Wakefield Av will required pole relocation by UI. AT&T will shift cables to new poles and guy poles as required.			
Special Considerations and Constraints			
The following describes the limiting factors that must be planned for in the scheduling and performance of the utility work. For example, restrictions on cut-overs, outages, limitations on customer service interruptions (e.g. nights, weekends, holidays), seasonal and environmental shutdown periods, long lead material procurements, etc..			

rev. 5/20/2013

UTILITY WORK SCHEDULE

CTDOT Project Number:	36-179	Town:	Derby/Ansonia
Project Description: Placement of Rt 8 on ramp utility pole relocation			
CTDOT Utilities Engineer:	Cai Xiuyun		
Phone:	860-594-3269	Email:	xiuyun.cai@ct.gov
Utility Company: Comcast of CT/GA/MA/NH/NY/NC/VA/VT,L			
Prepared By:	Dave Gerrish	Date Prepared:	4/24/2014
Phone:	203-732-0146 x73801	Email:	dave_gerrish@cable.comcast.com

Scope of Work

The following is a description of all utility work planned to be completed in conjunction with the CTDOT project. The narrative describes all work to be carried out by the utility or its contractor, including temporary and permanent work required by the project as well as any additional utility infrastructure work the utility intends on performing within the project limits during the construction of the project.

Comcast has one attachment to the poles that are being relocated for this project. In order to reach the new poles, Comcast will have to replace sections of strand and coax cable. The first area needing replacement is the section from pole 1297 at the intersection of Division St. and Wakelee Ave. up to pole 3148 on Westfield Ave. The second section needing replacement is from pole 2401 on Westfield Ave. to pole 79 also on Westfield Ave. Comcast will cutover the new pieces of coax cable and then remove the facilities from the old pole locations.

Special Considerations and Constraints

The following describes the limiting factors that must be planned for in the scheduling and performance of the utility work. For example, restrictions on cut-overs, outages, limitations on customer service interruptions (e.g. nights, weekends, holidays), seasonal and environmental shutdown periods, long lead material procurements, etc..

All UI work will need to be completed prior to Comcast beginning work. Also, there is a small wire attached above comcast wire which I believe may be a town owned signal communications wire. This will need to be identified and relocated before comcast will be able to complete the necessary work. Comcast will require police detail for all of the above mentioned work. Comcast will need to perform the cutover during the night between 12:00AM and 6:00AM due to the necessary outage.

UTILITY WORK SCHEDULE

CTDOT Project Number: 36-179
 Utility Company: Comcast of CT/GA/MA/NH/NY/NC/VA/VT, LLC
 Prepared By: Dave Gerrish
 Total Calendar Days: 4

Schedule

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

Location (Station to Station)	Description of Utility Work Activity	Predecessor Activity	Duration (calendar days)
45+00 to 12+00	Run new strand and coax cable to all new poles within this section.	UI and the Town Wire must be removed or relocated and old poles topped off.	1
16+00 to 83+30	Run new strand and coax cable to all new poles within this section.	UI and the Town Wire must be removed or relocated and old poles topped off.	1
45+00 to 12+00	Cold splice all cables to prepare for cutover	Comcast has run new facilities within section.	0.5
16+00 to 83+30	Cold splice all cables to prepare for cutover	Comcast has run new facilities within section.	0.5
45+00 to 12+00	Cutover to new cable and cutover customers to new cable.	Cold splicing complete.	0.25
16+00 to 83+30	Cutover to new cable and cutover customers to new cable.	Cold splicing complete.	0.25
45+00 to 12+00	Wreckout old strand and and coax from old poles.	Splicing complete	0.25
16+00 to 83+30	Wreckout old strand and and coax from old poles.	Splicing complete	0.25

rev. 5/20/2013

UTILITY WORK SCHEDULE

CTDOT Project Number:	SHP 36-179	Town:	ANSONIA
Project Description: LANE WIDENING - WALELEE AVE near DIVISION ST			
CTDOT Utilities Engineer:	Xiuyun Cai		
Phone:	860-594-3269	Email:	Xiuyun.Cai@ct.gov

Utility Company:	Fibertech Networks		
Prepared By:	Ray Soma	Date Prepared:	4/23/2014
Phone:	860-643-4365	Email:	rsoma@snet.net

Scope of Work

The following is a description of all utility work planned to be completed in conjunction with the CTDOT project. The narrative describes all work to be carried out by the utility or its contractor, including temporary and permanent work required by the project as well as any additional utility infrastructure work the utility intends on performing within the project limits during the construction of the project.

Fibertech's work will consist of shifting a 4 poles to accommodate lane widening on Wakelee Ave at Division St.

Special Considerations and Constraints

The following describes the limiting factors that must be planned for in the scheduling and performance of the utility work. For example, restrictions on cut-overs, outages, limitations on customer service interruptions (e.g. nights, weekends, holidays), seasonal and environmental shutdown periods, long lead material procurements, etc..

New poles must be set, with utilities above Fibertech shifting prior to Fibertech work.

rev. 5/20/2013		UTILITY WORK SCHEDULE	
CTDOT Project Number:	36-179	Town:	Asonina
Project Description:	RTe 8 On Ramp		
CTDOT Utilities Engineer:	Xiuyun Cai		
Phone:	(860) 594-3269	Email:	Xiuyun.Cai@ct.gov
Utility Company:	United Illuminating		
Prepared By:	Fred Arnold	Date Prepared:	4/25/2014
Phone:	203-499-3922	Email:	fred.arnold@uinet.com
Scope of Work			
<p>The following is a description of all utility work planned to be completed in conjunction with the CTDOT project. The narrative describes all work to be carried out by the utility or its contractor, including temporary and permanent work required by the project as well as any additional utility infrastructure work the utility intends on performing within the project limits during the construction of the project.</p>			
<p>According to the UI utility plans, submitted we are going to replace about 17 poles and install conductor on Westfield Ave and Division Street. There is no temporary work in the current design. There are outages required for the completion of work.</p>			
Special Considerations and Constraints			
<p>The following describes the limiting factors that must be planned for in the scheduling and performance of the utility work. For example, restrictions on cut-overs, outages, limitations on customer service interruptions (e.g. nights, weekends, holidays), seasonal and environmental shutdown periods, long lead material procurements, etc..</p>			
<p>Due to the business services, cutovers may require outages during non business hours. The estimate assumes that we have the labor resources available. Any guying required will be allowed by business and residential customers is assumed.</p>			

UTILITY WORK SCHEDULE

CTDOT Project Number: **36-179**

Utility Company: **United Illuminating**

Prepared By: **Fred Arnold**

Total Calendar Days: **0**

Schedule

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

Location (Station to Station)	Description of Utility Work Activity	Predecessor Activity	Duration (calendar days)
Westfield Street	Relocation of poles and conductors	none	4 to 6 weeks
Divison Street	Relocation of poles and conductors	none	3 to 4 weeks

NOTICE TO CONTRACTOR – UTILITY INFORMATIONAL PLANS SHEETS

The Contractor's attention is hereby called to the fact that included in the plans are plan sheets furnished to the State by various utility companies affected by the proposed construction. These sheets are not intended to show all proposed work in utility installations to be done by the various utility companies or municipal authorities or both before, during, or after the life of this contract. In addition to the work indicated on these plans, the utility companies and authorities may make adjustments to, or removal of, certain of their installations other than those indicated on the plans or may install facilities not indicated.

**NOTICE TO CONTRACTOR - CONNECTICUT DEPARTMENT OF
TRANSPORTATION DISCLAIMER**

Connecticut Department of Transportation bidding and other information and documents which are obtained through the Internet or other sources, not authorized by the Department, are not to be construed to be official information for the purposes of bidding or conducting other business with the Department.

It is the responsibility of each bidder and all other interested parties to obtain all bidding related information and documents from authorized official sources of the Department, such as, the Department of Administrative Services (DAS) State Contracting Portal and Bid Express (bidx.com).

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

NOTICE TO CONTRACTOR - GENERAL PERMIT FOR STORMWATER DISCHARGE

This notice is provided to summarize some of the requirements of the Connecticut Department of Energy and Environmental Protection's General Permit for the Discharge of Stormwater and Dewatering Wastewaters associated with Construction Activities (Permit) issued on August 21, 2013, effective October 01, 2013. In no way, does this Notice alleviate the Contractor from understanding and complying with all the requirements and conditions of the Permit.

The Stormwater Pollution Control Plan (SWPCP) addresses pollution caused by soil erosion and sedimentation during construction as well as the long term post-maintenance use of the facility after construction is completed. The Contractor and all subcontractors will be required to sign a certified statement to comply with all applicable conditions of the SWPCP. There will be no additional payment for the Contractor to sign the certification statement and no additional payment for the Contractor to comply with the conditions of the SWPCP.

Erosion and Sedimentation Controls - Structural Measures:

When construction activities will result in the disturbance of a total of 1 acre or more of land regardless of phasing, the Connecticut Department of Transportation (Department) will incorporate a Stormwater Registration and SWPCP as part of the Contract documents in order to insure compliance with all conditions of this Permit. The Permit's 'Construction activities' means activities including but not limited to clearing and grubbing, grading, excavation, and dewatering.

Unless specifically outlined in the Contract Plans and/or SWPCP, the Contractor is not allowed to disturb more than two (2) acres of erodible material per discharge point at any one time regardless of phasing. If the Contractor elects to deviate from the Contract Plans and/or SWPCP to disturb more than two (2) acres of erodible material per discharge point at any one time regardless of phasing, the Contractor must provide a sequenced staging plan outlining the proposed disturbed activities. In all cases, the Contractor must meet the following conditions:

- *If the area of disturbance is maintained less than two (2) acres per discharge point*, the Contractor may disturb additional areas if and only if the previously disturbed areas are temporarily or permanently stabilized immediately using acceptable measures such as the standard controls which are provided in the SWPCP or as shown on the Contract Plans.
- *If the construction activities create an area of disturbance between (2) acres and (5) acres per discharge point*, the Contractor must submit to the Engineer a revised SWPCP for review and approval. The SWPCP must include locations of the temporary sedimentation trap per discharge point with a capacity to contain 134 cubic yards per acre of material in accordance with the 2002 Connecticut Guidelines for Erosion and Sediment Control (Guidelines). The Contractor shall provide an inspection and maintenance plan for the temporary sedimentation trap as part of the amended SWPCP.

- *If the area of disturbance has a potential to reach more than five (5) acres per discharge point,* the Contactor must submit to the Engineer a revised SWPCP for review and approval. The SWPCP must include locations of the temporary sediment basin designed and installed in accordance with the Guidelines. The Contractor shall provide an inspection and maintenance plan for the temporary sediment basin as part of the amended SWPCP.

Other Controls – Washout Areas:

Unless specifically outlined in the Contract Plans and/or SWPCP, the Contractor will be required to identify a designated washout area(s) to collect concrete, paint and other materials from applicators, containers, vehicles and equipment. There shall be no surface discharge of washout wastewaters from this area. In addition to the above, the following conditions must be met:

- Washout shall be conducted outside of any buffers and at least 50 feet from any stream, wetland or sensitive resource.
- Washout shall be conducted in an entirely self-contained system.
- Designated washout areas are to be clearly flagged.
- All washwater is to be directed into a container or pit designed that no overflows can occur during a rainfall event or snowmelt.
- Hardened concrete is considered “Waste Disposal” and is to be removed from the project and disposed of at an approved facility.

Routine Inspections:

At a minimum, the Contractor along with a qualified inspector (provided by the permittee) shall inspect, at minimum, the following: disturbed areas of the construction activity that have not been finally stabilized; all erosion and sedimentation control measures; all structural control measures; soil stockpile areas; washout areas and locations where vehicles enter or exit the site at least once a week and within 24 hours at the end of a storm event that is equal to or exceeds 0.5 inches. If a potential source of pollution is identified, pollution preventive measures shall be implemented within 24 hours and the SWPCP must be amended within three calendar days.

Keeping Plans Current:

If the Contractor requires a modification to the SWPCP, it shall be in accordance with the Guidelines and the 2004 Connecticut Stormwater Quality Manual or amended. The Department shall approve or reject the modification to the SWPCP and notify the Contractor in writing as to any revisions or additional information required for approval. No damage for delays will be granted to the Contractor based on time taken by the Department to review the Contractor’s proposal, or to apply for or secure the Permit amendment, modification or revision as per Section 1.10 - Environmental Compliance, of the Standard Specifications for Roads, Bridges, and Incidental Construction Form 816 and any Supplements thereto.

Date 01/29/14

At no time shall the Contractor proceed with the proposed SWPCP amendment, modification, or revision unless the Engineer approves, in writing, the Contractor's request. The permittee shall amend the SWPCP whenever there is a change in Contactors or subcontractors at the site, or a change in design, construction, operation, or maintenance at the site which has the potential for the discharge of pollutants. In all cases as described above, the amended SWPCP shall adhere to and comply with Section 1.10 - Environmental Compliance, of the Standard Specifications for Roads, Bridges and Incidental Construction Form 816 and any Supplements thereto. No additional payment will be made for any Permit amendment, modification, or revision which alters the Contract Plans, SWPCP, and/or estimated quantities as a result of the Department's approval of the modifications to the Contract by the Contractor. Changes or variations to the Contract Plans and/or SWPCP by the Contractor shall not result in any additional cost to the State.

In order for the Contractor to meet the requirements set forth in the SWPCP, the Contractor shall comply with additional erosion and sedimentation control provisions included in the project or as identified in the Guidelines.

NOTICE TO CONTRACTOR - ENVIRONMENTAL INVESTIGATIONS

Environmental site investigations have been conducted that involved the sampling and laboratory analysis of soil, and groundwater collected from various locations and depths within the project limits. The results of these investigations indicated the presence of semi-volatile organic compounds (SVOCs), total arsenic, and leachable lead at concentrations exceeding the applicable Connecticut Department of Energy and Environmental Protection (CTDEEP) Remediation Standard Regulations (RSRs) in soil within the project corridor. The contamination was detected in soils ranging from 0 to 3 feet below grade. In addition, low concentrations of volatile organic compounds (VOCs), extractable total petroleum hydrocarbons (ETPH), total and leachable metals were detected in the soils at concentrations below the applicable CTDEEP RSR criteria. In addition, the results of the Task 210 indicated the presence of SVOCs in the groundwater within the project corridor at concentrations exceeding the CTDEEP General Permit (GP) for the Discharge of Groundwater Remediation Wastewater Directly to Surface Water effluent limits. Therefore, any construction dewatering fluids generated adjacent to boring GP-42 as shown on the plans will require proper management and disposal in accordance with permit requirements. The CTDEEP groundwater classification beneath the site is GA.

Based on these findings, four (4) Areas of Environmental Concern (AOEC's) for soil have been designated within the proposed project limits. Also, a Groundwater Area of Environmental Concern (GW-AOEC) has been designated within the proposed project limits. Dewatering fluids generated from within the GW-AOEC must be treated and discharged in accordance with CTDEEP's "General Permit for the Discharge of Groundwater Remediation Wastewater to Directly to Surface Water" or CTDEEP's "General Permit for the Discharge of Groundwater Remediation Wastewater to Sanitary Sewer" or discharged at an off-site disposal facility.

In addition, two (2) "Low Level" Areas of Environmental Concern (LLAOEC's) have been designated within the proposed project limits, where the compounds were detected at concentrations below the numeric criteria. The presence of the compounds at these concentrations will not require material-handling measures beyond those required for normal construction operations. The presence of these compounds at these concentrations will require the disposition of soils excavated from these areas to be restricted as described herein. Material excavated from within the LLAOEC's that cannot be reused within the Project limits will require disposal at an approved treatment/disposal facility in accordance with Item No. 0202315A - Disposal of Controlled Materials.

The Contractor is hereby notified that controlled materials requiring special management or disposal procedures will be encountered during various construction activities conducted within the project limits. Therefore, the Contractor will be required to implement appropriate health and safety measures for all construction activities to be performed within the AOEC's. These measures shall include, but are not limited to, air monitoring, engineering controls, personal protective equipment and decontamination, equipment decontamination and personnel training. **WORKER HEALTH AND SAFETY PROTOCOLS WHICH ADDRESS POTENTIAL**

AND/OR ACTUAL RISK OF EXPOSURE TO SITE SPECIFIC HAZARDS IS SOLELY THE RESPONSIBILITY OF THE CONTRACTOR.

All suitable material excavated within the AOEC's shall be utilized as fill/backfill within any project AOEC within the project limits and all suitable material excavated from within the LLAOEC's shall be utilized as fill/backfill within the project limits, in accordance with the following conditions: (1) such soil is deemed to be structurally suitable for use as fill by the Engineer; (2) such soil is not placed below the water table; 3) the DEEP groundwater classification of the area where the soil is to be reused as fill does not preclude said reuse; and (4) such soil is not placed in an area subject to erosion. Suitable soils within the LLAOEC's are to be reused on-site prior to the use of other soils and/or fill such that no excess soils requiring off-site disposal are generated from the LLAOEC's.

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

- Item No. 0101000A - Environmental Health and Safety
- Item No. 0101117A - Controlled Materials Handling
- Item No. 0101128A - Securing, Construction and Dismantling of a Waste Stockpile and Treatment Area
- Item No. 0101130A – Environmental Work – Solidification
- Item No. 0202315A - Disposal of Controlled Materials
- Item No. 0202318A - Management of Reusable Controlled Material
- Item No. 0204213A – Handling Contaminated Groundwater

The Contractor is alerted to the fact that a Department environmental consultant will be on site for excavation and dewatering activities within the AOEC's, to collect soil, and groundwater samples (if necessary), and to observe site conditions for the State. **The WSA on the plans is to be used exclusively for temporary stockpiling of excavated materials from within project AOEC's for determination of disposal classification. Access to the WSA may be limited.**

Information pertaining to the results of the environmental investigations discussed can be found in the documents listed below. These documents shall be available for review at the Office of Contracts, 2800 Berlin Turnpike, Newington, Connecticut.

- Task 210: Subsurface Site Investigation Report. Route 8 – Interchange 18, New Northbound On-Ramp, Cities of Ansonia and Derby, Connecticut, CDR Maguire, Inc., April 19, 2013.

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 parenthesis.

(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 parenthesis.

(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) and Polymer-Modified Asphalt (PMA) 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

Mix Designation	PG Binder		All Roads	Route	Route	Route	Route
	PG 64-22	PG 76-22	Design Level				
HMA S0.25	-	-	-	-	-	-	-
HMA S0.375	-	-	-	-	-	-	-
HMA S0.5	X	-	2	-	-	-	-
HMA S1	X	-	2	-	-	-	-
PMA S0.25	-	-	-	-	-	-	-
PMA S0.375	-	-	-	-	-	-	-
PMA S0.5	-	-	-	-	-	-	-
PMA S1	-	-	-	-	-	-	-

Note: Please note that PMA mix designations typically use PG 76-22 and HMA mix designations use PG 64-22.

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 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 the requirements in National Cooperative Highway Research Program (NCHRP) Report 350 or the AASHTO Manual for Assessing Safety Hardware (MASH), as appropriate.

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) have been crash tested and have approval in writing from FHWA conforming to the requirements in National Cooperative Highway Research Program (NCHRP) Report 350 or the AASHTO Manual for Assessing Safety Hardware (MASH), as appropriate.

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

Information regarding NCHRP Report 350 and AASHTO Manual for Assessing Safety Hardware (MASH) may be found at the following web sites:

FHWA: http://safety.fhwa.dot.gov/roadway_dept/Policy_guide/road_hardware/

ATSSA: <http://www.atssa.com/resources.aspx>

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 have been crash tested and have approval in writing from FHWA conforming to the requirements in National Cooperative Highway Research Program (NCHRP) Report 350 or the AASHTO Manual for Assessing Safety Hardware (MASH), as appropriate.

SECTION 1.02 – PROPOSAL REQUIREMENTS AND CONDITIONS

Article 1.02.04 – Examination of Plans, Specifications, Special Provisions and Site of Work:

Replace the third sentence of the last paragraph with:

The Department cannot ensure a response to inquiries received later than ten (10) days prior to the original scheduled opening of the related bid.

SECTION 1.03 - AWARD AND EXECUTION OF CONTRACT

Article 1.03.08 - Notice to Proceed and Commencement of Work:

Change the first paragraph to read as follows:

"The Contractor will commence and proceed with the Contract work on the date specified in written notice to proceed issued by the Engineer to the Contractor. The date specified will be no later than April 1, 2015".

In the first sentence of the second paragraph, replace "within the said 45 calendar days" with "prior to the close of business on April 1, 2015".

SECTION 1.05 – CONTROL OF THE WORK

1.05.02(2)---Working Drawings: is amended as follows:

Delete the first sentence in the first paragraph and substitute the following:

When required by the Contract or when ordered by the Engineer, the Contractor shall prepare and submit nine (9) copies of the working drawings and calculations to the following for review prior to implementation:

Connecticut Department of Transportation
District 4 Office
Attn: Kenneth E. Fagnoli, P.E.
District Engineering Manager
359 South Main Street
Thomaston, Connecticut 06787
(203) 591-3540

Add the following to the first paragraph:

When Working Drawings are submitted to the District, copies of the transmittal letter shall be sent to the following parties:

DeCarlo & Doll, Inc.
Attn: Doron Dagan, P.E.
89 Colony Street
Meriden, Connecticut 06451
(203) 379-0467

Valley Council of Governments
Attn: Rick Dunne
12 Main Street
Railroad Station
Derby, Connecticut 06418
(203) 735-8688

BL Companies, Inc.
Attn: Robert A. Lacourse, P.E.
150 Trumbull Street, 6th Floor
Hartford, Connecticut 06103-2403
(860) 249-2200

GENERAL

Traffic Signal Items:

When required by the contract documents or when ordered by the Engineer, The Contractor shall prepare and submit working drawings for all traffic signal items, except Steel Span Poles and Mast Arm Assemblies when applicable, to the DeCarlo & Doll, Inc. for approval before fabrication. The packaged set of catalog cuts, 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. Catalog cuts 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:

DeCarlo & Doll, Inc.
Attn: Doron Dagan, P.E.
89 Colony Street
Meriden, Connecticut 06451
(203) 379-0467

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 catalog cuts 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:

dagan@decarloanddoll.com

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.

A copy of all approved submittals shall be furnished to ConnDOT Division of Traffic Engineering – Electrical for their records. Copies of approved submittals should be sent to the following address:

Lisa N. Conroy, P.E.
Transportation Supervising Engineer
Connecticut Department of Transportation
Division of Traffic Engineering – Electrical
2800 Berlin Turnpike
P.O. Box 317546
Newington, Connecticut 06131-7546
(860) 594-2985

lisa.conroy@ct.gov

GENERAL

SECTION 1.05 – CONTROL OF THE WORK

1.05.02(3)---Shop Drawings: is amended as follows:

Delete the first sentence in the first paragraph and substitute the following:

When required by the Contract or when ordered by the Engineer, the Contractor shall prepare and submit nine (9) copies of the shop drawings to the following Contracting Engineers for review and approval before fabrication:

DeCarlo & Doll, Inc.
Attn: Doron Dagan, P.E.
89 Colony Street
Meriden, Connecticut 06451
(203) 379-0467

Add the following to the first paragraph:

When Shop Drawings are submitted to the Contracting Engineer, copies of the transmittal letter shall be sent to:

BL Companies, Inc.
Attn: Robert Lacourse, P.E.
150 Trumbull Street, 6th Floor
Hartford, Connecticut 06103-2403
(860) 249-2200

Valley Council of Governments
Attn: Rick Dunne
12 Main Street
Railroad Station
Derby, Connecticut 06418
(203) 735-8688

and to the District:

Connecticut Department of Transportation
District 4 Office
Attn: Kenneth E. Fagnoli, P.E.
District Engineering Manager
359 South Main Street
Thomaston, Connecticut 06787
(203) 591-3540

GENERAL

Traffic Signal Items:

When required by the contract documents or when ordered by the Engineer, The Contractor shall prepare and submit catalog cuts and/or shop drawings for all traffic signal items, except Steel Span Poles and Mast Arm Assemblies when applicable, to the DeCarlo & Doll, Inc. for approval before fabrication. The packaged set of catalog cuts, 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. Catalog cuts 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:

DeCarlo & Doll, Inc.
Attn: Doron Dagan, P.E.
89 Colony Street
Meriden, Connecticut 06451
(203) 379-0467

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 catalog cuts 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:

dagan@decarloanddoll.com

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.

A copy of all approved submittals shall be furnished to ConnDOT Division of Traffic Engineering – Electrical for their records. Copies of approved submittals should be sent to the following address:

Lisa N. Conroy, P.E.
Transportation Supervising Engineer
Connecticut Department of Transportation
Division of Traffic Engineering – Electrical
2800 Berlin Turnpike
P.O. Box 317546
Newington, Connecticut 06131-7546
(860) 594-2985

lisa.conroy@ct.gov

GENERAL

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, catalog cuts 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 shop drawings shall be submitted at one time, unless otherwise approved by the engineer.

Aluminum Pedestals	Loop Vehicle Detection
Traffic Signal Housings and Hardware	Loop Detector
LED Traffic Signal Lamp Unit	Loop Sealant
Pedestrian Signals Housing and Hardware	Loop Wire
Pedestrian Pushbuttons and Type of Sign	Loop Lead-in Wire
Accessible Pedestrian Signal & Detector	Cable Closure
Traffic Signal Controller Unit	
Traffic Controller Cabinet	
Controller Unit	
Solid State Time Switch	
Solid State Load Switch	
Conflict Monitor	
Solid State Flasher	
Flash Transfer Relay	

Article 1.06.07 - Certified Test Reports and Materials Certificate.

Add the following:

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

Steel Span Pole Anchor Bolts
Steel Span Poles

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

Aluminum Pedestals	Pedestrian Pushbuttons and Type of Sign
Steel Span Poles	Accessible Pedestrian Signal & Detector
Traffic Signal Housings and Hardware	Traffic Signal Controller Unit
Flasher Cabinet	Traffic Controller Cabinet
LED Traffic Signal Lamp Unit	Controller Unit
Pedestrian Signals Housing and Hardware	Solid State Time Switch
	Solid State Load Switch

Conflict Monitor
Solid State Flasher
Flash Transfer Relay

Loop Vehicle Detection
Loop Detector
Loop Sealant
Loop Wire
Loop Lead-In Wire
Cable Closure

SECTION 1.07 – LEGAL RELATIONS AND RESPONSIBILITY TO PUBLIC

Article 1.07.10 - Contractor’s Duty to Indemnify the State against Claims for Injury or Damage:

Add the following after the only paragraph:

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

Article 1.07.11 Opening of Section of project to Traffic or Occupancy:

Add the following sentence to the last paragraph;

“In cases in which guiderail is damaged by the traveling public, repair or replacement will be reimbursable as contained elsewhere herein.”

Article 1.07.13 – Contractor’s Responsibility for Adjacent Property, Facilities and Service 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:

AT&T CONNECTICUT (SOUTHERN NEW ENGLAND TELEPHONE COMPANY)

Mr. Eric Clark
Manager-OSP Engineering
1441 North Colony Road
Meriden, CT. 06450-4101
Tel. (203) 238-7407
E-Mail: ec9795@att.com

THE UNITED ILLUMINATING COMPANY – DISTRIBUTION DEPT.

Mr. Fred Arnold
Project Manager
180 Marsh Hill Road
Orange, CT 06477
Tel. (203) 499-3922
E-Mail: fred.arnold@uinet.com

YANKEE GAS SERVICES COMPANY

Mr. Steven P. Testa
Construction Manager

107 Selden Street, Mail Stop: NUS2
Berlin, CT 06037
Tel. (860) 665-621
E-Mail: Steven.Testa@nu.com

SOUTH CENTRAL CONNECTICUT REGIONAL WATER AUTHORITY

Mr. Lawrence J. Marcik, Jr., P.E.
Project Engineer
90 Sargent Street
New Haven, CT 06511-5966
Tel. (203) 401-6709
E-Mail: lmarcik@rwater.com

COMCAST OF CT/GA/MA/NH/NY/NC/VA/VT/, LLC dba: Comcast/Seymour

Mr. Dean Muratori
Construction Manager
80 Great Hill Road
Seymour, CT 06483
Tel. (203) 732-0146 Ext:73802
E-Mail: Dean.Muratori@cable.comcast.com

FIBER TECHNOLOGIES NETWORKS, LLC

Mr. Joe Pellegrini
Construction Manager - CT
1781 Highland Avenue, Suite 102
Cheshire, CT 06410
Tel. (860) 758-7277
E-Mail: jpellegrini02@fibertech.com

CITY OF ANSONIA DEPARTMENT OF PUBLIC WORKS

Mr. Fred D'Amico
City Engineer
North Division Street
Ansonia, CT 06401
Tel. (203) 736-5945

CITY OF DERBY DEPARTMENT OF PUBLIC WORKS

Mr. Gary Parker,
Director of Public Works
35 Fifth Street
Derby, CT 06418
Tel. (203) 736-1468

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:

TIME RESTRICTIONS

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 that will interfere with existing traffic operations on all project roadways as follows:

ROUTE 8 NB

On the following State observed Legal Holidays:

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

The following restrictions also apply:

On the day before and the day after any of the above Legal Holidays.

On the Friday, Saturday and Sunday immediately preceding any of the above Holidays celebrated on a Monday.

On the Saturday, Sunday and Monday immediately following any of the above Holidays celebrated on a Friday.

* From 6:00 a.m. the Thursday before the Holiday to 8:00 p.m. the Monday after the Holiday.

** From 6:00 a.m. the Wednesday before the Holiday to 8:00 p.m. the Monday after the Holiday.

During all other times

The Contractor shall maintain and protect traffic as shown on the accompanying "Limitation of Operations" charts, which dictate the minimum number of lanes that must remain open for each day of the week.

Rev. Date 3/17/13

PROJECT NO. 36-179

LIMITATION OF OPERATIONS - Minimum Number of Lanes to Remain Open

ROUTE: 8 N.B.

NUMBER OF EXISTING LANES: 2

LOCATION: Exit 18 to Exit 19; Ansonia and Derby

	Mid	1a	2a	3a	4a	5a	6a	7a	8a	9a	10a	11a	Noon	1p	2p	3p	4p	5p	6p	7p	8p	9p	10p	11p
Mon thru Thur	1	1	1	1	1	1	E	E	E	2	2	2	2	2	2	E	E	E	2	2	2	1	1	1
Fri	1	1	1	1	1	1	E	E	E	1	1	1	2	2	2	E	E	E	2	2	1	1	1	1
Sat	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	1	1	1	1	1	1
Sun	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Hol	E (Existing Traffic Operations)																							

Hol = all designated holidays and holiday periods

E = maintain existing traffic operations = all available travel lanes, including exit only lanes, climbing lanes, and lanes added during construction, and all available shoulder widths, including shoulder width added during construction, shall be open to traffic during this period

ROUTE 8 EXIT 18 NB OFF RAMP

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

During Full Depth Reconstruction the Contractor shall provide a paved travel path full width across the roadway by the end of each work week.

WESTFIELD AVENUE AND DIVISION STREET

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

The Contractor will be allowed to halt traffic on Division Street / Seymour Avenue / Wakelee Avenue intersection to perform necessary work to install span poles, transverse drainage runs and mobilization of equipment with the approval of the Engineer for a period of time not to exceed 10 minutes between 12:01 am and 5:00 am on all non-Holiday days.

ALL OTHER ROADWAYS

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

During Full Depth Reconstruction the Contractor shall provide a paved travel path full width across the roadway by the end of each work week.

ADDITIONAL LANE CLOSURE RESTRICTIONS

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

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

Article 1.08.13 – Termination of the Contractor's Responsibility Replace with the following:

1.08.13 – Acceptance of Work and Termination of the Contractor's Responsibility:

The Contractor's responsibility for non-administrative Project work will be considered terminated when the final inspection has been held, any required additional work and final cleaning-up have been completed, all final operation and maintenance manuals have been submitted, and all of the Contractor's equipment and construction signs have been removed from the Project site. When these requirements have been met to the satisfaction of the Engineer, the Commissioner will accept the work by certifying in writing to the Contractor, that the non-administrative Project work has been satisfactorily completed.

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 and placement of a non-segregated, smooth and dense bituminous concrete mixture brought to proper grade and cross section. This section shall also include the method and construction of longitudinal joints. The Contractor shall furnish ConnDOT with a Quality Control Plan as described in Article 4.06.03.

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

Bituminous Concrete: A concrete material that uses a bituminous material (typically asphalt) as the binding agent and stone and sand as the principal aggregate components. Bituminous concrete may also contain any of a number of additives engineered to modify specific properties and/or behavior of the concrete material. For the purposes of this Specification, references to bituminous concrete apply to all of its sub-categories, for instance those defined on the basis of production and placement temperatures, such as hot-mix asphalt (HMA) or warm-mix asphalt (WMA), those categories derived from the mix-design procedure used, such as “Marshall” mixes or “Superpave” mixes, or those defined on the basis of composition, such as polymer-modified asphalt (PMA).

Course: A lift or multiple lifts comprised of the same bituminous concrete mixture placed as part of the pavement structure.

Density Lot: All material placed in a single lift and as defined in Article 4.06.03.

Disintegration: Wearing away or fragmentation of the pavement. Disintegration will be evident in the following forms: Polishing, weathering-oxidizing, scaling, spalling, raveling, potholes or loss of material.

Dispute Resolution: A procedure used to resolve conflicts resulting from discrepancies between the Engineer and the Contractor’s density results that may affect payment.

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

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

Marshall: A bituminous concrete mix design used in mixtures designated as “Bituminous Concrete Class ()”.

Polymer Modified Asphalt (PMA): A bituminous concrete mixture containing a polymer modified asphalt binder in accordance with contract specifications.

Production Lot: All material placed during a continuous daily paving operation.

Quality Assurance (QA): All those planned and systematic actions necessary to provide confidence that a product or facility will perform as designed.

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 volumetrics, gradation or temperature.

Warm Mix Asphalt (WMA): A bituminous concrete mixture that can be produced and placed at reduced temperatures than HMA using a qualified additive or technology.

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. Bituminous Concrete plant QC plan requirements are defined in Section M.04.

2. Recycle Option: The Contractor has the option of recycling reclaimed asphalt pavement (RAP) or Crushed Recycled Container Glass (CRCG) in bituminous concrete mixtures in accordance with Section M.04. CRCG shall not be used in the final lift of the surface course.

4.06.03—Construction Methods:

1. Material Documentation: All vendors producing bituminous concrete must have their truck-weighing scales, storage scales, and mixing plant automated to provide a detailed ticket.

Delivery tickets must include the following information:

- a. State of Connecticut printed on ticket.
- b. Name of producer, identification of plant, and specific storage bin (silo) if used.
- c. Date and time of day.

English

- d. Mixture Designation If RAP is used, the plant printouts shall include RAP dry weight, percentage and daily moisture content. If WMA technology is used, the technology and the additive rate or the water injection rate must be noted on the ticket. Class 3 mixtures for machine-placed curbing must state "curb mix only".
- e. Net weight of mixture loaded into truck (When RAP is used, RAP moisture shall be excluded from mixture net weight).
- f. Gross weight (Either equal to the net weight plus the tare weight or the loaded scale weight).
- g. Tare weight of truck – Daily scale weight.
- h. Project number, purchase order number, name of Contractor (if Contractor other than Producer).
- i. Truck number for specific identification of truck.
- j. Individual aggregate, RAP, and virgin asphalt high/target/low weights shall be printed on batch plant tickets (For drum plants and silo loadings, the plant printouts shall be printed out at 5 minute intervals maintained by the vendor for a period of three years after the completion of the project).
- k. For every mixture designation the running daily total delivered and sequential load number.

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

The Contractor must notify the Engineer immediately if, during the production day, there is a malfunction of the weighing or recording system in the automated plant or truck-weighing scales. Manually written tickets containing all required information will be allowed for one hour, but for no longer, provided that each load is weighed on State-approved scales. At the Engineer's sole discretion, trucks may be approved to leave the plant if a State inspector is present to monitor weighing. If such a malfunction is not fixed within forty-eight hours, mixture will not be approved to leave the plant until the system is fixed to the Engineer's satisfaction. No damages will be considered should the State be unable to provide an inspector at the plant.

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

2. Transportation of Mixture: Trucks 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 of all vehicles and allowable weights transporting mixture.

The State reserves the right to check the gross and tare weight of any delivery truck. A variation of 0.4 percent or less in the gross or tare weight shown on the delivery ticket and the certified scale weight shall be considered evidence that the weight shown on the delivery ticket is correct. 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 take action to correct discrepancy to the satisfaction of the Engineer.

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

The mixture shall be transported from the mixing plant in trucks that have previously been cleaned of all foreign material and that have no gaps through which mixture might inadvertently escape. The Contractor shall take care in loading trucks uniformly so that segregation is minimized. Loaded trucks shall be tightly covered with waterproof covers acceptable to the Engineer. Mesh covers are prohibited. The front and rear of the cover must be fastened to minimize air infiltration. The Contractor shall assure that all trucks are in conformance with this specification. Trucks found not to be in conformance shall not be allowed to be loaded until re-inspected to the satisfaction of the Engineer.

Truck body coating and cleaning agents must not have a deleterious effect on the transported mixture. The use of solvents or fuel oil, in any concentration, is strictly prohibited for the coating of the inside of truck bodies. When acceptable coating or agents are applied, truck bodies shall be raised immediately prior to loading to remove any excess agent in an environmentally acceptable manner.

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

Refueling of equipment is prohibited in any location on the paving project where fuel might come in contact with bituminous concrete mixtures already placed or to be placed. Solvents for use in cleaning mechanical equipment or hand tools shall be stored clear of areas paved or to be paved. Before any such equipment and tools are cleaned, they shall be moved off the paved or to be paved area; and they shall not be returned for use until after they have been allowed to dry.

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.

English

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 and may be capable of operating in a static or dynamic mode. Rollers that operate in a dynamic mode shall have drums that use a vibratory or oscillatory system or combination of. The vibratory system achieves compaction through vertical amplitude forces. Rollers with this system shall be equipped with indicators that provide the operator with amplitude, frequency and speed settings/readouts to measure the impacts per foot during the compaction process. The oscillatory system achieves compaction through horizontal shear forces. Rollers with this system 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 self-propelled and 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, adjusting ballast and tire inflation pressure as required. The Contractor shall furnish evidence regarding tire size; pressure and loading to confirm that the proper contact pressure is being developed and that the loading and contact pressure are uniform for all wheels.

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 approved lighting fixtures of equivalent light output characteristics. A sufficient number of spare lamps shall be available on site as replacements in the event of failures. The Contractor shall provide brackets and hardware for mounting light fixtures and generators to suit the configuration of the rollers and pavers. Mounting brackets and hardware shall provide for secure connection of the fixtures, minimize vibration, and allow for adjustable positioning and aiming of the light fixtures. Lighting shall be aimed to maximize the illumination on each task and minimize glare to passing traffic. The Contractor shall provide generators on rollers and pavers of the type, size, and wattage, to adequately furnish 120 V AC of electric power to operate the specified lighting equipment. A sufficient amount of fuel shall be available on site. There shall be switches to control the lights. Wiring shall be weatherproof and installed to all applicable codes. The minimum lighting requirements are found in tables 4.06-1 and 4.06-2:

Table 4.06-1: Paver Lighting

Fixture	Quantity	Remarks
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

Table 4.06-2: Roller Lighting

Fixture*	Quantity	Remarks
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
OR		
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

*All fixtures shall be mounted above the roller.

Type A: Fluorescent fixture shall be heavy-duty industrial type. It shall be enclosed and sealed to keep out dirt and dampness. It shall be UL listed as suitable for wet locations. The fixture shall contain two 4-foot long lamps - Type "F48T12CWHO". The integral ballast shall be a high power factor, cold weather ballast, and 120 volts for 800 MA HO lamps. The housing shall be aluminum, and the lens shall be acrylic with the lens frame secured to the housing by hinging latches. The fixture shall be horizontal surface mounting, and be made for continuous row installation.

Type B: The floodlight fixture shall be heavy-duty cast aluminum housing, full swivel and tilt mounting, tempered-glass lens, sealed door, reflector to provide a wide distribution or narrow distribution as required, mogul lamp socket for 250 watt Metal Halide lamp, 120 volt integral ballast, and be UL listed as suitable for wet locations.

Type C: The power beam holder shall have ribbed die cast aluminum housing and a clear tempered-glass lens to enclose the fixture. There shall be an arm fully adjustable for aiming, with a male-threaded mount with serrated teeth and lock nuts. There shall be a 120-volt heatproof socket with extended fixture wiring for an "Extended Mogul End Prong" lamp base. The fixture shall have gaskets, and shall be UL listed as suitable for wet locations. The lamps shall be 1000-watt quartz PAR64, both Q1000PAR64MFL (flood) and Q1000PARNSP (spot) will be required.

Material Transfer Vehicle (MTV): A MTV shall be used when placing a bituminous concrete surface course as indicated in the contract documents. A surface course is defined as the total thickness of the same bituminous concrete mix that extends up to and includes the final wearing surface whether it is placed in a single or multiple lifts, and regardless of any time delays between lifts.

The MTV must be a self-propelled vehicle specifically designed for the purpose of delivering the bituminous concrete mixture from the delivery truck to the paver. The MTV must have the capability to remix the bituminous concrete mixture.

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

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

- Bituminous concrete mixes shall not be placed when the air or subbase temperature is below 40°F regardless of the season.
- Should paving operations be scheduled during the Extended Season, the Contractor's Quality Control Plan for placement described in Section 9. "Contractor Quality Control Plan for Placement" shall include a separate section titled "Extended Season Paving" and address minimum delivered mix temperature, maximum paver speed, enhanced rolling patterns and the method to balance mixture delivery and placement operations. Work covered by the section on Extended Season paving shall not commence until the Engineer's comments have been incorporated into the section and approved.
- Should placement of the final lift of bituminous concrete be scheduled during the Extended Season, the Contractor is required to submit this plan to the Engineer for review 30 days prior to the paving operation.

5. Superpave 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 acceptance by the Engineer. The 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.

6. 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: A permanent transition is defined as any transition that remains as a permanent part of the work. All permanent transitions, leading and trailing ends shall meet the following length requirements:

- a) Posted speed limit is greater than 35 MPH: 30 feet per inch of vertical change (thickness)
- b) Posted speed limit is 35 MPH or less: 15 feet per inch of vertical change (thickness).
- c) Bridge Overpass and underpass transition length will be 75 feet either
 - (1) Before and after the bridge expansion joint, or
 - (2) Before or after the parapet face of the overpass.

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 35 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 35 MPH or less
 - (1) Leading and Trailing = 4 feet per inch of vertical change (thickness)

Note: Any temporary transition to be in-place over the winter shutdown period, holidays, or during extended periods of inactivity (more than 7 calendar days) shall conform to the "Permanent Transition" requirements shown above.

7. Spreading and Finishing of Mixture: Prior to the placement of the bituminous concrete, the underlying base course shall be brought to the plan grade and cross section within the allowable tolerance. Immediately before placing the mixture, the area to be surfaced shall be cleaned by sweeping or by other means acceptable to the Engineer. The bituminous concrete mixture shall not be placed whenever the surface is wet or frozen. The Engineer will verify the mix temperature by means of a probe or infrared type of thermometer. A probe type thermometer, verified by the Department on an annual basis, must be used in order to reject a load of mixture based on temperatures outside the range stated in the placement QC plan.

Placement: The bituminous concrete 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 mix, 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 daily, 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 uniform 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 total thickness of the lift of mixture exceeds that shown on the plans beyond the tolerances shown in Table 4.06-3, the longitudinal limits of such variation including locations and intervals of the measurements will be documented by the Engineer for use in calculating an adjustment in accordance with Article 4.06.04.

TABLE 4.06-3 Thickness Tolerances

Mixture Designation	Lift Tolerance
Class 4 and S1	+/- 3/8 inch
Class 1, 2 and 12 and S0.25, S0.375, S0.5	+/- 1/4 inch

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

- b) Area- Where the width of the lift exceeds that shown on the plans by more than the specified thickness of each lift, the longitudinal limits of such variation including locations and intervals of the measurements will be documented by the Engineer for use in calculating the adjustment in Article 4.06.04.
- c) Delivered Weight of Mixture - When the delivery ticket shows that the truck exceeds the allowable gross weight for the vehicle type the quantity of tons representing the overweight amount will be documented by the Engineer for use in calculating an adjustment in accordance with Article 4.06.04.

Transverse Joints: All transverse joints shall be formed by saw-cutting a sufficient distance back from the previous run, existing bituminous concrete pavement or bituminous concrete driveways to expose the full thickness of the lift. A brush of tack coat shall be used on any cold joint immediately prior to additional bituminous concrete mixture being placed.

Tack Coat Application: A thin uniform coating of tack coat shall be applied to the pavement immediately before overlaying and be allowed sufficient time to break (set). All surfaces in contact with the bituminous concrete that have been in place longer than 3 calendar days shall have an application of tack coat. The tack coat shall be applied by a non-gravity 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.

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.

The Contractor shall only operate rollers in the dynamic mode using the oscillatory system at the lowest frequency setting on concrete structures such as bridges and catch basins. The use of the vibratory system on concrete structures is prohibited. Rollers operating in the dynamic mode shall be shut off when reversing directions.

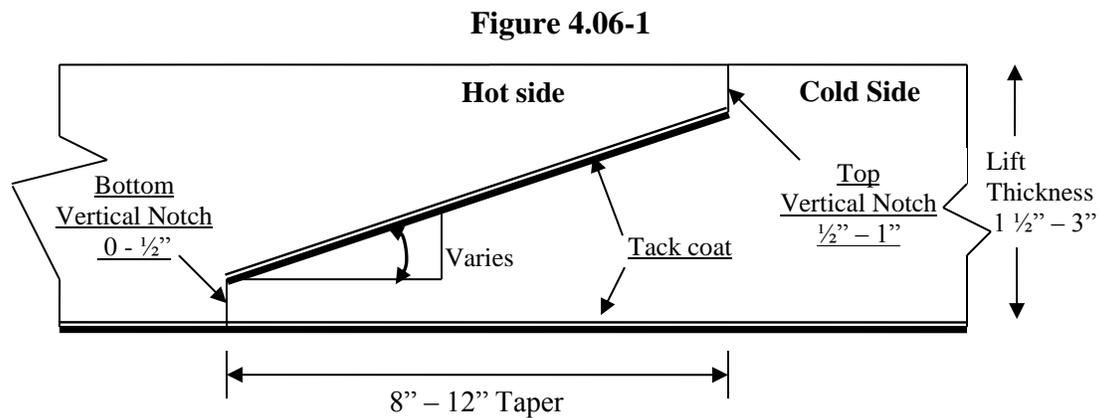
If the Engineer determines that the use of compaction equipment in the dynamic vibratory mode may damage highway components, utilities, or adjacent property, the Contractor shall provide alternate compaction equipment. The Engineer may allow the Contractor to operate rollers in the dynamic mode using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

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

Surface Requirements: The pavement surface of any lift shall meet the following requirements for smoothness and uniformity. Any irregularity of the surface exceeding these requirements shall be corrected by the Contractor.

- a) Smoothness- Each lift of the surface course shall not vary more than $\frac{1}{4}$ inch from a Contractor-supplied 10 foot straightedge. For all other lifts of bituminous concrete, the tolerance shall be $\frac{3}{8}$ inch. Such tolerance will apply to all paved areas.
- b) Uniformity- The paved surface shall not exhibit segregation, rutting, cracking, disintegration, flushing or vary in composition as determined by the Engineer.

8. Longitudinal Joint Construction Methods: Unless noted on the plans or the contract documents or directed by the Engineer, the Contractor shall use Method I- Notched Wedge Joint (see figure 4.06-1) when constructing longitudinal joints where lift thicknesses are between $1\frac{1}{2}$ and 3 inches, except for S1 and Class 4 mixes. Method II Butt Joint (see figure 4.06-2) shall be used for lifts less than $1\frac{1}{2}$ inches or greater than 3 inches, and S1 and Class 4 mixes. During placement of multiple lifts of bituminous concrete, 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.

Method I - Notched Wedge Joint:

A notched wedge joint shall be constructed, as shown in the figure using a device that is capable of adjusting the top and bottom vertical notches independently and is attached to the paver screed.

The taper portion of the 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 compacted and not be exposed to traffic for more than 5 calendar days.

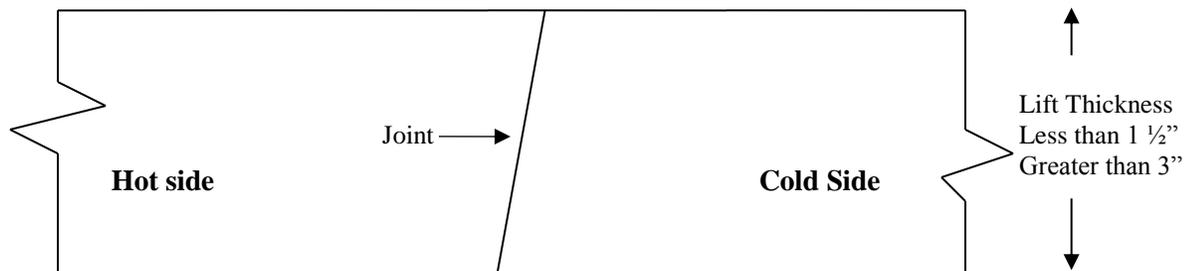
The pavement surface under the wedge joint must have an application of tack coat material. Prior to placing the completing pass (hot side), an application of tack coat must be applied to the exposed surface of the tapered section; regardless of time elapsed between paver passes. The in-place time allowance described in Sub article 4.06.03-7 does not apply to joint construction.

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.

Method II - Butt Joint:

Figure 4.06-2

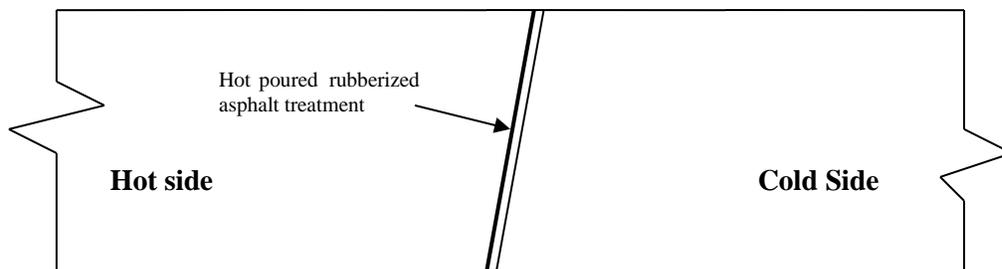


When adjoining passes are placed, the Contractor shall utilize equipment that creates a near vertical edge (refer to figure). The completing pass (hot side) shall have sufficient mixture so that the compacted thickness is not less than the previous pass (cold side). The end gate on the paver should be 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: When required by the contract or allowed by the Engineer, Method III (see figure 4.06-3) may be used.

Figure 4.06-3



English

All of the requirements of Method II must be met with Method III. In addition, the longitudinal vertical edge must be treated with a joint seal material meeting the requirements of Section M.04 prior to placing a completing pass. 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.

9. Contractor Quality Control (QC) Requirements for Placement:

The Contractor shall be responsible for maintaining adequate quality control procedures throughout the placement operations. Therefore, the Contractor must ensure that the materials, mixture and work provided by Subcontractors, Suppliers and Producers also meet contract specification requirements.

Quality Control Plan: Prior to placement the Contractor shall submit a QCP to the Engineer for approval. The QCP shall be submitted at the pre-construction meeting or a minimum 30 days prior to any production or paving. The QCP shall be in the format provided by the Engineer (http://www.ct.gov/dot/lib/dot/documents/dconstruction/pat/qcp_outline_hma_placement.pdf). Work covered by the QCP shall not commence until the Engineer's comments have been incorporated into the QCP and approved. The QCP shall detail every aspect of the placement process and if required, include a separate section on Extended Season paving as described in Section 4. "Seasonal Requirements". Information provided shall include the organization and procedures which the Contractor shall use to control all project site activity. The QCP must address the actions, inspection, or sampling and testing necessary to keep the production and placement operations in control, to determine when an operation has gone out of control and to respond to correct the situation in a timely fashion. The QCP shall also include details on when and who will communicate with personnel at the bituminous concrete plant to determine when immediate changes to the production or placement processes are needed, and to implement the required changes.

In addition the QCP shall also 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.

Approval of the QCP will be based on the inclusion of all of the required information. Approval of the QCP does not relieve the Contractor of its responsibility to comply with the project specifications. The Contractor may modify the QCP as work progresses and must document the changes in writing prior to commencing the next paving operation. These changes include but are not limited to changes in quality control procedures or personnel. Placement may be suspended by the Engineer until the revisions to the QCP have been put into effect.

The Quality Control Plan shall also include the name and qualifications of any outside testing laboratory performing any QC functions on behalf of the Contractor.

Quality Control Inspection, Sampling and Testing: The Contractor shall perform all quality control sampling and testing, provide inspection, and exercise management control to ensure that bituminous concrete production and placement conforms to the requirements as outlined in its QCP during all phases of the work.

- a) **Control Charts:** The Contractor shall develop and maintain density control charts and shall submit them to the Engineer. The control charts shall include the project number, test numbers, test parameter, applicable upper and lower specification limits, and test data. The control charts shall be used as part of the quality control system to document the placement process. The control chart(s) shall be updated each day of production, and a copy shall be submitted prior to the next day's production.
- b) **Records of Inspection and Testing:** For each day of placement, the Contractor shall document all test results and inspections on forms approved by the Engineer. The document shall be certified by the Quality Control Manager or his representative that the information in the document is accurate, and that all work complies with the requirements of the contract.

The Contractor shall submit complete and accurate density sampling, testing and inspection documents to the Engineer within 48 hours. The documents shall be submitted in a manner acceptable to the Engineer.

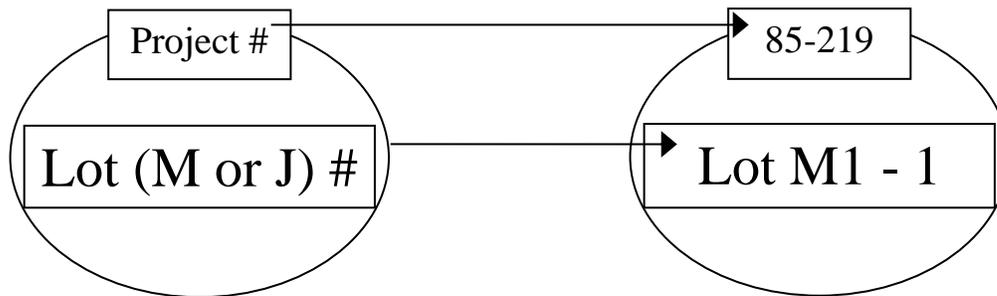
The Contractor may obtain one (1) mat core and one (1) joint core per day for process control, provided this process is detailed in the QCP. The results of these process control cores shall not be used to dispute the Department determinations from the acceptance cores. The Contractor shall submit the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

10. Density Testing of Bituminous Concrete Utilizing Core Samples: This procedure describes the frequency and the method the Contractor shall use to obtain pavement cores for acceptance from the project. Coring shall be performed on each lift specified to a thickness of one and one-half (1 ½) inches or more. Each lift including the longitudinal joints shall be compacted to the degree specified in Tables 4.06-9 and 4.06-10. The density of each core shall be determined using the production lot's average maximum theoretical gravity established from the plant production testing. Bituminous concrete Class 4 and HMA S1 are excluded from the longitudinal joint density requirements.

The Contractor shall extract cores (4 or 6 inch diameter for S0.25, S0.375 and S0.5 mixes, 6 inch diameter for S1.0 mixtures -wet sawed) from sampling locations determined by the Engineer. The Engineer must witness the extraction and labeling of cores, as well as the filling of the core holes. The cores shall be labeled by the Contractor with the project number, lot number, and sub-lot number on the top surface of the core. When labeling the core lot number, include whether the core is from a mat lot or joint lot by using an "M" for a mat core and "J" for a joint core. For example, a core from the first sub-lot of the first mat lot shall be labeled with "Lot M1 - 1". The first number refers to the lot and the second number refers to the sub-lot. Refer to

Figure 4.06-4. The side of the cores shall be labeled with the core lot number and date placed. The project inspector shall fill out a MAT-109 containing the same information to accompany the cores. The Contractor shall deliver the cores and MAT-109 to the Department’s Central Testing Lab in a safe manner to ensure no damage occurs to the cores. The Contractor shall use a container approved by the Engineer. In general the container shall consist of an attached lid container made out of plastic 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 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. The Central Lab will break the security seal and take possession of the cores upon receipt.

Figure 4.06-4



Frequency of sampling is in accordance with the following tables:

TABLE 4.06-4 - TESTING REQUIREMENT FOR BRIDGE DENSITY LOT

Length of Each Structure (Feet)	MAT – No. of Cores	JOINT - No. of 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 – TESTING REQUIREMENT FOR DENSITY LOTS
≥ 500 TONS**

Lot Type	No. of Mat Cores		No. of Joint Cores		Target Lot Size (Tons)
Lot Without Bridge ⁽¹⁾	4		4		2000
Lot With Bridge(s) ⁽¹⁾⁽²⁾	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 – TESTING REQUIREMENT FOR DENSITY LOTS
< 500 TONS**

Lot Type	No. of Mat Cores	No. of Joint Cores	Lot Size (Tons)
Lot Without Bridge ⁽¹⁾	3	3	1 per lift
Lot With Bridge(s) ⁽¹⁾⁽²⁾	3	3	1 per lift

Note (1): The number of “Required Paver Passes for Full Width” shall be used to determine the sub-lot sizes within the lot. The number of paver passes for full width is determined by the contractor.

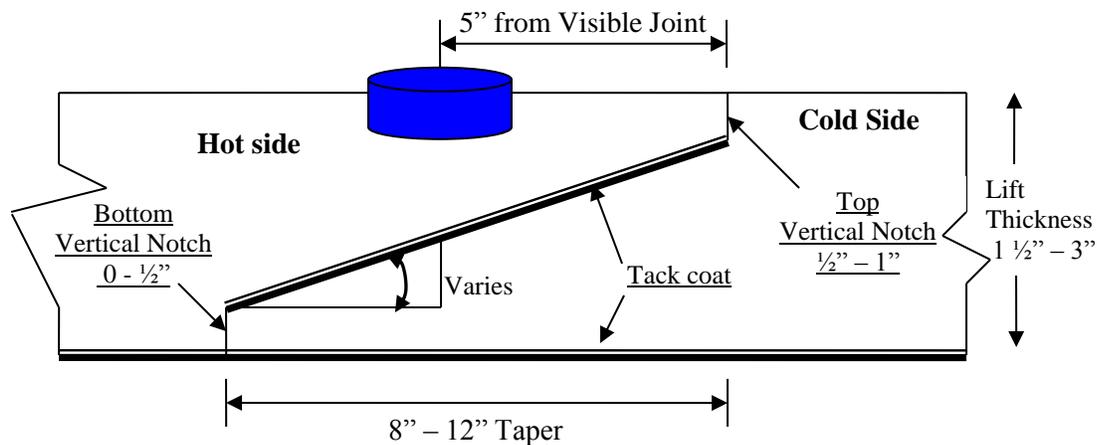
Note (2): If a non-bridge mat or joint core location randomly falls on a structure, the core is to be obtained on the structure in addition to the core(s) required on the structure.

A density lot will be complete when the full designed paving width of the established lot length has been completed and shall include all longitudinal joints that exist between the curb lines regardless of date(s) paved. Quantity of material placed on structures less than or equal to 500 feet long is inclusive of the standard lot. Prior to paving, the total length of the project to be paved shall be split up into lots that contain approximately 2000 tons each. Areas such as highway ramps may be combined to create one lot. In general, combined areas should be set up to target a 2000 ton lot size. One adjustment will apply for each lot. The tons shall be determined using the yield calculation in Article 4.06.04. The last lot shall be the difference between the total payable tons for the project and the sum of the previous lots.

After the compaction process has been completed, the material shall be allowed to cool sufficiently to allow the cutting and removal of the core without damage. The Contractor shall core to a depth that allows extraction so that the uppermost layer being tested for density will not be affected.

A mat core shall not be taken 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, locate the core so that the sample is one foot from the edge.

Joint cores must be taken so that the center of the core is 5 inches from the visible joint on the hot mat side. Refer to figure 4.06-5.

Figure 4.06-5

Cores may be obtained daily or weekly. All cores must be cut within 5 calendar days of placement. 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.

Core holes shall be filled immediately 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 with a mixture containing the same nominal maximum aggregate size and compacted with a hand compactor or other mechanical means to the maximum compaction possible. The bituminous concrete mixture shall be compacted to 1/8 inch above the finished pavement prior to opening the roadway to traffic.

11. Acceptance Inspection, Sampling and Testing: Inspection, sampling, and testing to be used by the Engineer shall be performed at the minimum frequency specified in Section M.04 and stated herein.

Sampling for acceptance shall be established using ASTM D 3665, or a statistically based procedure of random sampling approved by the Engineer.

Plant Material Acceptance: The Contractor shall provide the required acceptance sampling, testing and inspection during all phases of the work in accordance with Section M.04. The Department will perform verification testing on the Contractor's acceptance test results. Should binder content or air void results exceed the specified tolerances in the Department's current QA Program for Materials, Acceptance and Assurance Testing Policies and Procedures, the Department will investigate to determine an assignable cause. Contractor's test results for a subject lot or sub lot may be replaced with verification's result for the purpose of assessing adjustments. The verification procedure is included in the Department's current QA Program for Materials.

Density Acceptance: The Engineer will perform all acceptance testing on the cores in accordance with AASHTO T 331(M).

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 10 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. 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 30 calendar days from the date of Engineer's authorization. The number and type (mat, joint, or structure) of the cores taken for dispute resolution must reflect the number and type of the cores taken for acceptance. The location of each core shall be 36" from the original acceptance core location forward along a line parallel to the baseline that results in the same type (mat, joint, or structure) of core. All such core samples shall be extracted and filled using the procedure outlined in Article 4.06.03. The results from the dispute resolution cores shall be added to the results from the acceptance cores and averaged for determining the final in-place density value.

13. Corrective Work Procedures: Any portion of the completed pavement that does not meet the requirements of the specification shall be corrected at the expense of the Contractor. Any corrective courses placed as the final wearing surface shall not be less than 1½ inches in thickness after compaction.

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) Perform all corrective work in accordance with the Contract and the approved corrective procedure.

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. Prior to the Engineer's authorization to open the pavement to traffic, the Contractor is responsible to protect the pavement from damage.

15. Cut Bituminous Concrete Pavement: Work under this item shall consist of making a straight-line cut in the bituminous concrete 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. Bituminous Concrete Class () or 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 x W_{adj})/9] x (t) x 0.0575 Tons/SY/inch = (-) Tons

Where: L = Length (ft)

(t) = Actual thickness (inches)

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

- b) Thickness: If the actual 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 x t_{adj} x 0.0575 = (-) Tons

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

t_{adj} = Adjusted thickness = [(Dt + tolerance) - 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:

Tons Adjusted for Weight (T_w) = GVW – DGW = (-) Tons

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

- d) Mixture Adjustment: If the quantity of bituminous concrete representing the produced mixture exceeds one or more of the production tolerances for Marshall (Table 4.06-6) or Superpave mix designs (Table 4.06-7 and 4.06-8), an adjustment will be made using the following formulas. The Department's Division of Material Testing will calculate the daily adjustment values for T_{MD} and T_{SD} .

- (1) *Marshall Design*- The tolerances shown in Table 4.06-6 for gradation and binder content will be used to determine whether a mixture adjustment will apply. If the mixture does not meet the requirements of Section M.04, an adjustment will be computed using the following formula:

Tons Adjusted for Marshall Design (T_{MD}) = M x 0.10

Where: M= Tons of bituminous concrete mixture exceeding the tolerances in Table 4.06-5.

**TABLE 4.06-6
TOLERANCES FOR CONSECUTIVE TESTS (MARSHALL)**

Classes	Criteria	% Tolerances (+/-)
-	Binder	0.4
1, 2, 4, 5, 5A & 5B	#200	2.0
1, 2, 4	#50	4
1, 2, 5, 5A & 5B	#30	5
1, 2, 4, 5, 5A & 5B	#8	6
1, 2, 4, 5, 5A & 5B	#4	7
1, 2, 4, 5, 5A & 5B	$\frac{3}{8}$ & $\frac{1}{2}$ inch	8

- (2) *Superpave Design*- The adjustment values in Table 4.06-7 and 4.06-8 shall be calculated for each sub lot based on the Air Void and Liquid Binder Content test results for that sub lot. The total adjustment for each day's production (lot) will be computed using tables and the following formulas:

Tons Adjusted for Superpave Design (T_{SD}) = [(AdjAV_t + AdjPB_t) / 100] X 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.04.03-1

**TABLE 4.06-7
 ADJUSTMENT VALUES FOR AIR VOIDS (SUPERPAVE)**

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

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

Where: AdjPB_t = Total percent liquid 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 4.06-8

Adjustment Value (AdjAV _i) (%)	<u>S0.25, S0.375, S0.5, S1</u> Pb (refer to Table M.04.03-5)
0.0	Equal to or above the min. liquid content
- 10.0	Below the min. liquid content

- e) Density Adjustment: The quantity of bituminous concrete measured for payment for a specified lift of pavement 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. If either the Mat or Joint adjustment value is “remove and replace”, the density lot shall be removed and replaced (curb to curb).

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

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

English

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.

Method of Measurement:

- 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. Truck Method- The Engineer will establish a weight per gallon of the bituminous material based on the specific gravity at 60°F for the material furnished. The number of gallons furnished will be determined by weighing the material on scales furnished by and at the expense of the Contractor.

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. Bituminous Concrete Class (), HMA S* or PMA S*: The furnishing and placing of bituminous concrete will be paid for at the Contract unit price per ton for "Bituminous Concrete, Class ()" or "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 constructing longitudinal joints are included in the general cost of the work.
- All costs associated with obtaining cores for core correlation 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 do not equal zero. A payment will be made for a positive adjustment. A deduction from monies due the Contractor will be made for a negative adjustment.

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

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 estimated cost figure if included in the bid proposal or estimate is not to be altered in any manner by the bidder. If the bidder should alter the amount shown, the altered figure will be disregarded and the original cost figure will be used to determine the amount of the bid for the Contract.

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 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>
Bituminous Concrete, Class ()	ton
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 7.02 PILES

Section 7.02 is being deleted in its entirety and replaced with the following:

7.02.01—Description

7.02.02—Materials

7.02.03—Construction Methods

7.02.04—Method of Measurement

7.02.05—Basis of Payment

7.02.01—Description: This item shall consist of furnishing and driving foundation piles of the type and dimensions designated. Piles shall conform to and be installed in accordance with these specifications, and at the location, and to the elevation, penetration and/or capacity shown on the plans, or as directed by the Engineer. If specified in the plans or directed by the Engineer, piles shall be tipped, shaped, reinforced or otherwise pointed and strengthened

Test piles shall be piles of the type specified, driven in advance of placing orders for the piles, for the purpose of determining length or bearing capacity of piles. The Contractor shall furnish the piles in accordance with an itemized order list which will be furnished by the Engineer, showing the number and length of all piles. When test piles are specified, the pile lengths shown on the plans are for estimating purposes only. The actual lengths to be furnished for production piles will be determined by the Engineer after the test piles have been driven.

7.02.02—Materials: Piles of the type indicated on the plans shall conform to the requirements of Articles M.09.02 and M.14.01.

7.02.03—Construction Methods

1. Pile Types:

(a) **Timber Piles:** The method of storing and handling timber piles shall be such as to avoid damage to the piles. Special care shall be taken to avoid breaking the surface of treated piles. Cant dogs, hooks, or pike-poles shall not be used. Cuts or breaks in the surface of treated piling shall be given three brush coats of hot creosote oil of approved quality, and hot creosote oil shall be poured into all bolt holes.

(b) **Steel Piles:** The methods of storing and handling steel piles shall be such as to prevent damage to the piles and to protect them from corrosion.

(c) **Cast-In-Place Concrete Piles:** Cast-in-place concrete piles shall be constructed by driving steel shells and filling them with concrete. Shells shall be continuously or incrementally tapered, or cylindrical, or a combination of continuously or incrementally tapered lower sections, which are extended with cylindrical upper sections, unless otherwise provided in the plans or special provisions. The tapered portion of piles shall have a minimum tip diameter of 8 inches and shall change in diameter not less than 1 inch in every 12 feet. Cylindrical piles and the cylindrical extension portions of tapered piles shall have a minimum diameter of 12 inches. Shells for cast-in-place concrete piles shall be formed by joining sections of the same manufacture, unless

otherwise permitted by the Engineer. Composite shell piles, which are piles composed of different thicknesses or of different manufacture, shall not be used unless shown on the plans or approved by the Engineer. Prefabricated driving points or other type tip enclosures shall be subject to the approval of the Engineer.

The Contractor shall furnish shells of a type and gage which can be driven without distortion. Shells which fail, fracture or otherwise distort during driving or after driving shall be withdrawn or replaced at the Contractor's expense. The metal of shells which are to be driven without a mandrel shall be of sufficient thickness to withstand the driving without failure, fracture or distortion, but in no case shall the thickness be less than No. 7 gage. Shells driven with a mandrel shall have a thickness not less than No. 18 gage. Piles having a shell thickness less than No. 9 gage shall be reinforced as shown on the plans.

Composite shell piles formed by extending lower sections of No. 7 or heavier gage, with upper sections of lighter than No. 7 gage, shall be driven with an internal mandrel in such a manner so as to insure shell alignment and maximum hammer energy transmission throughout the pile shell length. All details concerning compatibility of shell and mandrel construction shall be subject to the approval of the Engineer.

After driving has been completed, the shell shall be inspected and approved before any concrete is placed. The Contractor shall provide suitable lights and other equipment necessary to inspect each shell throughout its length.

All seams, joints and splices in shells shall develop the full strength of the shell and shall be watertight. Damaged shells that are unacceptable to the Engineer shall be filled with sand and a replacement shell or shells shall be driven adjacent thereto.

Reinforcement shall be placed in accordance with the requirements of the plans or special provisions.

No concrete shall be placed in a pile until all driving within a radius of 15 feet from the pile has been completed, or until all the shells for any one bent have been completely driven. If this is not practical, all driving within the above limits shall be discontinued until the concrete in the last pile cast has set at least 7 days.

Concrete shall be placed continuously in each pile, care being used to fill every part of the shell, and to work concrete around the reinforcement without displacing it. No concrete shall be placed in shells containing an accumulation of water or any foreign material.

Extensions, or "build-ups" on concrete piles, shall be avoided; but when necessary, they shall be made as specified in Subarticle 7.02.03-7.

(d) Prestressed Concrete Piles (Pretensioned): The piles shall be manufactured in accordance with the provision of Article 5.14.03, except as follows:

(1) Forms: The forms for the piles shall be of substantial construction and shall produce a uniformly smooth surface on all formed sides. A minimum concrete cover of 2 inches shall be maintained for prestressing elements by the use of spreaders or by bundling in areas adjacent to openings or inserts. Ties shall also have a minimum cover of 2 inches at these locations. Side forms carrying no load may be removed after 24 hours with the permission of the Engineer or after the concrete has reached the minimum transfer strength as required by Subarticle M.09.02-6.

(2) Finishing: The topside surface of the piles shall be given a uniformly smooth steel trowel finish to match the surface of the formed sides. The prestressing elements shall be cut flush or recessed 1/8 inch to the top of the pile. Projecting fins and surface imperfections shall be removed in a workmanlike manner. Exposed jet pipe connections, inserts or other devices shall be removed or recessed to a depth as directed, and the hole or opening patched with non-shrink grout in a workmanlike manner. The patching material shall have a degree of finish comparable to the adjacent surfaces. Additional finishing of piles, if required, shall be as shown on the plans or as otherwise directed.

(3) Handling and Storage: Care shall be taken during storage, transporting, hoisting and handling of the prestressed piles to prevent cracking or damage. Damaged piles shall be replaced by the Contractor at his expense. Lifting and support points shall be marked on the piles as required.

(4) Pile Extensions: Pile extensions shall normally be fabricated for this purpose in accordance with the specifications. However, sound sections of pile cutoffs or sound portions of rejected piles may be used, subject to the approval of the Engineer. Short pile extensions may, with the permission of the Engineer, be cast-in-place monolithically with the footing or cap.

2. Pile Driving Equipment:

(a) Hammers: Piles shall be driven with approved air, steam, diesel, or hydraulic hammers or a combination of acceptable hammer and water jet. The plant and equipment furnished for air/steam hammers shall have sufficient capacity to maintain at the hammer, under working conditions, the volume and pressure specified by the manufacturer. The plant and equipment shall be equipped with accurate pressure gauges which are easily accessible to the Engineer. The valve mechanism and other parts of the hammer shall be properly maintained so that the length of stroke for a single-acting hammer and the number of blows per minute for a double-acting hammer will be obtained. The power plant for hydraulic hammers shall have sufficient capacity to maintain at the hammer, under working conditions, the volume and pressure specified by the manufacturer. The power plant and equipment shall be equipped with accurate pressure gauges which are easily accessible to the Engineer.

The size of hammer shall be adapted to the type and size of piles and the driving conditions. Unless otherwise specified, the minimum rated striking energy per blow for hammers used shall be 7000-foot pounds for driving timber piles; 15,000-foot pounds for driving steel piles and for driving shells for cast-in-place concrete piles; and 19,000-foot pounds for driving precast concrete piles and for driving prestressed concrete piles. The hammer model used for the driving of test piles shall be used for the driving of service or production piles, unless a change is

authorized by the Engineer in writing. Hammers delivering an energy which the Engineer considers detrimental to the piles shall not be used.

Non-impact hammers, such as vibratory hammers, or driving aids such as jets, followers and pre-augered holes shall not be used unless either specifically permitted in writing by the Engineer or stated in the contract documents.

(b) Pile Hammer Approval: All pile driving equipment furnished by the Contractor shall be subject to the approval of the Engineer. All pile driving equipment shall be sized in such a way that the piles can be driven with reasonable effort to the ordered lengths without damage. Approval of pile driving equipment by the Engineer will be based on wave equation analysis and/or other judgments. In no case shall the driving equipment be used without written approval of the Engineer. Prerequisite to such approval, the Contractor shall submit to the Engineer the necessary pile driving equipment information and wave equation analysis at least 30 days prior to driving piles. The wave equation analysis shall be signed, sealed and dated by a Connecticut licensed Professional Engineer.

The criteria that the Engineer will use to evaluate the driving equipment consists of both the required number of hammer blows per foot as well as the pile stresses at the required ultimate pile capacity. The required number of hammer blows indicated by the wave equation at the ultimate pile capacity shall be between 36 and 180 blows per foot for the driving equipment to be acceptable. In addition, for the driving equipment to be acceptable the pile stresses which are indicated by the wave equation to be generated by the driving equipment shall not exceed the maximum driving stresses allowed by the governing design code stated in the contract documents.

During pile driving operations, the Contractor shall use the approved system. No variations in the driving system will be permitted without the Engineer's written approval. Any change in the driving system will only be considered after the Contractor has submitted the necessary information for a revised wave equation analysis.

If the Engineer determines the Contractor's hammer is unable to transfer sufficient energy to the pile, the hammer shall be removed from service until repaired to the satisfaction of the Engineer.

(c) Drive System Components and Accessories:

(1) Hammer Cushion: Impact pile driving equipment designed to be used with a hammer cushion shall be equipped with a suitable thickness of hammer cushion material to prevent damage to the hammer or pile and to insure uniform driving behavior. Hammer cushions shall be made of durable manufactured materials, provided in accordance with the hammer manufacturer's guidelines. Wood, wire rope, and asbestos hammer cushions are specifically disallowed and shall not be used. A striker plate as recommended by the hammer manufacturer shall be placed on the hammer cushion to insure uniform compression of the cushion material. The hammer cushion shall be removed from the helmet and inspected prior to beginning pile driving at each structure or after each 100 hours of pile driving, whichever is less. The Contractor shall replace any hammer cushion whose thickness is less

than 75% of the original thickness.

(2) Helmet: Piles driven with impact hammers require an adequate helmet or drive head to distribute the hammer blow to the pile head. The helmet shall be axially aligned with the hammer and the pile. The helmet shall be guided by the leads and not be free-swinging. The helmet shall fit around the pile head in such a manner as to prevent transfer of torsional forces during driving, while maintaining proper alignment of hammer and pile. For steel and timber piling, the pile heads shall be cut squarely and a helmet, as recommended by the hammer manufacturer, shall be provided to hold the axis of the pile in line with the axis of the hammer. For precast concrete and prestressed concrete piles, the pile head shall be plane and perpendicular to the longitudinal axis of the pile to prevent eccentric impacts from the helmet. For special types of piles, appropriate helmets, mandrels or other devices shall be provided in accordance with the manufacturer's recommendations so that the piles may be driven without damage.

(3) Pile Cushion: The heads of concrete piles shall be protected by a pile cushion. Pile cushions shall be made of plywood, hardwood, or composite plywood and hardwood materials. The minimum pile cushion thickness placed on the pile head prior to driving shall be at least 4 inches. A new pile cushion shall be provided for each pile. In addition the pile cushion shall be replaced if, during the driving of any pile, the cushion is compressed more than one-half the original thickness or it begins to burn. The pile cushion dimensions shall match the cross sectional area of the pile top. The use of manufactured pile cushion materials in lieu of a wood pile cushion shall be evaluated on a case by case basis.

(4) Leads: Piles shall be supported in line and position with leads while being driven. Pile driver leads shall be constructed in a manner that affords freedom of movement of the hammer while maintaining alignment of the hammer and the pile to insure concentric impact for each blow. Leads may be either fixed or swinging type. Swinging leads, when used, shall be fitted with a pile gate at the bottom of the leads and, in the case of batter piles, a horizontal brace may be required between the crane and the leads. The pile section being driven shall not extend above the leads. The leads shall be adequately embedded in the ground or the pile constrained in a structural frame such as a template to maintain alignment. The leads shall be of sufficient length to make the use of a follower unnecessary, and shall be so designed as to permit proper alignment of batter piles.

(5) Followers: Followers shall only be used when approved in writing by the Engineer, or when specifically stated in the contract documents. In cases where a follower is permitted, the first pile in each bent and every tenth pile driven thereafter shall be driven full length without a follower, to determine that adequate pile penetration is being attained to develop the ultimate pile capacity. The follower and pile shall be held and maintained in equal and proper alignment during driving. The follower shall be of such material and dimensions to permit the piles to be driven to the penetration depth determined necessary from the driving of the full length piles. The final position and alignment of the first two piles installed with followers in each substructure unit shall be verified to be within the required location tolerances before additional

piles are installed.

(6) Jets: Jetting shall only be permitted if approved in writing by the Engineer or when specifically stated in the contract documents. When jetting is not required in the contract documents, but approved after the Contractor's request, the Contractor shall determine the number of jets and the volume and pressure of water at the jet nozzles necessary to freely erode the material adjacent to the pile without affecting the lateral stability of the in place pile. When jetting is specifically required in the contract documents, the plant shall have sufficient capacity to deliver at all times at least 100 psi pressure at two 3/4-inch jet nozzles. In either case, unless otherwise indicated by the Engineer, jet pipes shall be removed when the pile toe is a minimum of 5 feet above prescribed toe elevation and the pile shall be driven to the required ultimate pile capacity with an impact hammer. Also, the Contractor shall control, treat if necessary, and dispose of all jet water in a manner satisfactory to the Engineer and in accordance with the provisions of Article 1.10.

(7) Pre-Augering: When stated in the contract documents, the Contractor shall pre-auger holes at pile locations to the depths shown on the plans. Pre-augered holes shall be of a size smaller than the diameter or diagonal of the pile cross section; however, large enough to allow penetration of the pile to the specified depth. If subsurface obstructions, such as boulders or rock layers, are encountered, the hole diameter may be increased to the least dimension which is adequate for pile installation. Any void space remaining around the pile after completion of driving shall be filled with sand or other approved material. The use of spuds shall not be permitted in lieu of pre-augering. Augering, wet-rotary drilling, or other methods of pre-augering shall be used only when approved by the Engineer. When permitted, such procedures shall be carried out in a manner which will not impair the capacity of the piles already in place or the safety of existing adjacent structures. If the Engineer determines that pre-augering has disturbed the capacities of previously installed piles, those piles that have been disturbed shall be restored to conditions meeting the requirements of this specification by re-driving or by other methods acceptable to the Engineer. Redriving or other remedial measures shall be instituted after the pre-augering operations in the area have been completed.

3. Pile Capacity

(a) Ultimate Pile Capacity: Piles shall be driven by the Contractor to the penetration depth shown on the plans or to a greater depth if necessary to obtain the ultimate pile capacity. The ultimate pile capacity shall be as defined in the contract documents.

Jetting or other methods shall not be used to facilitate pile penetration unless specifically permitted in the contract documents or in writing by the Engineer. The ultimate pile capacity of jetted piles shall be based on driving resistances recorded during impact driving after the jet pipes have been removed. Jetted piles not attaining the ultimate pile capacity at the ordered length shall be spliced, as required, at the Contractor's cost, and driven with an impact hammer until the ultimate pile capacity is achieved.

The ultimate pile capacity of piles driven with followers shall only be considered acceptable when the follower driven piles attain the same pile toe elevation or top of bedrock elevation as required for the full length piles driven without followers that attained the required ultimate pile capacity.

(b) Wave Equation: The ultimate pile capacity shall be determined by the Engineer. Piles shall be driven with the approved driving equipment to the ordered length or other lengths necessary to obtain the required ultimate pile capacity. Jetting or other methods to facilitate pile penetration shall not be used unless specifically permitted either in the contract documents or approved by the Engineer after a revised driving resistance is established from the wave equation analysis. Adequate pile penetration shall be considered to be obtained when the specified wave equation resistance criteria is achieved within 5 feet of the pile toe elevation, based on ordered length. Piles not achieving the specified resistance within these limits shall be driven to penetrations established by the Engineer.

(c) Static Load Tests: Compression load tests shall be performed by procedures set forth in ASTM D-1143 using the quick load test method, except that the test shall be taken to plunging failure or the capacity of the loading system. Testing equipment and measuring systems shall conform to ASTM D-1143, except that the loading system shall be capable of applying 150% of the ultimate pile capacity as stated in the contract documents, and that a load cell and spherical bearing plate shall be used. The apparatus shall be constructed to allow the various increments of the load to be placed gradually, without causing vibration to the test pile. The Contractor shall submit to the Engineer for approval working drawings of the loading apparatus in accordance with Article 1.05.02. When the approved method requires the use of tension (reaction) piles, the tension piles, when feasible, shall be of the same type and diameter as the production piles, and shall be driven in the location of permanent piles except that timber or tapered piles installed in permanent locations shall not be used as tension piles.

The top elevation of the test pile shall be determined immediately after driving and again just before load testing to check for heave. Any pile which heaves more than a ¼ inch shall be redriven or jacked to the original elevation prior to testing. Unless otherwise specified in the contract, a minimum 3-day waiting period shall be observed between the driving of any anchor piles or the load test pile and the commencement of the load test.

On completion of the load testing, any test or anchor piling not a part of the finished structure shall be removed or cut off at least 1 foot below either the bottom of footing or the finished ground elevation, if not located within the footing area.

(d) Dynamic Pile Driving Analysis (PDA) Test: Dynamic measurements following procedures set forth in ASTM D-4945 will be taken during the driving of piles designated as dynamic monitoring test piles. The Contractor shall employ a qualified specialty Consultant, which has successfully completed no less than ten dynamic pile driving tests, to perform the testing and report preparation for all Dynamic Pile Driving Analysis (PDA) Tests to be performed.

At least thirty days prior to driving the test piles the Contractor shall submit to the Engineer for review and approval the qualified specialty consultant, as well as the complete installation, and testing procedures. The submittal shall include all necessary pile driving equipment and support facilities to drive the piles to capacities and depths shown on the plans within allowable stress limits. As part of the submittal the Contractor's Consultant shall perform a wave equation analyses, and a summary report confirming that the pile driving system proposed by the Contractor can meet the capacity, driving resistance and allowable stress limits.

All equipment necessary for the dynamic monitoring of the piles such as gages, cables, etc., shall be furnished by the Contractor's Consultant. The equipment shall conform to the requirements of ASTM D-4945, Standard Test Method for High Strain Dynamic Testing of Piles, and be capable of testing the pile to one and one-half times the ultimate pile capacity. An experienced engineer, who has successfully completed no less than ten dynamic pile driving tests, shall operate the Pile Driving Analyzer in the field. The Contractor shall furnish within 100 feet of test location(s) to protect the dynamic test equipment from the elements. The shelter shall be a minimum floor size of 400 square feet, with a minimum ceiling height of 7 feet, and an inside temperature maintained between 50° and 85°.

The Contractor shall provide power to the test pile locations for the duration of the dynamic testing. The power supply shall consist of a power source providing 115-Volt alternating current with a frequency of 60 Hz and a minimum of 2 kilowatts. If field generators are used as the power source, provide functioning meters to monitor power voltage and frequency. Direct current welders or non-constant power sources are unacceptable.

Prior to lifting the pile to be dynamically tested, the Contractor shall provide as a minimum 3 feet of clear access to 180 degree opposite faces of the pile for pile preparation. The Contractor or its Consultant shall then drill and prepare holes in the pile for gage attachment.

The Contractor or its Consultant shall attach the gages to the pile before driving the piles. Pile driving shall be performed using routine pile installation procedures. When the level of the gages is within one foot of the ground surface, or obstruction, driving shall be halted to remove the gages from the pile. If additional driving is required, the pile shall be spliced and gages shall be reattached to the head of the next pile segment.

With the dynamic testing equipment attached, the Contractor shall drive the pile to the design penetration depth or to a depth determined by the Engineer. The Engineer will use the ultimate pile capacity estimates at the time of driving and/or restriking from dynamic test methods to determine the required pile penetration depth for the ultimate pile capacity. The stresses in the piles will be monitored during driving with the dynamic test equipment to ensure that the actual driving stresses do not exceed the maximum allowed values. If necessary, the Contractor shall reduce the driving energy transmitted to the pile by using additional cushions or reducing the energy output of the hammer in order to maintain

driving stresses below the maximum values. If non-axial driving is indicated by dynamic test equipment measurements, the Contractor shall immediately realign the driving system. After the initial drive of the pile, the Contractor shall wait 24 hours, or the time specified in the contract documents, and restrike the dynamic monitoring test pile with the dynamic testing instruments attached. A cold hammer shall not be used for the restrike. The hammer shall be warmed up before restrike begins by applying at least 20 blows to another pile. The maximum amount of penetration required during restrike shall be 6 inches, or 50 hammer blows, whichever occurs first.

The Contractor's Consultant shall provide preliminary estimates of pile capacity of the test pile to the Engineer within 24 hours of the restrike of each tested pile. The Contractor's Consultant shall also prepare and submit a written report within 5 calendar days of the completion of the testing. This report shall contain a discussion of the pile capacity obtained from the dynamic testing. CAPWAP analyses of the dynamic testing data shall be performed on data obtained at the end of initial driving and the beginning of restrike. The Engineer may request additional analyses at selected pile penetration depths. The report shall also discuss hammer and driving system performance, driving stress levels, and pile integrity. The report is to be prepared, signed, sealed and dated by a Connecticut licensed Professional Engineer. No production piles can be driven until the report has been submitted and approved by the Engineer.

4. Test Piles and Order Lists: Test piles shall be driven at the locations shown on the plans and to the penetration depths specified by the Engineer. Test piles shall be driven to a driving resistance established by the Engineer at the estimated pile toe elevation. The Contractor shall excavate the ground at each test pile to the elevation of the bottom of the footing before the pile is driven. All test piles shall be driven with impact hammers unless specifically stated otherwise in the plans. In general, the specified length of test piles will be greater than the estimated length of production piles in order to provide for variation in soil conditions. The driving equipment used for driving test piles shall be identical to the equipment proposed for driving the production piling. Approval of driving equipment shall conform to the requirements of these Specifications.

Test piles that do not attain the specified driving resistance at a depth of 6 inches above the estimated pile tip elevation, or are specified as a dynamic monitoring pile, shall be redriven after being allowed to set up. The minimum time period before restrike shall be 24 hours, or as specified in the contract documents. A cold hammer shall not be used for the restrike. The hammer used shall be warmed up by applying at least 20 blows to another pile.

Unless otherwise specified in the contract documents, the Contractor shall not order piling to be used in the permanent structure until test pile data has been reviewed and pile order lengths are authorized by the Engineer. The Engineer will provide the pile order list after completion of the test pile(s) and dynamic pile driving analysis (PDA) tests and/or pile loading tests specified in the contract documents.

When no test piles are specified for a substructure, the estimated pile lengths in the contract

documents are taken as the pile order length.

The lengths given in the order list will be based on the lengths which are assumed after cutoff to remain in the completed structure. The Contractor shall, without added compensation, increase the lengths to provide for fresh heading and for such additional length as may be necessary to suit the Contractor's method of operation.

5. Pile Preparation and Driving: The heads of all piles shall be plane and perpendicular to the longitudinal axis of the pile before the helmet is attached. Approval of a pile hammer relative to driving stress damage shall not relieve the Contractor of responsibility for piles damaged because of misalignment of the leads, failure of cushion materials, failure of splices, malfunctioning of the pile hammer, or other improper construction methods. Piles damaged for such reasons shall be rejected and replaced at the Contractor's expense when the Engineer determines that the damage impairs the strength of the pile.

If it becomes necessary and is authorized by the Engineer to resort to jetting, spudding or pre-holing — and further, if no contract bid price is asked for in the proposal for jetting, spudding, or pre-holing — such work will be paid for as "extra work" in accordance with Articles 1.04.05 and 1.09.04.

The use of a hammer with a greater mass, or the use of piles manufactured or designed with pile tips of a nature to provide for better penetration such as but not limited to composite shells, tapered sections or H-pile sections, shall not be considered as extra work. Authorized point reinforcement for piles shall be a separate item.

Piles for exposed pile bents shall be driven with pile driver leads and templates. They shall be of rigid design and construction and shall maintain the required position and alignment of the piles within the tolerances hereinafter specified. Templates shall be anchored or spudded into position, shall be capable of guiding all piles required for the bent and shall remain in place until all the piles in the bent are driven.

(a) Location and Alignment Tolerance: Piles shall be driven with a variation of not more than 1/4 inch per foot from the vertical or from the batter line indicated, except that piles for trestle bents shall be so driven that the cap may be placed in its proper location without inducing excessive stresses in the piles. Upon completion of driving and released from leads, exposed piles such as in bents shall not have a variation of more than 2 inches at the cut-off elevation from the position shown on the plans. Unless otherwise permitted in writing by the Engineer, failure to meet this tolerance shall be cause for rejection. Other foundation piles shall not be out of the position shown on the plans more than 6 inches after driving. The Engineer may require that driving be stopped in order to check the pile alignment. Pulling laterally on piles to correct misalignment, or splicing a properly aligned section on a misaligned section shall not be permitted.

If the location and/or alignment tolerances specified are exceeded, the extent of overloading shall be evaluated by the Engineer. If in the judgement of the Engineer, corrective measures

are necessary, suitable measures shall be designed and constructed by the Contractor.

(b) Heaved Piles: Level readings to measure pile heave after driving shall be made by the Contractor at the start of pile driving operations and shall continue until the Engineer determines that such checking is no longer required. Level readings shall be taken immediately after the pile has been driven and again after piles within a radius of 15 feet have been driven. If pile heave is observed, the Contractor shall take accurate level readings referenced to a fixed datum on all piles immediately after installation and periodically thereafter as adjacent piles are driven to determine the pile heave range. All piles that have been heaved more than ¼ inch shall be redriven at the Contractor's cost, to the required resistance or penetration. Concrete shall not be placed in pile casings until pile driving has progressed beyond a radius of 15 feet from the pile to be concreted. If pile heave is detected for pipe or shell piles which have been filled with concrete, the piles shall be redriven to original position after the concrete has obtained sufficient strength and a proper hammer-pile cushion system, satisfactory to the Engineer, is used.

(c) Installation Sequence: The order of placing individual piles in pile groups shall be either starting from the center of the group and proceeding outwards in both directions or starting at the outside row and proceeding progressively across the group.

6. Unsatisfactory Piles: The method used in driving piles shall not subject the piles to excessive or undue abuse producing crushing and spalling of concrete, injurious splitting, splintering, and brooming of the wood, or deformation of the steel. Misaligned piles shall not be forced into proper position. Any pile damaged during driving by reason of internal defects, or by improper driving, or driven out of its proper location, or driven below the designated cutoff elevation, shall be corrected by the Contractor by a method approved by the Engineer.

Piles which have been bent during installation shall be considered unsatisfactory unless the ultimate capacity is proven by load tests performed at the Contractor's expense. If such tests indicate inadequate capacity, corrective measures as determined by the Engineer shall be taken, such as use of bent piles at reduced capacity, installation of additional piles, strengthening of bent piles, or replacement of bent piles.

A concrete pile will be considered defective if a visible crack, or cracks, appears around the entire periphery of the pile, or if any defect is observed which, as determined by the Engineer, affects the strength or life of the pile.

7. Splicing Piles and Extensions: Full length piles shall be used when practicable; but if splices cannot be avoided, piles or shells for cast-in-place piles may be spliced in accordance with the requirements of the plans. Piles shall not be spliced except with the approval of the Engineer. Splices in excess of two per pile for timber, steel and cast-in-place concrete piles will not be permitted except with special permission of the Engineer. Only one splice per pile will be permitted in precast concrete or prestressed concrete piles. In the absence of splice details in the plans, piles or shells for cast-in-place concrete piles shall be spliced in accordance with the pile or shell manufacturer's recommendations, subject to the approval of the Engineer. Working

Drawings for prefabricated splicing devices and their method of installation shall be submitted to the Engineer for review. All seams, joints and splices shall develop the full strength of the pile.

8. Point Reinforcement: When directed by the Engineer, the contractor shall point-reinforce piles. Such point-reinforcement shall be in accordance with the plans or as directed.

9. Cutoff Lengths: The pile head of all permanent piles and pile casings shall be cutoff at the elevation shown on the plans or as ordered by the Engineer. All cutoff lengths shall become the property of the Contractor, and shall be removed by the Contractor from the site of the work.

10. Painting Steel Piles and Steel Pile Shells: When steel piles or steel pile shells extend above the ground surface or water surface, they shall be painted as specified elsewhere in the contract documents or as ordered by the Engineer. This protection shall extend from an elevation 2 feet below the ground or water surface to the top of the exposed steel.

11. Welding on Piles: When required or permitted, all welding on piles shall be done in accordance with the requirements of the current AWS Structural Welding Code.

7.02.04—Method of Measurement

1. Steel Piles-Timber Piles-Precast Concrete Piles: The length of (type) piles which will be the basis for the pay computation to be included under the item of furnishing (type) piles, shall be number of linear feet of (type) piles authorized by the Engineer or actually furnished by the Contractor, whichever is the lesser amount.

Length of pile cutoffs previously paid for under authorized lengths of piles and subsequently incorporated into the work will not be measured for payment.

The work, materials, tools, equipment and labor incidental to the disposal of pile cutoffs will not be measured for payment.

The amounts to be included under the item for driving (type) piles will be the number of linear foot of piles actually driven and accepted in the completed structure.

2. Cast-in-Place Concrete Piles: The amount to be included under the item of cast-in-place concrete piles shall be the number of linear feet of piles actually driven and accepted in place in the completed structure.

Cut-off materials from shells shall remain the property of the Contractor. They will be paid for in accordance with the unit cost applying in the Contractor's bill or bills for such shells, except that no payment will be made of material cut off from shells furnished by the Contractor in excess of the ordered length. The unit of measurement will be the unit applying in the Contractor's bill or bills for such shells. Material cut off from shells furnished by the Contractor in lengths in excess of those

ordered by the Engineer will not be measured for payment hereunder. The work, materials, tools, equipment and labor incidental to the disposal of cutoffs will not be measured for payment.

Reinforcement, if required in cast-in-place concrete piles, will not be measured for payment.

3. Prestressed Concrete Piles (Pretensioned): The length of the prestressed concrete piles, which will be the basis for the pay computation, shall be the number of linear feet of piles authorized by the Engineer or actually furnished by the Contractor, whichever is the lesser amount. The length of any specified pile tip protruding from the concrete will be included in the length measured for payment.

Also included in the length measured for payment will be the length of precast pile extensions ordered by the Engineer. Not to be included, however, is the length of pile extension furnished in excess of the ordered length. The length of projection dowels shall not be included in the length measured for payment.

Extensions to prestressed concrete piles which are poured monolithically with the footing or pier cap will be paid for at the Contract unit prices for the several items involved, which prices shall be full compensation for all materials, tools, equipment and labor necessary to the completion of the work.

Cut-offs shall not be used for pile extension. The work, material, tools equipment and labor incidental to the disposal of cutoffs will not be measured for payment.

The amounts to be included under the item for driving prestressed concrete piles shall be the number of linear feet of piles actually driven and accepted in the completed structure.

4. Test Piles: The amounts to be included under the respective items for test piles, of the type and length specified, shall be the number of test piles actually driven and accepted. Lengths of test piles ordered by the Engineer in excess of the length or lengths specified in the contract will be measured for payment by the actual number of linear feet ordered, furnished and accepted by the Engineer. Driving of such pile extensions will be measured for payment by the actual length driven and left in place.

Authorized splices performed on test piles will be measured for payment by the number of authorized splices actually completed and accepted. Splicing of test piles shall not be considered as authorized splices when such splicing is done to complete piles to the test pile length specified in the contract.

5. Static Load Tests: The amount to be included under the item of static loading tests shall be the actual number of static load tests completed and accepted.

6. Dynamic Pile Driving Analysis (PDA) Test: The amount to be included under this item shall be the actual number of piles which are driven and restruck with dynamic monitoring equipment attached, completed and accepted

7. Splices: The amount to be included under the items for splicing timber, steel, cast-in-place concrete, precast concrete and prestressed concrete piles (pretensioned) shall be the number of authorized pile splices actually completed and accepted.

The splicing of timber and steel piles, steel shells for cast-in-place concrete piles, precast concrete piles and prestressed concrete piles (pretensioned) shall not be considered as authorized splices when such splicing is performed to complete piles to the order lengths, as defined in Subarticle 7.02.03-7, or when the furnished lengths of such piles are less than the order lengths approved by the Engineer.

8. Point Reinforcement for Piles: The amount to be included under the item of "Point Reinforcement for Piles" for the type of piles specified shall be the number of authorized reinforced points actually completed and accepted.

9. Pre-Augering of Piles: The amount to be included under the item "Pre-Augering of Piles" shall be the number of linear feet of pre-augering completed and accepted by the Engineer.

7.02.05--Basis of Payment: This work will be paid for as follows:

1. Steel Piles: Payment for furnishing steel piles of the lengths authorized will be at the Contract unit price per pound for "Furnishing Steel Piles," which price shall include furnishing, delivery, storage and handling, and all materials, equipment, tools and labor incidental thereto. The mass of steel pile caps will be included with and paid for under this item.

Payment for driving steel piles will be at the contract unit price per linear foot for "Driving Steel Piles," complete in place, which price shall include all materials, equipment, tools and labor incidental thereto.

2. Timber Piles: Payment for furnishing timber piles or treated timber piles, up to a length 10 feet greater than that specified on the plans or in the proposal form, will be at the Contract unit price per foot for "Furnishing Timber Piles (‘ Length)" and "Furnishing Treated Timber Piles (‘ Length)," respectively, which price shall include furnishing, delivery, peeling, storage and handling, and all materials, equipment, tools and labor incidental thereto.

In case the length of any piles finally ordered is more than 10 feet, but less than 20 feet, greater than the length specified on the plans or proposal form, payment for furnishing such piles shall be at a price per linear foot equal to the original contract price, plus 20 percent thereof.

In case the length of any piles finally ordered is 20 feet or more greater than the length specified on the plans or proposal form, payment for furnishing such piles shall be at a price per linear foot equal to the original contract price plus 40 percent thereof.

Payment for driving timber piles or treated timber piles will be at the contract unit price per linear foot for "Driving Timber Piles" and "Driving Treated Timber Piles," respectively, complete in place and regardless of length, which price shall include all materials, equipment, tools and labor incidental thereto.

3. Cast-in-Place Concrete Piles: Payment for cast-in-place concrete piles will be at the contract unit price per linear foot for "Cast-in-Place Concrete Piles," complete in place, including all materials, equipment, tools and labor incidental thereto.

Cut-off materials from shells shall remain the property of the Contractor. They will be paid for in accordance with the unit cost applying in the Contractor's bill or bills for such shells, except that no payment will be made for material cut off from shells furnished by the Contractor in excess of the ordered length.

4. Prestressed Concrete Piles: Payment for furnishing prestressed concrete piles, of the lengths required, will be at the contract unit price per linear foot for "Furnishing Prestressed Concrete Piles" of the type and size as shown on the plans, which price shall include furnishing, delivery, storage and handling, and all materials, equipment, tools and labor incidental thereto.

Payment for driving prestressed concrete piles will be at the contract unit price per linear foot for "Driving Prestressed Concrete Piles," complete in place, which price shall include all material, equipment, tools and labor incidental thereto. Also included shall be all work involved in cutting piles to the direct cut-off elevation.

5. Test Piles: Test piles will be paid for at the contract unit price each for "Test Pile," of the type and length specified, which price shall constitute the complete compensation for furnishing and driving test piles and shall include all materials, equipment, tools and labor incidental thereto. Authorized splices to test piles will be paid for at 200 percent of the contract unit price bid for Splicing Timber Piles, Splicing Steel Piles, Splicing Cast-in-Place Piles or Splicing Prestressed Concrete Piles, whichever type of test pile the splice has been performed on; and such payment shall be for all costs including materials, equipment, tools and labor incidental thereto.

Extension to test piles in excess of the specified length will be paid for on the following basis, which shall include all equipment, tools, splices, labor and work incidental thereto.

(a) Timber Test Piles: Extensions will be paid for at 125 percent of the contract unit price per linear foot for "Furnishing Timber Piles," of the shortest length specified in the proposal, and at 125 percent of the contract unit price per linear foot for "Driving Timber Piles."

(b) Steel Test Piles: Extensions will be paid for at 125 percent of the contract unit price per pound for "Furnishing Steel Piles" and at 125 percent of the contract unit price per linear foot for "Driving Steel Piles."

(c) Cast-in-Place Concrete Test Piles: Extensions will be paid for at 125 percent of the contract unit price per linear foot for "Cast-in-Place Concrete Piles." Cut-off materials from shells will be paid for as provided in Subarticle 7.02.05-3.

(d) Prestressed Concrete Test Piles: Extensions will be paid for at 125 percent of the contract unit price per linear foot for "Furnishing Prestressed Concrete Piles," and at 125 percent of the contract unit price per linear foot for "Driving Prestressed Concrete Piles."

6. Static Load Tests: Loading tests will be paid for at the contract unit price each for "Pile Loading Test," which price shall include all expenses incidental to loading the pile or group of piles and removing the load, platform, etc., upon completion of the test.

7. Dynamic Pile Driving Analysis (PDA) Test: Dynamic monitoring will be paid for at the contract unit price each for "Dynamic Pile Driving Analysis (PDA) Test" which price shall include complete compensation for each pile tested using a pile driving analyzer during driving and restrike, including all materials, equipment, tools and labor incidental thereto, as well as providing preliminary and summary report(s).

8. Splices: Authorized splices in timber, steel, cast-in-place piles, precast concrete and prestressed concrete piles will be paid for at the contract unit price each for "Splicing Timber Piles," "Splicing Steel Piles," "Splicing Cast-in-Place Concrete Piles," "Splicing Precast Concrete Piles," "Splicing Prestressed Concrete Piles," respectively, which price shall include all materials, except as otherwise noted, and all equipment, tools and labor incidental thereto. In the absence of such prices, authorized splices will be paid for as extra work.

9. Trimming and Cutting: There shall be no direct compensation for cutting off timber, steel, precast concrete or prestressed concrete piles and shells for cast-in-place concrete piles as ordered; but the cost thereof shall be considered as included in the cost of the pile items.

10. Point Reinforcement for Piles: Authorized points for pointing and reinforcing piles will be paid for at the contract unit price each for "Point Reinforcement for Timber Piles," or "Point Reinforcement for Steel Piles," respectively, whichever applies, which price shall include all materials, equipment, tools and labor incidental thereto. In the absence of such prices, authorized points will be paid for as extra work.

11. Pre-Augering of Piles: Payment for "Pre-Augering of Piles" will be at the contract unit price per linear foot for "Pre-Augering of Piles," which price shall include which price shall include all materials, and all equipment, tools and labor incidental thereto.

12. Underground Obstructions: If the required pile penetration is not reached due to the presence of underground obstructions which are not the result of the Contractor's operations but are due to the presence of earlier construction at the site, then the cost of removing these obstructions and back-filling the area will be paid for as extra work unless otherwise specified in the contract documents.

13. Painting: There will be no additional payment for painting steel piles and steel pile shells, but the cost thereof shall be considered as included in the cost of furnishing and driving the piles.

14. Disposal of Pile Cutoffs: All costs incidental to the disposal of cutoff material will be included in the price of furnishing of the type of pile specified.

Pay Item	Pay Unit
Furnishing (Type) Piles (Lengths)	lb.
Driving (Type) Piles	l.f.
Test Pile (Type-Length)	ea.
Splicing (Type) Piles	ea.
Point Reinforcement for (Type) Piles	ea.
File Loading Test	ea.
Dynamic Pile Driving Analysis (PDA) Test	ea.
Pre-Augering of Piles	l.f.

SECTION 9.21 - CONCRETE SIDEWALKS AND RAMPS

Section 9.21 is being deleted in its entirety and replaced with the following:

9.21.01 – Description

9.21.02 – Materials

9.21.03 – Construction Methods

9.21.04 – Method of Measurement

9.21.05 – Basis of Payment

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.

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.

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.

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.

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.

Pay Item	Pay Unit
Concrete Sidewalk	s.f.
Concrete Sidewalk Ramp	s.f.
Detectable Warning Strip	Each
Retrofit Detectable Warning Strip	Each

**SECTION 10.00 - GENERAL CLAUSES FOR HIGHWAY
ILLUMINATION AND TRAFFIC SIGNAL PROJECTS**

Article 10.00.10 Section 3. Functional Inspection, first paragraph after the 2nd sentence: Add the following:

The contractor shall have a bucket truck with crew on site during the Functional Inspection to make any necessary aerial signal adjustments as directed by the Engineer.

Article 10.00.12 - Negotiations with utility company: Add the following:

The contractor shall give notice to utility companies a minimum of 30 days prior to required work or services to the utility company. Refer to Section 1.07 – Legal Relations and Responsibilities for the list of utility companies and representatives the contractor shall use.

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

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

SECTION 12.00 – GENERAL CLAUSES FOR HIGHWAY SIGNING

Description:

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

12.00.06 – 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

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 material, and facility or plant used to produce and test bituminous concrete must be qualified on an annual basis by the Engineer. Test Procedures and Specifications referenced herein are in accordance with the latest AASHTO and ASTM Standard Test Procedures and Specifications. Such references when noted with an (M) have been modified by the Engineer and are detailed in Table M.04.03-6.

The Contractor shall submit to the Engineer all sources of coarse aggregate, fine aggregate, mineral filler, PG binder, and if applicable any additives such as but not limited to anti-strip, warm mix, and polymer modifiers. The Contractor shall submit a Material Safety Data Sheet (MSDS) for each grade of binder, and additive to be used on the Project. The Contractor shall not change any material sources without prior approval of the Engineer.

An adequate quantity of each size aggregate, mineral filler, bitumen, and additives, shall be maintained at the bituminous concrete plant site at all times while the plant is in operation to ensure that the plant can consistently produce bituminous concrete mixtures that meet the job mix formula (JMF) as specified in Article M.04.02. The quantity of such material shall be reviewed by the Engineer on an individual plant basis and is dependent upon the plant's daily production capacity. A total quantity of any material on site that amounts to less than one day's production capacity may be cause for the job mix formula to be rejected.

1. Coarse Aggregate:

- a. **Requirements:** The coarse aggregate shall consist of clean, hard, tough, durable fragments of crushed stone or crushed gravel of uniform quality. Aggregates from multiple sources of supply must not be mixed or stored in the same stockpile.
- b. **Basis of Approval:** The request for approval of the source of supply shall include a washed sieve analysis in accordance with AASHTO T 27. The G_{sa}, G_{sb}, and P_{w_a} shall be determined in accordance with AASHTO T 85. The coarse aggregate must not contain more than 1% crusher dust, sand, soft disintegrated pieces, mud, dirt, organic and other injurious materials. When tested for abrasion using AASHTO T 96, the aggregate loss must not exceed 40%. When tested for soundness using AASHTO T 104 with a magnesium sulfate solution, the coarse aggregate must not have a loss exceeding 10% at the end of 5 cycles.

For all bituminous mixtures, materials shall also meet the coarse aggregate angularity criteria as specified in Tables M.04.02-2 thru M.04.02-4 for blended aggregates retained

on the #4 sieve when tested according to ASTM D 5821. The amount of aggregate particles of the coarse aggregate blend retained on the #4 sieve that are flat or elongated shall be determined in accordance with ASTM D 4791 and shall not exceed 10% by weight when tested to a 3:1 ratio, as shown in Tables M.04.02-2 thru M.04.02-4.

2. Fine Aggregate:

Requirements: The fine aggregate from each source quarry/pit deposit shall consist of clean, hard, tough, rough-surfaced and angular grains of natural sand; manufactured sand prepared from washed stone screenings; stone screenings, slag or gravel; or combinations thereof, after mechanical screening or manufactured by a process approved by the Engineer. The Contractor is prohibited from mixing two or more sources of fine aggregate on the ground for the purpose of feeding into a plant.

- a. All fine aggregate shall meet the listed criteria shown in items #1 thru #7 of Table M.04.01-1. Table M.04.01-1 indicates the quality tests and criteria required for all fine aggregate sources. Individually approved sources of supply shall not be mixed or stored in the same stockpile. The fine aggregates must be free from injurious amounts of clay, loam, and other deleterious materials.

For Superpave mixtures, in addition to the above requirements, the fine aggregate angularity shall be determined by testing the materials passing the #8 sieve in accordance with AASHTO T 304, Method A. Qualification shall be based on the criteria listed in Tables M.04.02-2 thru M.04.02-4. The fine aggregate shall also be tested for clay content as a percentage contained in materials finer than the #8 sieve in accordance with AASHTO T 176.

Table M.04.01-1: Fine Aggregate Criteria by Pit/Quarry Source

Item	Title	AASHTO Protocol(s)	Criteria
1	Grading	T 27 & T 11	100% Passing 3/8 inch 95% Passing the #4 min.
2	Absorption	T 84	3% maximum
3	Plasticity limits	T 90	0 or not detectable
4	L.A. Wear	T 96	50% maximum(fine agg. particle size # 8 and above)
5	Soundness by Magnesium Sulfate	T 104	20% maximum @ 5 cycles
6	Clay Lumps and Friable Particles	T 112	3% maximum
7	Deleterious Material	As determined by the Engineer	Organic or inorganic calcite, hematite, shale, clay or clay lumps, friable materials, coal-lignite, shells, loam, mica, clinkers, or organic matter (wood, etc). -Shall not contain more than 3% by mass of any individual listed constituent and not more than 5% by mass in total of all listed constituents.
8	Petrographic Analysis	ASTM C 295	Terms defined in Section M.04.01-2c.

- b. Basis of Approval: A Quality Control Plan for Fine Aggregate (QCPFA) provided by the Contractor shall be submitted for review and approval for each new source documenting how conformance to Items 1 through 7 as shown in Table M.04.01-1 is monitored. The QCPFA must be resubmitted any time the process, location or manner of how the fine aggregate (FA) is manufactured changes, or as requested by the Engineer. The QCPFA must include the locations and manufacturing processing methods. The QCPFA for any source may be suspended by the Engineer due to the production of inconsistent mixtures.

The Contractor shall submit all test results to the Engineer for review. The Contractor shall also include a washed sieve analysis in accordance with AASHTO T 27/T 11. Any fine aggregate component or final combined product shall have 100% passing the 3/8 inch sieve and a minimum of 95% passing the # 4. The G_{sa}, G_{sb}, and P_{w_a} shall be determined in accordance with AASHTO T 84.

The Contractor will be notified by the Engineer if any qualified source of supply fails any portion of Table M.04.01-1. One retest will be allowed for the Contractor to make corrections and/or changes to the process. If, upon retest, the material does not meet the requirements of items 1-7, additional testing will be required in accordance with item 8.

- c. The Contractor may provide a Petrographic analysis of the material performed by a third party acceptable to the Engineer at its' own expense. The Contractor shall submit the results of the analysis with recommended changes to the manufacturing process to the Engineer. The Contractor shall submit fine aggregate samples for testing by the Engineer after the recommended changes have been made.

The Contractor may request the use of such fine aggregate on select project(s) for certain applications of bituminous concrete pavement. Such material will be monitored for a period no less than 48 months, at no cost to the State. Terms of any evaluation and suitable application will be determined by the Engineer.

3. Mineral Filler:

- a. Requirements: Mineral filler shall consist of finely divided mineral matter such as rock dust, including limestone dust, slag dust, hydrated lime, hydraulic cement, or other accepted mineral matter. At the time of use it shall be freely flowing and devoid of agglomerations. Mineral filler shall be introduced and controlled at all times during production in a manner acceptable to the Engineer.
- b. Basis of Approval: The request for approval of the source of supply shall include the location, manufacturing process, handling and storage methods for the material. Mineral filler shall conform to the requirements of AASHTO M-17

4. Liquid Bituminous Materials:

a. General:

- i. Liquid PG binders shall be uniformly mixed and blended and be free of contaminants such as fuel oils and other solvents. Binders shall be properly heated and stored to prevent damage or separation.
- ii. The blending at mixing plants of PG binder from different suppliers is strictly prohibited. Contractors who blend PG binders will be classified as a supplier and will be required to certify the binder in accordance with AASHTO R-26(M). The binder shall meet the requirements of AASHTO M-320(M) and AASHTO R-29(M). 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 materials. 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 (tanker truck) 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 will be free of contamination from any residual material, along with two (2) copies of the bill of lading.
- iv. 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) will be allowed to supply PG binders to Department projects.

b. Neat Performance Grade (PG) Binder:

- i. PG binder shall be classified by the supplier as a "Neat" binder for each lot and be so labeled on each bill of lading. Neat PG binders shall be free from modification with: fillers, extenders, reinforcing agents, adhesion promoters, thermoplastic polymers, acid modification and other additives, and shall indicate such information on each bill of lading and certified test report.
- ii. The asphalt binder shall be Performance Grade PG 64-22.

c. Modified Performance Grade (PG) Binder

Unless otherwise noted, the asphalt binder shall be Performance Grade PG 76-22 asphalt modified 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-320(M) and AASHTO R-29(M).

d. Warm Mix Additive or Technology:

- i. The warm mix additive or technology must be listed on the NEAUPG Qualified Warm Mix Asphalt (WMA) Technologies List at the time of bid, which may be accessed online at http://www.neaupg.uconn.edu/wma_info.html.
- 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-320(M) and AASHTO R-29(M) 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.
- iv. Cut-backs (medium cure type):
 - i. Requirements: The liquid petroleum materials shall be produced by fluxing an asphalt base with appropriate petroleum distillates to produce the grade specified.
 - ii. Basis of Approval: The request for approval of the source of supply shall be submitted at least seven days prior to its use listing the location where the materials will be produced, and manufacturing, processing, handling and storage methods. The Contractor shall submit a Certified Test Report in accordance with Section 1.06 and a Material Safety Data Sheet (MSDS) for the grade to be used on the Project. The liquid asphalt shall be MC-250 conforming to AASHTO M-82.

e. Emulsions

- i. Requirements: The emulsified asphalt shall be homogeneous and not be used if exposed to freezing temperatures.
- ii. Basis of Approval: The request for approval of the source of supply must include the location where the materials will be produced, and manufacturing, processing, handling and storage methods.
 1. 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. When ambient temperatures are 80°F and rising, grade SS-1 or SS-1h may be substituted if accepted by the Engineer. Each shipment shall be accompanied with a Certified Test Report listing Saybolt viscosity, residue by evaporation, penetration of residue, and weight per gallon.
 2. Cationic emulsified asphalt shall conform to the requirements of AASHTO M-208(M). 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 accepted by the Engineer. Each shipment shall be accompanied with a Certified Test Report listing Saybolt viscosity, residue by evaporation, penetration of residue, and weight per gallon.

5. Reclaimed Asphalt Pavement (RAP):

- a. Requirements: RAP shall consist of asphalt pavement constructed with asphalt and aggregate reclaimed by cold milling or other removal techniques approved by the Engineer. For bituminous concrete mixtures containing RAP, the Contractor shall submit a JMF in accordance with Article M.04.02 to the Engineer for review.
- 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 test the material and provide the following information along with a 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 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.
3. A statement that RAP material has been crushed to 100% passing the ½ inch sieve and remains free from contaminants such as joint compound, wood, plastic, and metals.

6. 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

7. Joint Seal Material:

Requirements: Joint seal material shall be a hot-poured rubber compound intended for use in sealing joints and cracks in bituminous concrete pavements. Joint seal material must meet the requirements of AASHTO M-324 – Type 2.

8. Plant Requirements:

- a. Mixing Plant and Machinery:

The mixing plant used in the preparation of the bituminous concrete shall comply with AASHTO M-156(M)/ASTM D 995 for a Batch Plant or a Drum Dryer Mixer Plant, and be approved by the Engineer.

- b. Storage Silos:

For all mixes, the Contractor may use silos for short-term storage of Superpave mixtures with prior notification and 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. Prior approval must be obtained for storage times greater than those indicated. When multiple

silos are filled, the Contractor shall discharge one silo at a time. Simultaneous discharge of multiple silos 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	

- 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 delivery ticket, as specified herein. Material feed controls shall be automatically or manually adjustable to provide proportions within the tolerances listed below for any batch size.

An asterisk (*) shall be automatically printed next to any individual batch weight(s) exceeding the tolerances in ASTM D 995 section 8.7.3. 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.

There must be provisions so that scales are not manually adjusted during the printing process. In addition, the system shall be interlocked to allow printing only when the scale has come to a complete rest. A unique printed character (m) shall automatically be printed on the truck and batch plant printout when the automatic batching sequence is interrupted or switched to auto-manual or full manual during proportioning. For each day's production, each project shall be provided a clear, legible copy of these recordings on each delivery ticket.

- d. Aggregates: The Contractor shall ensure that aggregate stockpiles are managed to provide uniform gradation and particle shape, prevent segregation and cross contamination in a manner acceptable to the Engineer. For drum plants only, the Contractor shall determine the percent moisture content at a minimum, prior to production and half way through production.
- e. Mixture: The dry and wet mix times shall be sufficient to provide proper coating (minimum 95% as determined by AASHTO T 195(M)) of all particles with bitumen and produce a uniform mixture.

The Contractor shall make necessary adjustments to ensure all types of bituminous concrete mixtures contain no more than 0.5% moisture throughout when tested in accordance with AASHTO T 329.

- f. RAP: The Contractor shall indicate the percent of RAP, the moisture content (as a minimum determined twice daily – prior to production and halfway through production), and the net dry weight of RAP added to the mixture on each truck ticket. For each day of production, the production shall conform to the job mix formula and RAP percentage and no change shall be made without the prior approval of the Engineer.
- g. Asphalt Binder: The last day of every month, a binder log shall be submitted when the monthly production for the Department exceeds 5000 tons. Blending of PG binders from different suppliers or grades at the bituminous concrete production facility is strictly prohibited.
- h. Warm mix additive: For mechanically foamed WMA, the maximum water injection rate shall not exceed 2.0% water by total weight of binder and the water injection rate shall be constantly monitored during production.
- i. Field Laboratory: The Contractor shall furnish the Engineer an acceptable field laboratory at the production facility to test bituminous concrete mixtures during production. The field 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, 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 a high speed internet connection with a minimum upstream of 384 Kbps and a functioning web browser with unrestricted access to <https://ctmail.ct.gov>. This equipment shall be maintained in clean and good working order at all times and be made available for use by the Engineer.

The laboratory shall be equipped with a suitable 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. Windows shall be installed to provide sufficient light and ventilation. During summer months adequate cooling or ventilation must be provided so the indoor air temperature shall not exceed the ambient outdoor temperature. Light fixtures and outlets shall be installed at convenient locations, and a telephone shall be within audible range of the testing area. The laboratory shall be equipped with an adequate workbench that has a suitable length, width, and sampling tables, and be approved by the Engineer.

The field laboratory testing apparatus, supplies, and safety equipment shall be capable of performing all tests in their entirety that are referenced in AASHTO R 35(M), *Standard Practice for Superpave Volumetric Design for Hot-Mix Asphalt (HMA)* and AASHTO M 323, *Standard Specification for Superpave Volumetric Mix Design*. In addition, the quantity of all equipment and supplies necessary to perform the tests must be sufficient to initiate and complete the number of tests identified in Table M.04.03-2 for the quantity of mixture produced at the facility on a daily basis. The Contractor shall ensure that the

Laboratory is adequately supplied at all times during the course of the project with all necessary testing materials 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 field 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. Marshall Method - Class 1, 2, 3, 4, 5, 5A, 5B and 12:

- a. Requirements: When specified, the Marshall method shall be employed to develop a bituminous concrete mix design that includes a JMF consisting of target values for gradation and bitumen content for each class of bituminous concrete designated for the project in accordance with the latest Asphalt Institute's MS-2 manual. Each class of bituminous concrete must meet the requirements as shown in Table M.04.02-1.
- b. Basis of Approval: The Contractor shall submit to the Engineer a request for approval of the JMF annually in accordance with one of the methods described herein. Prior to the start of any paving operations, the JMF and production percentage of bitumen must be accepted by the Engineer, and the Contractor must demonstrate the ability to meet the accepted JMF and production percentage of bitumen for each class of mixture. Additionally, the fraction of material retained between any two consecutive sieves shall not be less than 4%.

The Engineer will test each class of mixture for compliance with the submitted JMF and Table M.04.02-1. The maximum theoretical density (Gmm) will be determined by AASHTO T 209(M). If the mixture does not meet the requirements, the JMF shall be adjusted within the ranges shown in Table M.04.02-1 until an acceptable mixture is produced. All equipment, tests and computations shall conform to the Marshall method in accordance with AASHTO T 245(M).

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

The Contractor shall not change sources of supply after a JMF has been accepted. Before a new source of supply for materials is used, a new JMF shall be submitted to the Engineer for approval.

- c. Marshall Mixture (Virgin): For bituminous concrete mixtures that contain no recycled material, the limits prescribed in Table M.04.02-1 govern. The Contractor shall submit to the Engineer for approval, a JMF with the individual fractions of the aggregate expressed as percentages of the total weight of the mix and the source(s) of all materials. The JMF shall indicate two bitumen contents; the JMF target percentage and a production percentage (actual amount added to mix) of bitumen for each mix class by total weight. For surface course Class 1, a 0.45 power gradation chart shall also be submitted on which is plotted the percentage passing each sieve. The JMF shall also indicate the target temperature of completed mixture as it is dumped from the mixer and tested in accordance with Article M.04.03.
- d. Marshall Mixtures with RAP: In addition to subarticles M.04.02 – 1a through c, RAP in bituminous concrete shall comply with requirements stated in Article M.04.01, and as stated herein. Upon approval of the Engineer, a maximum of 15% RAP may be used with no binder grade modification. RAP material shall not be used with any other recycling option.
The Contractor may increase the RAP percentage in 5% increments up to a maximum of 30% provided a new JMF is accepted by the Engineer. The following information shall be included in the JMF submittal:
- Gradation and asphalt content of the RAP.
 - Percentage of RAP to be used.
 - Virgin aggregate source(s).
 - Total binder content based on total mixture weight.
 - Production pull percentage of added virgin binder based on total mixture weight.
 - Gradation of combined bituminous concrete mixture (including RAP).
 - Grade of virgin added, if greater than 15% of total mix weight.
- e. Marshall Mixture with CRCG: In addition to subarticle M.04.02 – 1a through c, for bituminous concrete that contains CRCG, the Contractor shall submit a materials certificate to the Engineer stating that the mixture and its components comply with requirements stated in subarticle M.04.01 - (6). Additionally, 1% 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.

2. Cold Patch Method - Class 5, 5A, 5B:

- a. Requirements: This mixture must be capable of being stockpiled and workable at all times. A non-stripping agent accepted by the Engineer shall be used in accordance with manufacturer's recommendations. The Contractor shall take necessary steps to ensure that this mixture uses aggregate containing no more than 1% moisture and is not exposed to any rain, snow, or standing water for a period of 6 hours after being mixed. This mixture shall be mixed and stockpiled at the point of production on a paved surface at a height not greater than 4 feet during the first 48 hours prior to its use.

- i. Class 5A mixture shall have 3/8 to 1/2 inch polypropylene fibers that have been approved by the Engineer added at a rate of 6 pounds per ton of mixture.
 - ii. Class 5B mixture shall have 1/4 inch polyester fibers that have been approved by the Engineer added at the rate of 2 1/2 pounds per ton of mixture.
 - iii. Class 5 mixture shall not contain fibers.
- b. Basis of Approval: The aggregates, fibers and binder (MC-250) shall meet the requirements as specified in sub articles M.04.01-1 through 4 and in Table M.04.02-1. The use of recycled material is not permitted with these classes of bituminous concrete. Mixtures not conforming to the binder content as shown in Table M.04.02-1 shall be subject to rejection. There is a two test minimum per day of production. Mixtures not conforming to the gradation as shown in Table M.04.02-1 shall be subject to payment adjustment as specified in Section 4.06.

TABLE M.04.02 – 1 MASTER RANGES FOR MARSHALL BITUMINOUS-CONCRETE MIXTURES

Notes: (a) 75 blow (Marshall Criteria). (b) 3-6% when used for a roadway wearing surface. (c) For divided highways with 4 or more lanes, a stability of 1500 lbs is required. (d) Contains an accepted non-stripping compound. (e) To help prevent stripping, the mixed material will be stockpiled on a paved surface and at a height not greater than 4 feet during the first 48 hours. (f) As determined by AASHTO T 245(M). (g) The percent passing the #200 sieve shall not exceed the percentage of bituminous asphalt binder determined by AASHTO T 164 or AASHTO T 308(M). (h) Mixture with 5% or more aggregate retained on 3/4" sieve. (i) Mixtures finer than condition (h) above. (j) Class 5 mixture shall contain no fibers. Class 5A mixture shall have 3/8 to 1/2 inch polypropylene fibers that have been previously accepted by the Engineer added at a minimum rate of 6 pounds per ton of mixture. Class 5B mixture shall have 1/4 inch polyester fibers that have been previously accepted by the Engineer added at the minimum rate of 2 1/2 pounds per ton of mixture

CLASS	1	2	3	4	12	5 (e)(j)	5A (e)(j)	5B (e)(j)	JMF % Tol. (±)
Grade of PG Binder content %	PG 64-22 5.0 – 6.5	PG 64-22 5.0 – 8.0	PG 64-22 6.5 - 9.0	PG 64-22 4.0 - 6.0	PG 64-22 7.5 - 10.0	MC-250 (d) 6.0 - 7.5	MC-250 (d) 6.0 - 7.5	MC-250 (d) 6.0 - 7.5	0.4
Sieve Size	Percent Passing (%)								
# 200	3.0 – 8.0 (g)	3.0 – 8.0 (g)	3.0 – 8.0 (g)	0.0 – 5.0 (g)	3.0 – 10.0 (g)	0.0 - 2.5	0.0- 2.5	0.0 - 2.5	2.0
# 50	6 – 26	8 – 26	10 - 30	5 - 18	10 - 40				4
# 30	10 - 32	16 - 36	20 - 40		20 - 60	2 - 15	2 – 15	2 - 15	5
# 8	28 - 50	40 - 64	40 - 70	20 - 40	60 - 95	10 - 45	10 – 45	10 - 45	6
# 4	40 - 65	55 - 80	65 - 87	30 - 55	80 - 95	40 - 100	40 – 100	40 - 100	7
1/4"									
3/8 "	60 - 82	90 - 100	95 - 100	42 - 66	98 - 100	100	100	100	8
1/2 "	70 - 100	100	100		100				8
3/4"	90 - 100			60 - 80					8
1"	100								
2"				100					
Additionally, the fraction of material retained between any two consecutive sieves shall not be less than 4%									
Mixture Temperature									
Binder	325°F maximum					140-185° F			
Aggregate	280-350° F					100-175° F			
Mixtures	265-325° F				275-325°F	120-175° F			25 °F
Mixture Properties									
VOIDS - %	3.0 – 6.0 (a)	2.0 – 5.0 (b)	0 – 4.0		0 - 5.0 (a)				
Stability (f) lbs. min.	1200 (c)	1000	1000		1000				
FLOW (f) in.	.08 - .15	.08 - .15	.08 - .18		.08 - .15				
VMA % - min.	15(h) :16 (i)								

GENERAL

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

- a. Requirements: The Contractor or its representative shall design and submit Superpave mix designs annually for approval. The design laboratory developing the mixes shall be approved by the Engineer. The mix design shall be based on the specified Equivalent Single-Axle Loads (ESAL). Each bituminous concrete mix type must meet the requirements shown in Tables M.04.02-2 thru Table M.04.02-5 and in accordance with AASHTO M 323(M) and AASHTO R 35(M). The mix design shall include the nominal maximum aggregate size and a JMF consisting of target values for gradation and bitumen content for each bituminous concrete mix type designated for the project.

The contractor shall provide test results with supporting documentation from an AASHTO Materials Reference Laboratory (AMRL) with the use of NETTCP Certified Technicians for the following tests;

1. Aggregate consensus properties for each type & level, as specified in Table M.04.02-3. In addition the G_{sa}, G_{sb}, P_{wa} shall also be provided for each component aggregate.
2. New mixes shall be tested in accordance with AASHTO T 283(M) *Standard Method of Test for Resistance of Compacted Hot-Mix Asphalt (HMA) to Moisture-Induced Damage*, (TSR). The compacted specimens may be fabricated at a bituminous concrete facility and then tested at an AMRL accredited facility.

The AASHTO T 283(M) test results, specimens, and corresponding JMF sheet (Form MAT-429s) shall be submitted by the Contractor for review.

The Contractor shall supply the Engineer with 1 gallon of the specified PG binder and 1 gallon of the same PG binder with the warm mix additive blended into it. The MSDS for the WMA additive shall be included with every submittal.

In addition, minimum binder content values apply to all types of bituminous concrete mixtures, as stated in Table M.04.02-5. For mixtures containing RAP, the virgin production and the anticipated proportion of binder contributed by the RAP cannot be less than the total permitted binder content value for that type nor the JMF minimum binder content.

- i. Superpave Mixture (virgin): For bituminous concrete mixtures that contain no recycled material, the limits prescribed in Tables M.04.02-2 thru Table M.04.02-5 apply. The Contractor shall submit a JMF, on a form provided by the Engineer, with the individual fractions of the aggregate expressed as percentages of the total weight of the mix and the source(s) of all materials to the Engineer for approval. The JMF shall indicate the corrected target binder content and applicable binder correction factor (ignition oven or extractor) for each mix type by total weight of mix. The mineral filler (dust) shall be defined as that portion of blended mix that

passes the #200 sieve by weight when tested in accordance with AASHTO T 30(M). The dust-to-effective asphalt (D/Pbe) ratio shall be between 0.6 and 1.2 by weight. The dry/wet mix times and hot bin proportions (batch plants only) for each type shall be included in the JMF.

The percentage of aggregate passing each sieve shall be plotted on a 0.45 power gradation chart and shall be submitted for all bituminous concrete mixtures. This chart shall delineate the percentage of material passing each test sieve size as defined by the JMF. The percentage of aggregate passing each standard sieve shall fall within the specified control points, but outside the restricted zone limits as shown in Tables M.04.02-2 thru Table M.04.02-5. Mixes with documented performance history which pass through the restricted zone may be permitted for use as long as all other physical and volumetric criteria meets specifications as specified in Tables M.04.02-2 thru Table M.04.02-5 and with prior approval from the Engineer. A change in the JMF requires that a new chart be submitted.

- ii. Superpave Mixtures with RAP: Use of approved RAP may be allowed 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 and test results that show the combined binder (recovered binder from the RAP, virgin binder at the mix design proportions and warm mix asphalt additive if used) meets the requirements of the specified binder grade.

Unless approved by the Engineer, RAP material shall not be used with any other recycling option.

- b. Basis of Approval: On an annual basis, the Contractor shall submit to the Engineer any bituminous concrete mix design, and JMF anticipated for use on Department projects. Prior to the start of any paving operations, the mix design and JMF must be approved by the Engineer. Bituminous concrete mixture supplied to the project without an approved mix design and JMF will be rejected. The following information must be included in the mix design submittal:
 - a. Gradation, specific gravities and asphalt content of the RAP,
 - b. Source of RAP and percentage to be used.
 - c. Warm mix Technology and manufacturer's recommended additive rate and tolerances, mixing and compaction temperature ranges for the mix with and without the warm-mix technology incorporated.
 - d. Result of TSR testing, and if applicable Anti-strip manufacturer, and dosage rate.
 - e. Target Temperature at plant discharge.

Note – Testing to be performed shall be done in accordance with section M.04.03.

The JMF shall be accepted if the Plant mixture and materials meet all criteria as specified in Tables M.04.02-2 thru Table M.04.02-5. If the mixture does not meet the requirements, the contractor shall adjust the JMF within the ranges shown in Tables M.04.02-2 thru Table M.04.02-5 until an acceptable mixture is produced. All equipment, tests, and computations shall conform to the latest AASHTO R-35(M) and AASHTO M-323(M).

Any JMF, once approved, shall only be acceptable for use when it is produced by the designated plant, it utilizes the same component aggregates and binder source, and it continues to meet all criteria as specified herein, and component aggregates are maintained within the tolerances shown in Table M.04.02-2.

The Contractor shall not change any component source of supply including consensus properties after a JMF has been accepted. Before a new source of materials is used, a revised JMF shall be submitted to the Engineer for approval. Any approved JMF applies only to the plant for which it was submitted. 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.

Superpave mixture with CRCG: In addition to subarticles M.04.02 – 3 a through c, for bituminous concrete mixtures that contain CRCG, the Contractor shall submit a materials certificate to the Engineer stating that the CRCG complies with requirements stated in Article M.04.01, as applicable. Additionally, 1% 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.

- c. Mix Status: Each facility will have each type of bituminous concrete mixture evaluated based on the previous year of production, for the next construction paving season, as determined by the Engineer. Based on the rating a type of mixture receives it will determine whether the mixture can be produced without the completion of a PPT. Ratings 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.04.03-3: *Superpave Master Range for Bituminous Concrete Mixture Production*, and are as follows:

Criteria A: Based on Air Voids. Percentage of acceptance results with passing air voids.

Criteria B: Based on Air Voids and VMA. The percentage of acceptance results with passing VMA, and the percentage of acceptance results with passing air voids, will be averaged.

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

Ratings are defined as:

“A” – Approved:

A rating of “A” is assigned to each mixture type from a production facility with a current rating of 70% passing or greater.

“PPT” – Pre-Production Trial:

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

1. there are no passing acceptance production results submitted to the Department from the previous year;
2. there is a source change in one or more aggregate components from the JMF on record by more than 10% by weight;
3. there is a change in RAP percentage ,
4. the mixture has a rating of less than 70% from the previous season;
5. a new JMF not previously submitted.

Bituminous concrete mixtures rated with a “PPT” cannot be shipped or used on Department projects. A passing “PPT” test shall be performed with NETTCP certified personnel on that type of mixture by the bituminous concrete producer and meet all specifications (Table M.04.02-2 Table M.04.02-5) before production shipment may be resumed.

Contractors that have mix types rated a “PPT” may use one of the following methods to change the rating to an “A.”

Option A: Schedule a day when a Department inspector can be at the facility to witness a passing “PPT” test or,

Option B: When the Contractor or their representative performs a “PPT” test 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 for binder and gradation determination, and 5,000 grams of cooled loose bituminous concrete for Gmm determination for verification testing and approval. Passing verifications will designate the bituminous concrete type to be on an “A” status. Failing verifications will require the contractor to submit additional trials.

Option C: When the Contractor or their representative performs a “PPT” test without being witnessed by a Department inspector, the Engineer may verify the mix in the Contractor’s laboratory. Passing verifications will designate the bituminous concrete type to be an “A” status. Failing verifications will require the Contractor to submit additional trials.

When Option (A) is used and the “PPT” test meets all specifications, the “PPT” test is considered a passing test and the rating for that mix is changed to “A”. When the “PPT” test is not witnessed, the “PPT” Option (B) or (C) procedure must be followed. If the “PPT” Option (B) procedure is followed, the mixtures along with the test results must be delivered to the Materials Testing Lab. The test results must meet the “C” tolerances established by the Engineer. The tolerance Table is included in the Department’s current QA Program for Materials, Acceptance and Assurance Testing Policies and Procedures.

“U” – No Acceptable Mix Design on File:

Rating assigned to a type of mixture that does not have a JMF submitted, or the JMF submitted has not been approved, or is incomplete. A mix design or JMF must be submitted annually seven (7) days prior in order to obtain an “A,” or “PPT” status for that mix. A “U” will be used only to designate the mix status until the mix design has been approved, and is accompanied with all supporting data as specified. Bituminous concrete mixtures rated with a “U” cannot be used on Department projects.

TABLE M.04.02- 2: SUPERPAVE MASTER RANGE FOR BITUMINOUS CONCRETE MIXTURE DESIGN CRITERIA

Notes: (1) Minimum Pb as specified in Table M.04.02-5. (2) Voids in Mineral Aggregates shall be computed as specified herein. (3) Control point range is also defined as the master range for that mix. (4) Dust is considered to be the percent of materials passing the #200 sieve. (5) For WMA, lower minimum aggregate temperature will require Engineer's approval. (6) For WMA and PMA, the mix temperature shall meet manufacturer's recommendations.

Sieve inches	S0.25				S0.375				S0.5				S1			
	CONTROL POINTS ⁽³⁾		RESTRICTED ZONE		CONTROL POINTS ⁽³⁾		RESTRICTED ZONE		CONTROL POINTS ⁽³⁾		RESTRICTED ZONE		CONTROL POINTS ⁽³⁾		RESTRICTED ZONE	
	Min (%)	Max (%)	Max (%)	Min (%)	Min (%)	Max (%)	Min (%)	Max (%)	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	-	90	-	-	-	90	-	-	-	-	-	-	-	-	39.5	39.5
#8	32	67	47.2	47.2	32	67	47.2	47.2	28	58	39.1	39.1	19	45	26.8	30.8
#16	-	-	31.6	37.6	-	-	31.6	37.6	-	-	25.6	31.6	-	-	18.1	24.1
#30	-	-	23.5	27.5	-	-	23.5	27.5	-	-	19.1	23.1	-	-	13.6	17.6
#50	-	-	18.7	18.7	-	-	18.7	18.7	-	-	15.5	15.5	-	-	11.4	11.4
#100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
#200	2.0	10.0	-	-	2.0	10.0	-	-	2.0	10.0	-	-	1.0	7.0	-	-
Pb ⁽¹⁾	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VMA ⁽²⁾ (%)	16.0 ± 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/Pbe ⁽⁴⁾	0.6 – 1.2				0.6 – 1.2				0.6 – 1.2				0.6 – 1.2			
Agg. Temp ⁽⁵⁾	280 – 350F				280 – 350F				280 – 350F				280 – 350F			
Mix Temp ⁽⁶⁾	265 – 325 F				265 – 325 F				265 – 325 F				265 – 325 F			
Design TSR	> 80%				> 80%				> 80%				> 80%			
T-283 Stripping	Minimal, as determined by the Engineer															

TABLE M.04.02-3

SUPERPAVE MASTER RANGE FOR CONSENSUS PROPERTIES OF COMBINED AGGREGATE STRUCTURES

Notes: (1) If less than 25 % of a given layer is within 4 inches of the anticipated top surface, the layer may be considered to be below 4 inches for mixture design purposes.					
Traffic Level	Design ESALs (80 kN)	Coarse Aggregate Angularity ⁽¹⁾ ASTM D 5821	Fine Aggregate Angularity ⁽⁷⁾ AASHTO T 304	Flat or Elongated Particles ASTM D 4791	Sand Equivalent AASHTO T 176
-----	(million)			> # 4	-----
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
	Design ESALs are the anticipated project traffic level expected on the design lane, projected over a 20 year period, regardless of the actual expected design life of the roadway.	Criteria presented as minimum values. 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.	Criteria presented as minimum percent air voids in loosely compacted fine aggregate passing the #8 sieve.	Criteria presented as maximum Percent by mass of flat or elongated particles of materials retained on the #4 sieve, determined at 3:1 ratio.	Criteria presented as minimum values for fine aggregate passing the #8 sieve.

* NOTE: Level 1 for use by Towns and Municipalities ONLY.

TABLE M.04.02- 4: SUPERPAVE MASTER RANGE FOR 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*	< 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	73 - 76	73 - 76	65 - 75	65 - 75

* NOTE: Level 1 for use by Towns and Municipalities ONLY.

**TABLE M.04.02– 5: SUPERPAVE MINIMUM BINDER CONTENT
BY MIX TYPE & LEVEL.**

Mix Type	Level	Binder Content Minimum ⁽¹⁾
S0.25	1*	5.6
S0.25	2	5.5
S0.25	3	5.4
S0.375	1*	5.6
S0.375	2	5.5
S0.375	3	5.4
S0.5	1*	5.0
S0.5	2	4.9
S0.5	3	4.8
S1	1*	4.6
S1	2	4.5
S1	3	4.4

* NOTE: Level 1 for use by Towns and Municipalities ONLY.

M.04.03— Production Requirements:

1. Quality Control Plan and Processes: The Contractor shall submit a Quality Control Plan (QCP) for bituminous concrete production specifically for the plant producing the bituminous concrete mixture for review and approval of the Engineer on an annual basis.

The QCP 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. 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 upon request.

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. All daily QC sampling, inspection and test reports shall be reviewed by the Quality Control Manager and be submitted to the Engineer upon request.

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 Sampling & Testing Methods: Acceptance samples of mixtures shall be obtained from the hauling vehicles and tested by the Contractor at the facility during each day's production.

The hauling vehicle from which samples are obtained shall be selected using stratified – random sampling based on the total estimated tons of production in accordance with ASTM D 3665, except that the first test shall be randomly taken from the first 151 tons or as directed by the Engineer.

The number of sub lots and tests required per sub lot is based on the total estimated tons of production per day as indicated in Table M.04.03-1. Quantities of the same type/level mix per plant may be combined daily for multiple state projects to determine the number of sub lots.

The payment adjustment for air voids and liquid binder will be calculated per sub lot as described in Section 4.06.

An acceptance test shall not be performed within 150 tons of production from a previous acceptance test unless approved by the Engineer. Quality Control tests are not subject to this restriction. Unless otherwise tested, a minimum of one (1) acceptance test shall be performed for every four days of production at a facility for each type/level mix (days of production may or may not be consecutive days).

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. Verification testing will be performed by the Engineer on the retained specimens 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 at the plant. In addition the Contractor must provide supporting documentation or test results to validate the subject acceptance test result(s). The Engineer may invalidate any positive adjustments for material corresponding to the 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.

Contractor personnel performing acceptance sampling and testing must be present at the facility prior to, and during 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 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 inoperable, production can continue for a maximum of 1 hour. The Contractor shall obtain box sample(s) in accordance with Table M.04.03-1 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.

Table M.04.03 – 1: Acceptance Testing Frequency per Type/Level/Plant

Daily quantity produced in tons (lot)	Number of Sub Lots/Tests
0 to 150	0, Unless requested by the Engineer
151 to 600	1
601 to 1,200	2
1,201 to 1,800	3
1,801 or greater	1 per 600 tons or portions thereof

i. Marshall Mix Acceptance Sampling and Testing Procedures: When the Marshall mix design is specified, the following acceptance procedures and AASHTO test methods shall be used:

Table M.04.03 – 2: Marshall Acceptance Test Procedures

Protocol	Reference	Description
1	AASHTO T 30(M)	Mechanical Analysis of Extracted Aggregate
2	AASHTO T 40(M)	Sampling Bituminous Materials
3	AASHTO T 308(M)	Binder content by Ignition Oven method (adjusted for aggregate correction factor)
4	AASHTO T 245(M)	Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus
5	AASHTO T 209(M)	Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures
6	AASHTO T 269(M)	Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures
7	AASHTO T 329	Moisture Content of Hot-Mix Asphalt (HMA) by Oven Method

- a. Cessation of Supply: Marshall Mix Production shall cease for the Project from any facility that consistently fails to produce mixture that meets the JMF and volumetric properties. The criteria for ceasing the supply of a class of mixture from any plant are as follows:
- i. Off-Test Status: The results of AASHTO T 164 or AASHTO T 308(M) and T 30(M) will be used to determine if the mixture is within the tolerances shown in Table M.04.02-1. The Contractor will be notified that a plant is "off test" for a class of mixture 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 for that class of mixture.
 - ii. When multiple plants and 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" adjusted payment.
 - iii. If a test indicates that the bitumen content or gradation are outside the tolerances, the Contractor may make a single JMF change on classes 1, 2, 3, 4 and 12 as allowed by the Engineer prior to any additional testing. A JMF change shall

include the date and name of the Engineer that allowed it. Consecutive test results outside the requirements of Table M.04.02-1 JMF tolerances may result in rejection of the mixture.

- iv. The Engineer may cease supply of mixture from the plant when the test results from three non-consecutive samples of a class of mixture are not within the JMF tolerances or the test results from two non-consecutive samples not within the master range indicated in Table M.04.02-1 during any one production period, due to inconsistent production.
 - v. 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.
- b. Adjustments for Off Test Mixture under Cessation of Supply: The bituminous concrete plant shall cease supplying to the project:
- i. When the test results from three consecutive samples are “off test” and not within the JMF tolerances or,
 - ii. The test results from two consecutive samples are “off test” and not within the ranges indicated in Table M.04.02 – 1 or,
 - iii. When the percent of material passing the minus #200 sieve material exceeds the percent of extracted bitumen content for three consecutive samples during any production period of the values stated in Table M.04.02-1:
 - a. The quantity of mixtures shipped to the project determined to be “off test” and outside the tolerances will be tabulated by the Engineer and will be adjusted in accordance with Section 4.06.
 - b. Following cessation, a trial production period will be required at the plant for that class of mixture. Use of that class of mixture from that plant will be prohibited on the Project until the plant has demonstrated the ability to consistently produce acceptable mixture.
 - c. When the Engineer has accepted the mixtures from the trial production period, the use of that mixture on the Project may resume.

ii. Superpave Mix Acceptance Sampling and Testing Procedures: When the Superpave mix design is specified, the following acceptance and AASHTO test procedures shall be used:

Table M.04.03– 3: Superpave Acceptance Testing Procedures

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

The Contractor shall perform moisture susceptibility (TSR) testing annually for all design levels of HMA-, WMA-, and PMA- S0.5 plant-produced mixtures, in accordance with the latest version of AASHTO T 283(M).

If any material source changes from the previous year, or during the production season, a mix design TSR as well as a production TSR is required for the new mixture. The AASHTO T 283(M) test shall be performed at an AASHTO Materials Reference Laboratory (AMRL) by NETTCP Certified Technicians. The test results and specimens shall be submitted to the Engineer for review. This shall be completed within 30 days from the start of production. 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, and MSDS sheet for the anti-strip additive (if applicable) to the Engineer. In addition, compaction of samples shall be accomplished utilizing an accepted

Superpave Gyratory Compactor (SGC), supplied by the Contractor. The SGC shall be located at the facility supplying mixture to the project.

a. Determination of Off-Test Status:

i. Off Test Status: Superpave mixes shall be considered “*off test*” when any Control Point Sieve, VA, VMA, and Gmm values are outside of the limits specified in Table M.04.03-3 and the computed binder content (Pb) established by AASHTO T308(M) or as documented on the vehicle delivery ticket is below the minimum binder content stated in sub article M.04.03-5. 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 (and project staff) when the plant is “*off test*” for a type of mixture. When multiple plants and 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.

b. Cessation of Supply for Superpave Mixtures with no Payment Adjustment: Production of bituminous concrete shall cease for the Project from any plant that consistently fails to produce mixture that meets the JMF and volumetric properties. The quantity of Superpave mixtures shipped to the project that is “off-test” will not be adjusted for deficient mixtures.

A Contractor shall cease to supply mixture from a plant when:

1. Bituminous concrete mixture is “off test” on three (3) consecutive tests for VMA or Gmm, regardless of date of production due to inconsistency (i.e., small production requires 1 test per day for multiple days).

2. Bituminous concrete mixture is “off test” on two (2) consecutive tests for the Control Point sieves in one day’s production.

Following cessation, the Contractor shall immediately make necessary material or process corrections and run a Pre-Production Trial (PPT) for that type of mixture. Use of that type of mixture from that plant will be prohibited on the Project until the Contractor has demonstrated the ability to produce acceptable mixture from that facility. When the Contractor has a passing test and has received approval from the Engineer, the use of that mixture to the Project may resume.

c. Cessation of Supply for Superpave Mixtures with Payment Adjustment:

Production of bituminous concrete shall cease for the Project from any plant that consistently fails to produce mixture that meets the Superpave minimum binder content by mix type and level listed in Table M.04.02-5. The quantity of Superpave mixtures shipped to the project that is “off-test” will be adjusted for deficient mixtures in accordance with Section 4.06.

A Contractor shall cease to supply mixture from a plant when the binder content (P_b) is below the requirements of Table M.04.03-5 on the ignition oven test result after two (2) consecutive tests, regardless of the date of production.

Following cessation, the Contractor shall immediately make necessary material or process corrections and run a Pre-Production Trial (PPT) for that type of mixture. Use of that type of mixture from that plant will be prohibited on the Project until the Contractor has demonstrated the ability to produce acceptable mixture from that facility. When the Contractor has a passing test and has received approval from the Engineer, the use of that mixture to the Project may resume.

- d. JMF Changes for Superpave Mixture Production: It is understood that a JMF change is effective from the time it was submitted forward and is not retroactive to the previous test or tests. JMF changes are permitted to allow for trends in aggregate and mix properties but every effort shall be employed by the Contractor to minimize this to ensure a uniform and dense pavement.

JMF changes to the G_{mm} or mix Absorption Correction Factor (A_{cf}) are only permitted prior to or after a production shift for all bituminous-concrete types of mixtures and only when they:

- i. Are requested in writing and pre-approved by the Engineer;
- ii. Are based on a minimum of a two test trend;
- iii. Are documented with a promptly submitted revised JMF on form provided by the Engineer.
- iv. A revised JMF submittal shall include the date and name of the Engineer that allowed it.

TABLE M.04.03– 3: SUPERPAVE MASTER RANGE FOR BITUMINOUS CONCRETE MIXTURE PRODUCTION

Notes: (1) 300°F minimum after October 15. (2) Minimum Pb as specified in Table M.04.03-5 (3) Control point range is also defined as the master range for that mix. (4) JMF tolerances shall be defined as the limits for production compliance. VA & Pb payment is subject to adjustments, as defined in sub-article 4.06.04 - 2. (5) For WMA, lower minimum aggregate temperature will require Engineer's approval. (6) For WMA and/or polymer modified asphalt, the mix temperature shall meet manufacturer's recommendations. In addition, for WMA, the maximum mix temperature shall not exceed 325°F once the WMA technology is incorporated.									
	S0.25		S0.375		S0.5		S1		Tolerances
Sieve	CONTROL POINTS (4)		CONTROL POINTS (4)		CONTROL POINTS (4)		CONTROL POINTS (4)		JMF Limits (4)
inches	Min(%)	Max(%)	Min(%)	Max(%)	Min(%)	Max(%)	Min(%)	Max(%)	±Tol
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	-	90	-	90	-	-	-	-	
#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(2)	-	-	-	-	-	-	-	-	note (2)
VMA (%)	16.0		16.0		15.0		13.0		1.0
VA (%)	4.0		4.0		4.0		4.0		1.0
Gmm	JMF value		JMF value		JMF value		JMF value		0.030
Agg. Temp (5)	280 – 350F		280 – 350F		280 – 350F		280 – 350F		
Mix Temp (6)	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– 4: SUPERPAVE MASTER RANGE FOR 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

* NOTE: Level 1 for use by Towns and Municipalities ONLY.

TABLE M.04.03– 5: SUPERPAVE MINIMUM BINDER CONTENT BY MIX TYPE & LEVEL.

Mix Type	Level	Binder Content Minimum ⁽¹⁾
S0.25	1*	5.6
S0.25	2	5.5
S0.25	3	5.4
S0.375	1*	5.6
S0.375	2	5.5
S0.375	3	5.4
S0.5	1*	5.0
S0.5	2	4.9
S0.5	3	4.8
S1	1*	4.6
S1	2	4.5
S1	3	4.4

* NOTE: Level 1 for use by Towns and Municipalities ONLY.

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

AASHTO Standard Specification	
Reference	Modification
M 320	<p>1. Mass change for PG 64-22 shall be a maximum loss of 0.5% when tested in accordance with AASHTO T 240.</p> <p>2. The two bottles used for the mass change determination may be re-heated and used for further testing.</p>
AASHTO Standard Methods of Test	
Reference	Modification
T 27	Section 7.7 Samples are not washed
T 30	Section 6.2 thru 6.5 Samples are not routinely washed
T 168	<p>Samples are taken at one point in the pile. All types of bituminous concrete except Class 4 are scooped from the sample container instead of remixing and quartering. (Method verified by laboratory study).</p> <p>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>Article 9.5.1 Bowl is suspended 2 minutes prior to reading rather than 10 minutes. This makes no significant difference in results.</p> <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 245	<p>Article 3.3.2 A compacting temperature of 140 to 146°C (284 to 295°F) is used</p> <p>Article 3.5.2 Seventy-five (75) blows per side are used on Classes 1 and 12, per ConnDOT design requirements</p> <p>Section 3.1 for production testing: one specimen is molded for each extraction test for production over 275 metric tons/day (300 tons/day). Other mixtures: two specimens per extraction test.</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.
T 308	<p>In addition to the standard testing procedure, the Department has adopted a procedure that addresses a correction factor that is calculated using the composite aggregate percentages (Composite Aggregate Correction Factor Method (CACF)).</p> <p>The aggregate is burned in compliance with the standard AASHTO procedure Method A exclusively. All modifications are listed for this method only.</p> <p>A2.2 and A2.3 Omit</p> <p>A2.4 Omit. Replace with: Determine an aggregate gradation for each aggregate component “blank” in accordance with T30.</p> <p>A2.5 Omit. Replace with: The individual aggregate samples are to be dried in an oven at a maximum temperature of $148 \pm 5^{\circ}\text{C}$ ($300 \pm 9^{\circ}\text{F}$) to a constant weight. RAP samples are to be oven dried at a maximum temperature of $110 \pm 5^{\circ}\text{C}$ ($230 \pm 9^{\circ}\text{F}$) to a constant weight. RAP samples will be burned for total binder content only and not to arrive at a correction factor for a mixture.</p> <p>A2.6 and A2.7 and A2.8 Omit.</p> <p>A2.8.1 Omit Note 2</p> <p>A2.9 Omit. Replace with: Perform a gradation analysis on the residual aggregate in accordance with T30 and compare it to the gradation performed prior to burning.</p> <p>A2.9.1 and A2.9.2 Omit</p> <p>The correction factors for each size aggregate are provided by the Contractor to the Engineer prior to the Annual Plant Inspection. The Engineer may verify the correction factors. The Composite Aggregate Correction Factor (CACF) for any mixture may be calculated by summing the result of the correction factor for each individual aggregate multiplied by the percentage of that aggregate in the overall mixture.</p> <p>(Note: All correction factors must be re-calculated every time the percentage of any aggregate changes within the mixture.)</p> <p>If the average corrected Pb content from the ignition oven differs by 0.3% or more from the average bituminous concrete facility production weigh ticket 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, the Engineer may require a new correction factor calculation for all the aggregate components in the mix.</p> <p>In addition to the standard testing procedure, the Department has adopted a procedure that addresses the time involved between sampling the hot-mix asphalt specimen and the beginning of the test.</p> <p>6.3 Omit. Replace with: The test specimen must be ready to be placed in an approved ignition furnace for testing within ten minutes of being obtained from the hauling vehicle and the test shall start immediately after.</p>

T 331	6.1 Cores are dried to a constant mass prior to testing using a core-dry machine.
AASHTO Standard Recommended Practices	
Reference	Modification
R 35	<p><u>Volumetric Calculations of VMA and Correction Factor</u> VMA_a - Voids in Mineral Aggregate from (V_a + V_b) the mix:</p> <p>A. VMA calculated from the mix shall be determined in accordance with <i>Formula 5.16.1A</i>. It can be correlated that the VMA calculated from AASHTO R-35 is equivalent to VMA_a when the Pb_a x (100-Pb_t) / 100 is known and substituted for A_{cf}, as shown in <i>Formula 5.16.1A (ii)</i>. Test results from VMA_a shall therefore be required to meet all contract specifications. Values of VMA_a that are out of specifications during production may be cause for the contractor to determine assignable reason, take corrective action, and modify the Job Mix Formula (JMF), as needed. Continued VMA_a data that is out of specifications may be cause for the Engineer to order cessation of supply.</p> <p><i>Formula 5.16.1A</i>. Determining the VMA of bituminous concrete by the mix or air voids & effective binder method:</p> $VMA_a = V_a + \left[\frac{(Gmb_d \times (Pb_t - A_{cf}))}{G_b} \right]$ <p>Where: VMA_a = VMA calculated from plant production mix(V_a + V_b) Gmb_d = Bulk specific gravity as determined by AASHTO T 166(M) Pb_t = Total Binder Content (corrected) by AASHTO T 308(M) A_{cf} = Absorption correction factor provided by Contractor (refer to B. i and ii)</p> <p>B. Determining the bituminous concrete mix binder correction factor for each class by use of percent absorption of water by AASHTO T 84/85, AASHTO M 323 and D_f method. This value shall be performed by the Contractor during the mix design only and submitted as a JMF value. Two methods for determining the A_{cf} are shown, although method (i) will be the desired method to be used. Both methods are equivalent when the G_{sa}, G_{sb} and P_{wa} are recent and valid for the mix.</p> <p>i. $A_{cf} = D_f \times P_{wa} \times (100 - Pb_t) / 100$ ii. $A_{cf} = (Pb_a \text{ from annual JMF submittal}) \times (100 - Pb_t) / 100$</p> <p>Where: D_f = as determined by Formula 5.16.1B. P_{wa} = as determined by AASHTO T 84/85 Pb_a = as determined by AASHTO M 323 (from annual JMF submittal) D_f (Density Factor): The Contractor shall calculate the bituminous concrete</p>

	<p>mix design D_f (derived from formula XI.2 APPENDIX XI of AASHTO R 35) for each class of material, in accordance with <i>Formula 5.16.1B</i>.</p> <p><i>Formula 5.16.1B.</i> Determining the Density Factor (D_f) of mix design bituminous concrete:</p> $D_f = \left(\frac{G_{se} - G_{sb}}{G_{sa} - G_{sb}} \right)$ <p>Where: D_f = Density Factor or multiplier determined by AASHTO R-35(M) G_{se} = Effective Specific Gravity determined by AASHTO M-323 at plant G_{sa} = Apparent Specific Gravity determined by AASHTO T 84/85 of mix design G_{sb} = Bulk Specific Gravity determined by AASHTO T 84/85 of mix design</p>
<p>R 26</p>	<p>Quality Control Plans must be formatted in accordance with AASHTO R 26, certifying suppliers of performance-graded asphalt binders, Section 9.0, Suppliers Quality Control Plan, and “NEAUPG Model PGAB QC Plan.”</p> <ol style="list-style-type: none"> 1. The Department requires that 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. 2. Sampling of asphalt binders should be done under the supervision of qualified technician. NETCP “Manual of Practice,” Chapter 2 Page 2-4 (Key Issues 1-8). 3. A copy of the Manual of Practice for testing asphalt binders in accordance with the Superpave PG Grading system shall be in the testing laboratory. 4. All laboratories testing binders for the Department are required to be accredited by the AASHTO Materials Reference Laboratory (AMRL). 5. 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. 6. 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>Suppliers shall provide AASHTO M-320 Table 2 testing at a minimum of once per month on one sample of material. Each supplier shall rotate the PG grade each month (including polymer-modified asphalt (PMA)), so that data can be collected for all the grades produced.</p>

ON-THE-JOB TRAINING (OJT) WORKFORCE DEVELOPMENT PILOT:

Description

To provide construction industry related job opportunities to minorities, women and economically disadvantaged individuals; and to increase the likelihood of a diverse and inclusive workforce on Connecticut Department of Transportation (ConnDOT) projects.

All contractors (existing and newcomers) will be automatically placed in the Workforce Development Pilot. Standard OJT requirements typically associated with individual projects will no longer be applied at the project level for new projects. Instead, these requirements will be applicable on an annual basis for each contractor performing work on ConnDOT projects.

The OJT Workforce Development Pilot will allow a contractor to train employees on Federal, State and privately funded projects located in Connecticut. However, contractors should give priority to training employees on ConnDOT Federal-Aid funded projects.

Funding

The Department will establish an OJT fund annually from which contractors may bill the Department directly for eligible trainee hours. The funds for payment of trainee hours on federal-aid projects will be allocated from the ½ of 1% provided for OJT funding, and will be based on hours trained, not to exceed a maximum of \$25,000.00 per year; per contractor.

Minorities and Women

Developing, training and upgrading of minorities, women and economically disadvantaged individuals toward journeyman level status is the primary objective of this special training provision. Accordingly, the Contractor shall make every effort to enroll minority, women and economically disadvantaged individuals as trainees to the extent that such persons are available within a reasonable area of recruitment. This training commitment is not intended, and shall not be used, to discriminate against any applicant for training whether a member of a minority group or not.

Assigning Training Goals

The Department, through the OJT Program Coordinator, will assign training goals for a calendar year based on the contractor's past two year's activities and the contractor's anticipated upcoming year's activity with the Department. At the beginning of each year, all contractors eligible will be contacted by the Department to determine the number of trainees that will be assigned for the upcoming calendar year. At that time, the Contractor shall enter into an agreement with the Department to provide a self-imposed on-the-job training program for the calendar year. This agreement will include a specific number of annual training goals agreed to by both parties. The number of training assignments may range from one (1) to six (6) per

contractor per calendar year. Each January, a summary of the trainees required and the OJT Workforce Development Pilot package will be sent to participating contractors. The number of trainees assigned to each contractor in the summary will increase proportionately not to exceed 6, as shown in the following table. This package will also be provided to contractors as they become newly eligible for the OJT Workforce Development Pilot throughout the remainder of the year. Projects awarded after September 30 will be included in the following year's Program.

The dollar thresholds for training assignments are as follows:

\$4.5 – 8 million=	1 trainee
\$ 9 – 15 million=	2 trainees
\$16 – 23 million=	3 trainees
\$24 – 30 million=	4 trainees
\$31 – 40 million=	5 trainees
\$41 – and above=	6 trainees

Training Classifications

Preference shall be given to providing training in the following skilled work classifications. However, the classifications established are not all-inclusive:

Equipment Operators	Electricians
Laborers	Painters
Carpenters	Iron / Reinforcing Steel Workers
Concrete Finishers	Mechanics
Pipe Layers	Welders

The Department has on file common training classifications and their respective training requirements; that may be used by the contractors. Contractors shall submit new classifications for specific job functions that their employees are performing. The Department will review and recommend for acceptance the new classifications proposed by contractors, if applicable. New classifications shall meet the following requirements:

Proposed training classifications are reasonable and realistic based on the job skill classification needs, and the number of training hours specified in the training classification is consistent with common practices and provides enough time for the trainee to obtain journeyman level status.

Where feasible, 25% percent of apprentices or trainees in each occupation shall be in their first year of apprenticeship or training. The number of trainees shall be distributed among the work classifications on the basis of the contractor's needs and the availability of journeymen in the various classifications within a reasonable area of recruitment.

No employee shall be employed as a trainee in any classification in which they have successfully completed a training course leading to journeyman level status or in which they have been employed as a journeyman.

Records and Reports

The Contractor shall maintain enrollment in the program and submit all required reports documenting company compliance under these contract requirements. These documents and any other information shall be submitted to the OJT Program Coordinator as requested.

Upon the trainee's completion and graduation from the program, the Contractor shall provide each trainee with a certification Certificate showing the type and length of training satisfactorily completed.

Trainee Interviews

In order to determine the continued effectiveness of the OJT Program in Connecticut, the department will periodically conduct personal interviews with current trainees and may survey recent graduates of the program. This enables the OJT Program Coordinator to modify and improve the program as necessary. Trainee interviews are generally conducted at the job site to ensure that the trainees' work and training is consistent with the approved training program.

Trainee Wages

Contractors shall compensate trainees on a graduating pay scale based upon a percentage of the prevailing minimum journeyman wages (Davis-Bacon Act). Minimum pay shall be as follows:

60 percent	of the journeyman wage for the first half of the training period
75 percent	of the journeyman wage for the third quarter of the training period
90 percent	of the journeyman wage for the last quarter of the training period

In no case, will the trainee be paid less than the prevailing rate for general laborer as shown in the contract wage decision (must be approved by the Department of Labor).

Achieving or Failing to Meet Training Goals

The Contractor will be credited for each trainee currently enrolled or who becomes enrolled in the approved training program and providing they receive the required training under the specific training program. Trainees will be allowed to be transferred between projects if required by the Contractor's schedule and workload. The OJT Program Coordinator must be notified of transfers within five (5) days of the transfer or reassignments by e-mail (Phylisha.Coles@ct.gov).

Where a contractor does not or cannot achieve its annual training goal with female or minority trainees, they must produce adequate Good Faith Efforts documentation. Good Faith Efforts are those designed to achieve equal opportunity through positive, aggressive, and continuous result-oriented measures. 23 CFR § 230.409(g) (4). Contractors should request minorities and females from unions when minorities and females are under-represented in the contractor's workforce.

Whenever a contractor requests ConnDOT approval of someone other than a minority or female, the contractor must submit documented evidence of its Good Faith Efforts to fill that position with a minority or female. When a non-minority male is accepted, a contractor must continue to attempt to meet its remaining annual training goals with females and minorities.

Where a contractor has neither attained its goal nor submitted adequate Good Faith Efforts documentation, ConnDOT will issue a letter of non-compliance. Within thirty (30) days of receiving the letter of non-compliance, the contractor must submit a written Corrective Action Plan (CAP) outlining the steps that it will take to remedy the non-compliance. The CAP must be approved by ConnDOT. Failure to comply with the CAP may result in your firm being found non-responsive for future projects.

Measurement and Payment

Optional reimbursement will be made to the contractor for providing the required training under this special provision on ConnDOT Federal-Aid funded projects only.

Contractor will be reimbursed at \$0.80 for each hour of training given to an employee in accordance with an approved training or apprenticeship program. This reimbursement will be made even though the Contractor receives additional training program funds from other sources, provided such other source does not specifically prohibit the contractor from receiving other reimbursement.

Reimbursement for training is made annually or upon the trainees completion and not on a monthly basis. No payment shall be made to the Contractor if either the failure to provide the required training, or the failure to hire the trainee as a journeyman, is caused by the Contractor.

Program reimbursements will be made directly to the prime contractor on an annual basis. To request reimbursement, prime contractors must complete the Voucher for OJT Workforce Development Pilot Hourly Reimbursement for each trainee in the OJT Program. This form is included in the OJT Workforce Development Pilot package and is available on the Department's web site at:

www.ct.gov/dot

The completed form must be submitted to the Office of Contract Compliance for approval. The form is due on the 15th day of January for each trainee currently enrolled and for hours worked on ConnDOT Federal-Aid funded projects only.

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

January 2013

I. ABBREVIATIONS AND DEFINITIONS AS USED IN THIS SPECIAL PROVISION

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

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

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

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

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

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

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

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

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

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

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

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

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

II. ADMINISTRATIVE REQUIREMENTS

A. General Requirements

A DBE goal percentage equaling 12.0 percent (%) of the Contract value has been established for this Contract. This DBE goal percentage will be applied to the final Contract value to ultimately determine the required DBE goal. If additional work is required, DBE firms should be provided the appropriate opportunities to achieve the required DBE goal.

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

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

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

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

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

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

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

In addition, the report shall include:

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

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

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

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

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

B. Subcontract Requirements

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

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

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

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

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

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

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

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

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

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

C. Modification to Pre-Award Commitment

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

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

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

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

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

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

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

If the Contractor is unable to find a DBE replacement:

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

III. GOOD FAITH EFFORTS

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

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

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

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

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

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

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

IV. PROJECT COMPLETION

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

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

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

V. SHORTFALLS

A. Failure to meet DBE goals

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

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

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

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

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

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

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

B. Administrative Remedies for Non-Compliance:

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

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

VI. CLASSIFICATIONS OTHER THAN SUBCONTRACTORS

A. Material Manufacturers

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

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

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

B. Material Suppliers (Dealers)

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

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

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

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

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

C. Brokering

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

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

D. Non-Manufacturing or Non-Supplier DBE Credit

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

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

E. Trucking

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

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

VII. Suspected DBE Fraud

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

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

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

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

State Contract No.

Federal Aid Project No.

Description of Project

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

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

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

I further certify and affirm that _____ will assume the actual and
(DBE person, firm, association or Corporation)

for the provision of the materials and/or supplies sought by _____.

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

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

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

(Name of Corporation or Firm)

(Signature & Title of Official making the Affidavit)

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

Notary Public (Commissioner of the Superior Court)

My Commission Expires _____

CERTIFICATE OF CORPORATION

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

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

(Signature of Person Certifying)

(Date)

ITEM NO. 0101000A - ENVIRONMENTAL HEALTH AND SAFETY

Description:

Under this item, the Contractor shall establish protocols and provide procedures to protect the health and safety of its employees and subcontractors as related to the proposed construction activities performed within the Project AOEC's. Work under this Item consists of the development and implementation of a written HASP that addresses the relative risk of exposure to documented hazards present within Project limits. The HASP shall establish health and safety protocols that address the relative risk of exposure to regulated substances in accordance with 29 CFR 1910.120 and 29 CFR 1926.65. Such protocols shall only address those concerns directly related to site conditions.

Note: The Engineer will prepare a site-specific health and safety plan which is compatible with the Contractor's plan and will be responsible for the health and safety of all Project Inspectors, Department employees and consulting engineers.

Materials:

The Contractor must provide chemical protective clothing (CPC) and personal protective equipment (PPE) as stipulated in the Contractor's HASP during the performance of work in areas identified as potentially posing a risk to worker health and safety for workers employed by the Contractor and all subcontractors.

Construction Methods:

1-Existing Information: The Contractor shall utilize all available information and existing records and data pertaining to chemical and physical hazards associated with any of the regulated substances identified in the environmental site investigations to develop the HASP. A list of documents containing this data is found in "Notice to Contractor – Environmental Investigations".

2-General: The requirements set forth herein pertain to the provision of workers' health and safety as it relates to proposed Project activities when performed in the presence of hazardous or regulated materials or otherwise environmentally sensitive conditions. THE PROVISION OF WORKER HEALTH AND SAFETY PROTOCOLS WHICH ADDRESS POTENTIAL AND/OR ACTUAL RISK OF EXPOSURE TO SITE SPECIFIC HAZARDS POSED TO CONTRACTOR EMPLOYEES IS SOLELY THE RESPONSIBILITY OF THE CONTRACTOR.

The Contractor shall be responsible for the development, implementation and oversight of the HASP throughout the performance of work within the limits of the AOEC's, as identified in the Contract Documents, and in other areas identified by the Engineer or by the HASP where site conditions may pose a risk to worker health and safety and/or the environment. **No physical**

aspects of the work within the AOEC's shall begin until the HASP is reviewed by the Engineer and is determined to meet the requirements of the specifications. However, the Contract time, in accordance with Article 1.03.08, will begin on the date stipulated in the Notice to Proceed.

3-Regulatory Requirements: All construction related activities performed by the Contractor within the limits of the AOEC's or in other areas where site conditions may pose a risk to worker health and safety and/or the environment shall be performed in conformance with 29 CFR 1926, Safety and Health Regulations for Construction and 29 CFR 1910, Safety and Health Regulations for General Industry. Conformance to 29 CFR 1910.120, Hazardous Waste Site Operations and Emergency Response (HAZWOPER) may also be required, where appropriate.

4-Submittals: Three copies of the HASP shall be submitted to the Engineer within four (4) weeks after the Award of Contract or four (4) weeks prior to the start of any work in the AOEC's, whichever is first, but not before the Award of the Contract.

The HASP shall be developed by a qualified person designated by the Contractor. This qualified person shall be a Certified Industrial Hygienist (CIH), Certified Hazardous Material Manager (CHMM), or a Certified Safety Professional (CSP). He/she shall have review and approval authority over the HASP and be identified as the Health and Safety Manager (HSM). The HASP shall bear the signature of said HSM indicating that the HASP meets the minimum requirements of 29 CFR 1910.120 and 29 CFR 1926.65.

The Engineer will review the HASP within four (4) weeks of submittal and provide written comments as to deficiencies in and/or exceptions to the plan(s), if any, to assure consistency with the specifications, applicable standards, policies and practices and appropriateness given potential or known site conditions. Items identified in the HASP which do not conform to the specifications will be brought to the attention of the Contractor, and the Contractor shall revise the HASP to correct the deficiencies and resubmit it to the Engineer for determination of compliance with this item. The Contractor shall not be allowed to commence work activities in the AOEC's, as shown on the Plans, or where site conditions exist which may pose a risk to worker health and safety and/or the environment, until the HASP has been reviewed and accepted by the Engineer. No claim for delay in the progress of work will be considered for the Contractor's failure to submit a HASP that conforms to the requirements of the Contract.

5-HASP Provisions:

(a) General Requirements: The Contractor shall prepare a HASP covering all Project site work regulated by 29 CFR 1910.120(b)/ 1926.65(b) to be performed by the Contractor and all subcontractors under this Contract. The HASP shall establish in detail, the protocols necessary for the recognition, evaluation, and control of all hazards associated with each task performed under this Contract. The HASP shall address site-specific safety and health hazards of each phase of site operation and include the requirements and procedures for employee protection. The level of detail provided in the HASP shall be tailored to the type of work, complexity of operations to be performed, and hazards

anticipated. Details about some activities may not be available when the initial HASP is prepared and submitted. Therefore, the HASP shall address, in as much detail as possible, all anticipated tasks, their related hazards and anticipated control measures.

The HASP shall interface with the Contractor's Safety and Health Program. Any portions of the Safety and Health Program that are referenced in the HASP shall be included as appendices to the HASP. All topics regulated by the 29 CFR 1910.120(b)(4) and those listed below shall be addressed in the HASP. Where the use of a specific topic is not applicable to the Project, the HASP shall include a statement to justify its omission or reduced level of detail and establish that adequate consideration was given the topic.

(b) Elements:

(i) Site Description and Contamination Characterization: The Contractor shall provide a site description and contaminant characterization in the HASP that meets the requirements of 29 CFR 1910.120/1926.65.

(ii) Safety and Health Risk Analysis/Activity Hazard Analysis: The HASP shall address the safety and health hazards on this site for every operation to be performed. The Contractor shall review existing records and data to identify potential chemical and physical hazards associated with the site and shall evaluate their impact on field operations. Sources, concentrations (if known), potential exposure pathways, and other factors as noted in CFR 1910.120/126.65, paragraph (c)(7) employed to assess risk shall be described. The Contractor shall develop and justify action levels for implementation of engineering controls and personal protective equipment upgrades and downgrades for controlling worker exposure to the identified hazards. If there is no permissible exposure limit (PEL) or published exposure level for an identified hazard, available information from other published studies may be used as guidance. Any modification of an established PEL must be fully documented.

The HASP shall include a comprehensive section that discusses the tasks and objectives of the site operations and logistics and resources required to complete each task. The hazards associated with each task shall be identified. Hazard prevention techniques, procedures and/or equipment shall be identified to mitigate each of the hazards identified.

(iii) Staff Organization, Qualifications and Responsibilities: The HASP shall include a list of personnel expected to be engaged in site activities and certify that said personnel have completed the educational requirements stipulated in 29 CFR 1910.120 and 29 CFR 1926.65, are currently monitored under a medical surveillance program in compliance with those regulations, and that they are fit for work under "level C" conditions.

The Contractor shall assign responsibilities for safety activities and procedures. An outline or flow chart of the safety chain of command shall be provided in the HASP. Qualifications, including education, experience, certifications, and training in safety and health for all personnel engaged in safety and health functions shall be documented in the

HASP. Specific duties of each on-site team member should be identified. Typical team members include but are not limited to Team Leader, Scientific Advisor, Site Safety Officer, Public Information Officer, Security Officer, Record Keeper, Financial Officer, Field Team Leader, and Field Team members.

The HASP shall also include the name and qualifications of the individual proposed to serve as Health and Safety Officer (HSO). The HSO shall have full authority to carry out and ensure compliance with the HASP. The Contractor shall provide a competent HSO on-site who is capable of identifying existing and potential hazards in the surroundings or working conditions which are unsanitary, hazardous or dangerous to employees and who has authorization to take prompt corrective measures to eliminate or control them. The qualifications of the HSO shall include completion of OSHA 40-hour HAZWOPER training and 8-hour HAZWOPER supervisory training; a minimum of one year of working experience with the regulated compounds that have been documented to exist within Project limits; a working knowledge of Federal and State safety regulations; specialized training or documented experience (one year minimum) in personal and respiratory protective equipment program implementation; the proper use of air monitoring instruments, air sampling methods and procedures; and certification training in first aid and CPR by a recognized, approved organization such as the American Red Cross.

The primary duties of the HSO shall be those associated with worker health and safety. The Contractor's HSO responsibilities shall be detailed in the written HASP and shall include, but not be limited to the following:

- (A) Directing and implementing the HASP.
- (B) Ensuring that all Project personnel have been adequately trained in the recognition and avoidance of unsafe conditions and the regulations applicable to the work environment to control or eliminate any hazards or other exposure to illness or injury (29 CFR 1926.21). All personnel shall be adequately trained in procedures outlined in the Contractor's written HASP.
- (C) Authorizing Stop Work Orders, which shall be executed upon the determination of an imminent health and safety concern.
- (D) Contacting the Contractor's HSM and the Engineer immediately upon the issuance of a Stop Work order when the HSO has made the determination of an imminent health and safety concern.
- (E) Authorizing work to resume, upon approval from the Contractor's HSM.
- (F) Directing activities, as defined in the Contractor's written HASP, during emergency situations; and

(G) Providing personal monitoring where applicable, and as identified in the HASP.

(iv) Employee Training Assignments: The Contractor shall develop a training program to inform employees, supplier's representatives, and official visitors of the special hazards and procedures (including PPE, its uses and inspections) to control these hazards during field operations. Official visitors include but are not limited to Federal Agency Representatives, State Agency Representatives, Municipal Agency Representatives, Contractors, subcontractors, etc. This program shall be consistent with the requirements of 29 CFR 1910.120 and 29 CFR 1926.65.

(v) Personal Protective Equipment: The plan shall include the requirements and procedures for employee protection and should include a detailed section on respiratory protection. The Contractor shall describe in detail and provide appropriate personal protective equipment (PPE) to insure that workers are not exposed to levels greater than the action level for identified hazards for each operation stated for each work zone. The level of protection shall be specific for each operation and shall be in compliance with all requirements of 29 CFR 1910 and 29 CFR 1926. The Contractor shall provide, maintain, and properly dispose of all PPE.

(vi) Medical Surveillance Program: All on-site Contractor personnel engaged in 29 CFR 1910.120/1926.65 operations shall have medical examinations meeting the requirements of 29 CFR 1910.120(f) prior to commencement of work.

The HASP shall include certification of medical evaluation and clearance by the physician for each employee engaged in 29 CFR 1910.120/1926.65 operations at the site.

(vii) Exposure Monitoring/Air Sampling Program: The Contractor shall submit an Air Monitoring Plan as part of the HASP which is consistent with 29 CFR 1910.120, paragraphs (b)(4)(ii)(E), (c)(6), and (h). The Contractor shall identify specific air sampling equipment, locations, and frequencies in the air-monitoring plan. Air and exposure monitoring requirements shall be specified in the Contractor's HASP. The Contractor's CIH shall specify exposure monitoring/air sampling requirements after a careful review of the contaminants of concern and planned site activities.

(viii) Site Layout and Control: The HASP shall include a map, work zone delineation (support, contamination, reduction and exclusion), on/off-site communications, site access controls, and security (physical and procedural).

(ix) Communications: Written procedures for routine and emergency communications procedures shall be included in the Contractor's HASP.

(x) Personal Hygiene, Personal Decontamination and Equipment Decontamination: Decontamination facilities and procedures for personnel protective equipment, sampling equipment, and heavy equipment shall be discussed in detail in the HASP.

(xi) Emergency Equipment and First Aid Requirements: The Contractor shall provide appropriate emergency first aid kits and equipment suitable to treat exposure to the hazards identified, including chemical agents. The Contractor will provide personnel that have certified first aid/CPR training on-site at all times during site operations.

(xii) Emergency Response Plan and Spill Containment Program: The Contractor shall establish procedures in order to take emergency action in the event of immediate hazards (i.e., a chemical agent leak or spill, fire or personal injury). Personnel and facilities supplying support in emergency procedures will be identified. The emergency equipment to be present on-site and the Emergency Response Plan procedures, as required 29 CFR 1910.120, paragraph (1)(1)(ii) shall be specified in the Emergency Response Plan. The Emergency Response Plan shall be included as part of the HASP. This Emergency Response Plan shall include written directions to the closest hospital as well as a map showing the route to the hospital.

(xiii) Logs, Reports and Record Keeping: The Contractor shall maintain safety inspections, logs, and reports, accident/incident reports, medical certifications, training logs, monitoring results, etc. All exposure and medical monitoring records are to be maintained according to 29 CFR 1910 and 29 CFR 1926. The format of these logs and reports shall be developed by the Contractor to include training logs, daily logs, weekly reports, safety meetings, medical surveillance records, and a phase-out report. These logs, records, and reports shall be maintained by the Contractor and be made available to the Engineer.

The Contractor shall immediately notify the Engineer of any accident/ incident. Within two working days of any reportable accident, the Contractor shall complete and submit to the Engineer an accident report.

(xiv) Confined space entry procedures: Confined space entry procedures, both permit required and non permit required, shall be discussed in detail.

(xv) Pre-entry briefings: The HASP shall provide for pre-entry briefings to be held prior to initiating any site activity and at such other times as necessary to ensure that employees are apprised of the HASP and that this plan is being followed.

(xvi) Inspections/audits: The HSM or HSO shall conduct Inspections or audits to determine the effectiveness of the HASP. The Contractor shall correct any deficiencies in the effectiveness of the HASP.

6-HASP Implementation: The Contractor shall implement and maintain the HASP throughout the performance of work. In areas identified as having a potential risk to worker health and safety, and in any other areas deemed appropriate by the HSO, the Contractor shall be prepared to immediately implement the appropriate health and safety measures, including but not limited to the use of personal protective equipment (PPE), and engineering and administrative controls.

If the Engineer observes deficiencies in the Contractor's operations with respect to the HASP, they shall be assembled in a written field directive and given to the Contractor. The Contractor shall immediately correct the deficiencies and respond, in writing, as to how each was corrected. Failure to bring the work area(s) and implementation procedures into compliance will result in a Stop Work Order and a written directive to discuss an appropriate resolution(s) to the matter. When the Contractor demonstrates compliance, the Engineer shall remove the Stop Work Order. If a Stop Work Order has been issued for cause, no delay claims on the part of the Contractor will be honored.

Disposable CPC/PPE, i.e. disposable coveralls, gloves, etc., which come in direct contact with hazardous or potentially hazardous material shall be placed into 55 gallon USDOT 17-H drums and disposed of in accordance with Federal, State, and local regulations. The drums shall be temporarily staged and secured within the WSA until the material is appropriately disposed.

7-HASP Revisions: The HASP shall be maintained on-site by the Contractor and shall be kept current with construction activities and site conditions under this Contract. The HASP shall be recognized as a flexible document which shall be subject to revisions and amendments, as required, in response to actual site conditions, changes in work methods and/or alterations in the relative risk present. All changes and modifications shall be signed by the Contractor's HSM and shall require the review and acceptance by the Engineer prior to the implementation of such changes.

Should any unforeseen hazard become evident during the performance of the work, the HSO shall bring such hazard to the attention of the Contractor and the Engineer as soon as possible. In the interim, the Contractor shall take action, including Stop Work Orders and/or upgrading PPE as necessary to re-establish and maintain safe working conditions and to safeguard on-site personnel, visitors, the public and the environment. The HASP shall then be revised/amended to reflect the changed condition.

Method of Measurement:

1-Within thirty (30) calendar days of the award of the Contract, the Contractor shall submit to the Engineer for acceptance a breakdown of its lump sum bid price for this item detailing:

- (a) The development costs associated with preparing the HASP in accordance with these Specifications.
- (b) The cost per month for the duration of the Project to implement the HASP and provide the services of the HSM and the HSO.

2-If the lump sum bid price breakdown is unacceptable to the Engineer; substantiation showing that the submitted costs are reasonable shall be required.

3-Upon acceptance of the payment schedule by the Engineer, payments for work performed will be made as follows:

- (a) The lump sum development cost will be certified for payment.
- (b) The Contractor shall demonstrate to the Engineer monthly that the HASP has been kept current and is being implemented and the monthly cost will be certified for payment.
- (c) Any month where the HASP is found not to be current or is not being implemented, the monthly payment for the Environmental Health and Safety Item shall be deferred to the next monthly payment estimate. If the HASP is not current or being implemented for more than thirty calendar days, there will be no monthly payment.
- (d) Failure of the Contractor to implement the HASP in accordance with this Specification shall result in the withholding of all Contract payments.

Basis of Payment:

This work will be paid for at the Contract lump sum price for “Environmental Health and Safety” which price shall include all materials, tools, equipment and labor incidental to the completion of this item for the duration of the Project to maintain, revise, monitor and implement the HASP. Such costs include providing the services of the HSM and HSO, Contractor employee training, chemical protective clothing (CPC), personal protective equipment (PPE), disposal of PPE and CPC, medical surveillance, decontamination facilities, engineering controls, monitoring and all other HASP protocols and procedures established to protect the Health and Safety for all on-site workers.

Pay Item	Pay Unit
Environmental Health and Safety	L.S.

ITEM NO. 0101117A - CONTROLLED MATERIALS HANDLING

Description:

Work under this Item is intended to provide specific procedural requirements to be followed by the Contractor during the excavation of controlled materials from within any AOEC, as shown on the Project Plans. This supplements Specifications Section 2.02, 2.03, 2.05, and 2.06 and Contract Special Provisions for excavation wherever contaminated materials are encountered. Work under this item shall include transporting and stockpiling materials at the WSA; and covering, securing, and maintaining the stockpiled materials throughout the duration of the Project. All materials, excluding the existing pavement structure (asphalt and subbase), rock, ledge, and concrete excavated within AOEC's are to be considered controlled materials. If the vertical limits of the existing subbase cannot be determined visually, subbase will be presumed to extend 12" below the bottom of the existing pavement.

Controlled materials consisting of non-hazardous levels of regulated substances have been documented to exist within the Project. Such contamination is documented in the reports listed in the "Notice to Contractor – Environmental Investigations". Where contaminated soils are excavated, such soil will require special handling, disposal and documentation procedures. Excavated material from the AOEC's, if suitable, may be re-used within any AOEC within the project limits, in accordance with the following conditions: (1) such soil is deemed to be structurally suitable for use as fill by the Engineer; (2) such soil is not placed below the water table; and (3) such soil is not placed in an area subject to erosion. Materials removed from any excavation within an AOEC which cannot be immediately re-used shall be transported directly from their point of origin on the Project to the WSA.

Materials:

The required materials are detailed on the Project Plans. All materials shall conform to the requirements of the Contract.

Plastic Sheet: Polyethylene plastic sheeting for underlayment shall be at least 30 mil thick. Polyethylene plastic sheeting for covering excavated material shall be a thickness of 10 mil. Both shall be at least 10 feet wide.

Covers for roll-off/storage containers shall be made of polyethylene plastic, or similar water-tight material, that is of sufficient size to completely cover top opening and can be securely fastened to the container.

Sand Bags: Sandbags used to secure polyethylene covers shall be at least 30 pounds.

Sorbent Boom: Shall be 8 inches in diameter and 10 feet long and possess petrophilic and hydrophilic properties. Sorbent booms shall also have devices (i.e. clips, clasps, etc.) for connection to additional lengths of boom.

Construction Methods:

A. General

When controlled materials are encountered during the course of the work, health and safety provisions shall conform to the appropriate sections of the Contract. Provisions may include implementation of engineering controls, air and personal monitoring, the use of chemical protective clothing (CPC), personal protective equipment (PPE), implementation of engineering controls, air and personal monitoring, and decontamination procedures.

Excavated material from the AOECs, if suitable, may be re-used within any AOEC within the project limits, in accordance with the following conditions: (1) such soil is deemed to be structurally suitable for use as fill by the Engineer; (2) such soil is not placed below the water table; and (3) such soil is not placed in an area subject to erosion. Materials removed from any excavation within an AOEC which cannot be immediately re-used shall be transported directly from their point of origin on the Project to the WSA. The stockpiles of excavated controlled materials shall be maintained as shown on the Project Plans. The Contractor shall plan excavation activities within AOEC's in consideration of the capacity of WSA, and the material testing and disposal requirements of the applicable Contract item. **No claims for delay shall be considered based on the Contractor's failure to coordinate excavation activities as specified herein.**

The Engineer will sample the stockpiled controlled materials at a frequency and for the constituents to meet the acceptance criteria of the treatment/recycling/disposal facilities submitted by the Contractor. The Contractor is hereby notified that laboratory turnaround time is expected to be fifteen (15) working days. Turnaround time is the period of time beginning when the Contractor notifies the Engineer which facility it intends to use and that the stockpile is ready for sampling and ending with the Contractor's receipt of the laboratory analytical results. Any change of intended treatment/recycling/disposal facility may prompt the need to resample and will therefore restart the time required for laboratory turnaround. The laboratory will furnish such results to the Engineer. Upon receipt, the Engineer will make available to the Contractor the results of the final waste characterization determinations. **No delay claim will be considered based upon the Contractor's failure to accommodate the laboratory turnaround time as identified above.**

B. Transportation and Stockpiling

In addition to following all pertinent Federal, State and local laws or regulatory agency policies, the Contractor shall adhere to the following precautions during transport of non-hazardous materials:

- Transported controlled materials are to be covered prior to leaving the point of generation and are to remain covered until the arrival at the WSA;
- All vehicles departing the site are properly logged to show the vehicle identification, driver's name, time of departure, destination, and approximate volume and content of materials carried;
- All vehicles shall have secure, watertight containers free of defects for material transportation;
- No material shall leave the site until there is adequate lay down area prepared in the WSA; and,
- Documentation must be maintained indicating that all applicable laws have been satisfied and that the materials have been successfully transported and received at the WSA.

Construction of the WSA shall be completed prior to the initiation of construction activities generating Controlled Materials. Plastic polyethylene sheeting and bedding sand or existing/new pavement shall underlay all excavated controlled materials as shown on the Contract Plans. Measures shall be implemented to divert rainfall away from the WSA.

No controlled materials shall be excavated or transported to the WSA until registration under the General Permit for Contaminated Soil and/or Sediment Management (Staging and Transfer) has been obtained by ConnDOT.

Placement of sorbent boom along the perimeter of the WSA shall be conducted when soil is saturated with petroleum product.

Excavated materials shall be staged as shown on the Project Plans or as directed by the Engineer.

C. WSA Maintenance

The Contractor shall provide all necessary materials, equipment, tools and labor for anticipated activities within the WSA. Such activities include, but are not limited to, handling and management of stockpiles and drummed CPC/PPE; uncovering and recovering stockpiles; maintenance of WSA; replacement of damaged components (i.e. sand bags, plastic polyethylene sheeting, etc.); and waste inventory record management. The Contractor shall manage all

materials in the WSA in such a way as to minimize tracking of potential contaminated materials across the site and off-site, and minimize dust generation.

Each stockpile shall be securely covered when not in active use with a cover of sufficient size to prevent generation of dust and infiltration of precipitation.

The staged stockpiles shall be inspected at least daily by the Contractor to ensure that the cover and containment have not been damaged and that there is no apparent leakage from the pile. If the cover has been damaged, or there is evidence of leakage from the piles, the Contractor shall immediately replace the cover or containment as needed to prevent the release of materials to the environment from the piles.

An inventory of stockpiled materials and drummed CPC/PPE shall be conducted on a daily basis. Inventory records shall indicate the approximate volume of material/drums stockpiled per day; the approximate volume of material/drums stockpiled to date; material/drums loaded and transported off-site for disposal; any materials loaded and transported for on-site reuse; and identification of stockpiles relative to their points of generation.

Following the removal of all stockpiled controlled materials, residuals shall be removed from surfaces of the WSA as directed by the Engineer. This operation shall be accomplished using dry methods such as shovels, brooms, mechanical sweepers or a combination thereof. Residuals shall be disposed of as Controlled Materials.

D. Dewatering

Dewatering activities shall conform to Items in pertinent articles of the Contract.

E. Decontamination

All equipment shall be provided to the work site free of contamination. The Engineer may prohibit from the site any equipment that in his opinion has not been thoroughly decontaminated prior to arrival. Any decontamination of the Contractor's equipment prior to arrival at the site shall be at the expense of the Contractor. The Contractor is prohibited from decontaminating equipment on the Project that has not been thoroughly decontaminated prior to arrival.

The Contractor shall furnish labor, materials, tools and equipment for decontamination of all equipment and supplies that are used to handle Controlled Materials. Decontamination shall be conducted at an area designated by the Engineer and may be required prior to equipment and supplies leaving the Project, between stages of the work, or between work in different AOEC's.

Dry decontamination procedures are recommended. Residuals from dry decontamination activities shall be collected and managed as Controlled Materials. If dry methods are unsatisfactory as determined by the Engineer, the Contractor shall modify decontamination procedures as required subject to the Engineer's approval.

F. Dust Control

The Contractor shall implement a fugitive dust suppression program in accordance with the Contract to prevent the off-site migration of particulate matter and/or dust resulting from excavation, loading and operations associated with Controlled Materials. It shall be the Contractor's responsibility to supervise fugitive dust control measures and to monitor airborne particulate matter. The Contractor shall:

1. Employ reasonable fugitive dust suppression techniques.
2. Visually observe the amounts of particulate and/or fugitive dust generated during the handling of controlled materials. If the apparent amount of fugitive dust and/or particulate matter is not acceptable to the Engineer, the Engineer may direct the Contractor to implement corrective measures at his discretion, including, but not limited to, the following:
 - (a) apply water to pavement surfaces
 - (b) apply water to equipment and excavation faces; and
 - (c) apply water during excavation, loading and dumping.

G. Permit Compliance

The Contractor shall comply with the terms and conditions of the DEEP "General Permit for Contaminated Soil and/or Sediment Management (Staging and Transfer)", including the General Operating Conditions and the Specific Operating Conditions, except that the Engineer will conduct all soil/sediment characterization and perform all record keeping. In particular, the Contractor shall:

1. Operate, maintain and repair the WSA in conformance with the requirements of the General Permit.
2. Maintain a communications system capable of summoning fire, police, and/or other emergency service personnel.
3. Prevent unauthorized entry onto the stockpiles by the use of fences, gates, or other natural or artificial barriers.
4. Separate incidental excavation waste to the satisfaction of the receiving facility or to an extent that renders the contaminated soil and/or sediment suitable for its intended reuse.
5. Isolate and temporarily store incidental waste in a safe manner prior to off-site transport to a facility lawfully authorized to accept such waste.
6. Not store more than 100 cubic yards of incidental waste at any one time.
7. Sort, separate and isolate all hazardous waste from contaminated soil and/or sediment.
8. Prevent or minimize the transfer or infiltration of contaminants from the stockpiles to the ground as detailed in "B. Transportation and Stockpiling" above.
9. Securely cover each stockpile of soil as detailed in "C. WSA Maintenance" above.
10. Minimize wind erosion and dust transport as detailed in "F. Dust Control" above.

11. Use anti-tracking measures at the WSA to ensure the vehicles do not track soil from the WSA onto a public roadway at any time.
12. Instruct the transporters of contaminated soil and/or sediment of best management practices for the transportation of such soil (properly covered loads, removing loose material from dump body, etc.).
13. Control all traffic related to the operation of the facility in such a way as to mitigate the queuing of vehicles off-site and excessive or unsafe traffic impact in the area where the facility is located.
14. Ensure that except as allowed in section 22a-174-18(b)(3)(C) of the Regulations of Connecticut State Agencies, trucks are not left idling for more than three (3) consecutive minutes.

Method of Measurement:

The work of Controlled Material Handling will be measured for payment by the number of cubic yards of controlled material excavated within the AOEC's and taken to the WSA, and stockpiled within the storage bins for sampling by the Engineer or temporarily stockpiled for later reuse. Material kept in proximity to the site of the excavation and reused as it is generated will not be measured for payment under this item. This measurement shall be in accordance with and in addition to the quantity measured for payment of the applicable excavation item in Specification Sections 2.02, 2.03, 2.05, 2.06, or the Contract Special Provisions, as applicable. Excess excavations made by the Contractor beyond the payment limits specified in the Contract will not be measured for payment and the Contractor assumes all costs associated with the appropriate handling, management and disposal of this material.

Equipment decontamination, the collection of residuals, and the collection and disposal of liquids generated during equipment decontamination activities will not be measured separately for payment.

Basis of Payment:

This work shall be paid for at the Contract unit price, which shall include all transportation from the excavation site to the final WSA, including any intermediate handling steps; stockpiling controlled materials at the WSA; covering, securing, and maintaining the individual stockpiles within the WSA throughout the duration of the Project; and all tools, equipment, material and labor incidental to this work.

This price shall also include equipment decontamination; the collection of residuals generated during decontamination and placement of such material in the WSA; and the collection and disposal of liquids generated during equipment decontamination activities.

All materials, labor and equipment associated with compliance with the General Permit for Contaminated Soil and/or Sediment Management (Staging and Transfer) will not be measured separately, but will be considered incidental to the item "Controlled Materials Handling".

Securing, construction and dismantling of the WSA shall be paid for under Item 0101128A. Handling and disposal of contaminated groundwater will be paid for under Item 0204213A. Payment for dust control activities shall be made under the appropriate Contract items.

Pay Item	Pay Unit
Controlled Materials Handling	C.Y.

ITEM NO. 101128A - SECURING, CONSTRUCTION AND DISMANTLING OF A WASTE STOCKPILE AND TREATMENT AREA

Description:

Work under this Item shall consist of the securing, construction and dismantling of the temporary Waste Stockpile Area at the location designated on the Project Plans and in accordance with the Contract. All controlled materials excavated during construction activities which are not designated for immediate reuse shall be stockpiled in the WSA. The WSA shown on the Plans is to be used exclusively for temporary stockpiling of excavated materials from within Project AOEC's for determination of disposal classification.

Materials:

The required materials are detailed on the Project Plans. All materials shall conform to the requirements of the Contract.

Construction blocks shall be solid precast rectangular concrete six feet in length, three in height, and two feet in depth.

Polyethylene plastic sheeting for underlayment shall be a thickness of 30 mil and minimum width of ten feet. Polyethylene plastic sheeting for covering shall be a thickness of 10 mil and minimum width of ten feet.

Sand bags used to secure polyethylene sheeting soil covers shall have a minimum weight of thirty pounds.

Bedding sand shall conform to Section 6.51.02 of the Specifications.

Processed Aggregate Base shall conform to Section 3.04 of the Specifications.

Hay bales shall conform to the requirements of Section 2.18 of the Specifications.

Bituminous Concrete shall conform to Section 4.06 of the Specifications.

Roll-off/Storage Containers shall be of watertight, steel-body construction, of the size specified and able to handle the storage and subsequent transportation of material to the disposal facility.

Precast Concrete Barrier Curb shall conform to Section 8.22 of the Specifications.

Construction Methods:

The WSA shall be constructed in accordance with the Contract at the location shown on the Project Plans.

Construction of the WSA shall be completed prior to the initiation of construction activities generating Controlled Materials. The Contractor is responsible for the maintenance and protection of all utilities potentially affected during WSA construction. The Contractor shall locate and mark all existing utilities potentially affected prior to initiating WSA construction.

The proposed location of the WSA shall be cleared of any debris and vegetation as directed by the Engineer. Any objectionable materials, which may result in damage to the polyethylene sheeting underlayment, shall be removed prior to stockpiling excavated controlled materials.

The Contractor shall comply with the terms and conditions of the DEEP “General Permit for Contaminated Soil and/or Sediment Management (Staging and Transfer)”, including the General Operating Conditions and the Specific Operating Conditions, except that the Engineer will conduct all soil/sediment characterization and perform all record keeping. In particular, the Contractor shall:

1. Construct and repair the WSA in conformance with the requirements of the General Permit.
2. Prevent unauthorized entry onto the stockpiles by the use of fences, gates, or other natural or artificial barriers.
3. Install anti-tracking measures at the WSA to ensure the vehicles do not track soil from the WSA onto a public roadway at any time.
4. Post and maintain a sign that is visible from a distance of at least 25’ at the WSA identifying the name of the permittee (State of CT, Department of Transportation), the DOT field office phone number, the hours of operation for the WSA, and the phrase, “Temporary Soil Staging Area”. Lettering shall be at least one inch (1”) high with a minimum overall sign dimension of four (4) feet wide by two (2) feet high. Such sign is only required if the capacity of the WSA is equal to or greater than 1,000 cubic yards. If initially the WSA capacity is less than 1,000 c.y. and the WSA capacity is subsequently increased, the Contractor shall post and maintain the required sign at no additional cost to the State, prior to stockpiling the additional material.

Following the removal of all stockpiled material, the Contractor shall use dry decontamination procedures for all surfaces of the WSA as directed by the Engineer. Residual materials shall be disposed of as Controlled Materials. If the results from dry methods are unsatisfactory to the Engineer, the Contractor shall modify decontamination procedures as required.

The Contractor shall be responsible for the collection and treatment/recycling/disposal of any liquid wastes that may be generated by its decontamination activities in accordance with applicable regulations.

Upon completion of the Project and following removal of all residual Controlled Materials, the Contractor shall dismantle the WSA and return the area to original condition. During dismantling, the Contractor shall remove all materials such as polyethylene sheeting and sand bags. Materials shall be disposed of by the Contractor as solid waste in accordance with the Contract and all Federal, State and local regulations.

Operation and maintenance of the WSA shall be included under Item 0101117A “Controlled Material Handling”.

Method of Measurement:

This work will be measured for payment at the Lump Sum cost for securing, construction, and dismantling of a WSA.

Basis of Payment:

This work will be paid for at the Contract Lump Sum, which shall include all materials, tools, labor, equipment, permits, and work needed to secure, construct, decontaminate and dismantle the WSA, including all clearing, grubbing, grading, clean up, site restoration and seeding.

All materials, labor and equipment associated with compliance with the General Permit for Contaminated Soil and/or Sediment Management (Staging and Transfer) will not be measured separately, but will be considered incidental to the item “Securing, Construction and Dismantling of a Waste Stockpile and Treatment Area”.

Pay Item	Pay Unit
Securing, Construction and Dismantling Of a Waste Stockpile and Treatment Area	L.S.

ITEM #0101130A - ENVIRONMENTAL WORK - SOLIDIFICATION

Description:

Under this item, the Contractor shall be responsible for the solidification of controlled materials containing free draining liquids, as may be necessary during the performance of work operations prior to off-site disposal. Materials shall be dewatered prior to the addition of solidification material.

The Contractor shall submit within seven (7) days of the Notice to Proceed, for the Engineer's review, a detailed methodology and plan of operation for the solidification of materials.

Materials:

The materials used for solidification shall be a naturally occurring material such as diatomaceous earth or other material as approved by the Engineer. Said material shall be in a dry state prior to use in solidification operations. No polymers or other synthetic materials shall be allowed.

Construction Methods:

Submittals:

The Contractor shall submit for the Engineer's review, a plan showing the location of solidification material storage and proposed mixing location as well as a detailed narrative describing the equipment, materials and methodology to be used. The Contractor shall also include its planned methods to remove or drain away free water prior to the addition of any solidification materials to controlled materials. The methodology shall completely describe the Contractor's proposed plan for removal of free liquids (as determined by ASTM) from the excavated materials. Should solidification fail to eliminate free liquids as proposed, the Contractor will be required to revise the solidification plan at no additional cost to the State.

Upon visual examination, if controlled materials have free liquids present, the Contractor may, with concurrence of the Engineer, add dry materials to absorb free-standing liquids, utilizing a methodology accepted by the Engineer. The Contractor shall dewater controlled materials prior to the addition of solidification materials to the satisfaction of the Engineer. All dewatering fluids shall be handled in accordance with the Contract. Solidification procedures shall be subject to monitoring by the Engineer.

The maximum quantity of solidification material that may be used by the Contractor shall be limited to twenty (20) percent, by volume, of the material being solidified. Should this procedure be demonstrated as not effective in the elimination of the presence of free-standing liquids, the Contractor shall submit methods for the removal of free-standing water. The Contractor shall also submit the additional costs of the proposed alternative to the Engineer for review. No alternative methods of solidification shall be initiated until reviewed and accepted by the Engineer.

Method of Measurement:

This work will be measured for payment as the actual weight of solidification material used by the Contractor. The Contractor shall demonstrate the amount of solidification material used by the original weight tickets from a certified scale. The weight tickets shall show the weight of the material brought to the site and subsequently used in solidification operations.

If no certified scale is available, the Engineer may allow for the calculation of the weight by a summation of sealed, pre-measured bags.

Basis of Payment:

This work will be paid for at the Contract unit price for solidification material used and accepted by the Engineer. Such price shall include all labor, materials, tools, and equipment incidental to the work including transportation of the materials to the Project and the addition of solidification material to excavated materials.

Pay Item	Pay Unit
Environmental Work - Solidification	Ton

ITEM NO. 0202315A - DISPOSAL OF CONTROLLED MATERIALS

Description:

Work under this item shall consist of the loading, transportation and final off-site disposal/recycling/treatment of controlled materials (excluding dewatering fluids) that have been generated from various excavations within the AOEC's, brought to the WSA and determined to be contaminated with regulated substances at non-hazardous levels. This contamination is documented in the reports listed in the "Notice to Contractor – Environmental Investigations". The controlled materials, after proper characterization by the Engineer, shall be taken from the WSA, loaded, transported to and treated/recycled/disposed of at a permitted treatment/recycle/disposal facility listed herein.

The Contractor must use one or more of the following Department-approved treatment/recycle/disposal facilities for the disposal of non-hazardous materials:

Cranston Sanitary Landfill 1690 Pontiac Avenue Cranston, RI 02920 413-552-3688; Paul Mahoney	Northampton Landfill 170 Glendale Road Florence, MA 01062 413-498-0099
ESMI of New York 304 Towpath Road Fort Edward, New York 12828 (800) 511-3764; Peter Hanson	Waste Management of New Hampshire P.O. Box 27065 97 Rochester Neck Road Gonic, NH 03839 (603) 330-2170; Ellen Bellio
Ted Ondrick Company, LLC 58 Industrial Road Chicopee, MA 01020 (413) 592-2566; Alan Desrosiers	ESMI of New Hampshire 67 International Drive Loudon, NH 03307 (603) 783-0228; Stephen Raper
The Southbridge Recycling and Disposal Park 165 Barefoot Road Southbridge, MA 508-765-9723	South Hadley Landfill, LLC 12 Industrial Drive South Hadley, MA 01075 413-535-3095
Waste Management – Chicopee Sanitary Landfill 161 New Lombard Road Chicopee, MA 01020 413-534-8741	Waste Management – Granby Sanitary Landfill 11 New Ludlow Road Granby, MA 01033 413-467-3200

Moretown Landfill 187 Palisades Park Waterbury, VT 05676 802-244-1100 x 226	Allied Waste Niagra Fall Landfill, LLC 5600 Niagra Falls Blvd. Niagra, NY 14304 716-285-3398; David Hanson
Clean Earth of Philadelphia 3201 S. 61 Street Philadelphia, PA 19153 215-724-5520; Mike Kelly	Clean Earth of Carteret 24 Middlesex Avenue Carteret, NJ 07008 732-541-8909; Cheryl Coffee

Construction Methods:

A. Submittals

The apparent low bidder shall submit in writing, within fourteen days after Bid opening, (1) a letter listing the names of the treatment/recycle/disposal facilities (from the list above) which the bidder, if it is awarded the Contract, will use to receive controlled material from this Project, (2) a copy of the attached “Disposal Facility Material Acceptance Certification” form from each facility, which shall be signed by an authorized representative of each treatment/recycle/disposal facility, and (3) a copy of the facility acceptance criteria and facility sampling frequency requirements from each facility.

Any other Contractor which the Department may subsequently designate as the apparent low bidder shall make the aforementioned submissions within fourteen (14) days from the date on which the Department notifies the Contractor that it has become the apparent low bidder. If, however, the Department deems it is necessary for such a subsequent-designated Contractor to make said submissions within a shorter period of time, the Contractor shall make those submissions within the time designated by the Department.

Failure to comply with all of the above requirements may result in the rejection of the bid.

No facility may be substituted for the one(s) designated in the Contractor’s submittal without the Engineer’s prior approval. If the material cannot be accepted by any of the Contractor’s designated facilities, the Department will supply the Contractor with the name(s) of other acceptable facilities.

Disposal Facility Materials Acceptance Certification

Project Number _____

Project Location _____

Facility Name _____ Telephone _____

Facility Address _____ Fax _____

The Contractor has supplied the analytical data contained in the report concerning the site investigation performed by the Designer. I have personally reviewed this data and intend to accept the following:

Controlled materials as described in Item # 202315A Disposal of Controlled Materials for the subject Project at a cost of \$ _____ per ton for treatment/disposal and an additional \$ _____ per ton for transportation from the Project to the facility (if applicable).

This intent to accept the material will be subject to and dependent upon the facility's subsequent evaluation of waste characterization determination documentation to be provided to the Contractor by the Engineer.

Authorized Facility
Representative _____ / _____
Printed/Typed Name Title

Signature Date

Note: The facility shall attach the acceptance criteria and facility sampling frequency requirements to this document.

DO NOT ALTER FORM IN ANY WAY. FORM MUST BE COMPLETED IN ENTIRETY.

B. Material Disposal

The Engineer will sample materials stored at the WSA at a frequency established by the selected treatment/recycling/disposal facilities. The Contractor shall designate to the Engineer which facility it intends to use prior to samples being taken. The Contractor is hereby notified that laboratory turnaround time is expected to be fifteen (15) working days. Turnaround time is the period of time beginning when the Contractor notifies the Engineer which facility it intends to use and that the bin within the WSA is full and ready for sampling and ending with the Contractor's receipt of the laboratory analytical results. Any change of intended treatment/recycling/disposal facility may prompt the need to resample and will therefore restart the time required for laboratory turnaround. The laboratory will furnish such results to the Engineer. Upon receipt, the Engineer will make available to the Contractor the results of the final waste characterization determinations. **No delay claim will be considered based upon the Contractor's failure to accommodate the laboratory turnaround time as identified above.**

The Contractor shall obtain and complete all paperwork necessary to arrange for material disposal (such as disposal facility waste profile sheets). It is solely the Contractor's responsibility to co-ordinate the disposal of controlled materials with its selected treatment/recycling/disposal facility(s). Upon receipt of the final approval from the facility, the Contractor shall arrange for the loading, transport and treatment/recycling/disposal of the materials in accordance with all Federal and State regulations. **No claim will be considered based on the failure of the Contractor's selected disposal facility(s) to meet the Contractor's production rate or for the Contractor's failure to select sufficient facilities to meet its production rate.**

All manifests or bills of lading utilized to accompany the transportation of the material shall be prepared by the Contractor and signed by an authorized Department representative, as Generator, for each truck load of material that leaves the site. The Contractor shall forward the appropriate original copies of all manifests or bills of lading to the Engineer the same day the material leaves the Project.

A load-specific certificate of treatment/recycling/disposal, signed by the authorized agent representing the disposal facility, shall be obtained by the Contractor and promptly delivered to the Engineer for each load.

C. Material Transportation

In addition to all pertinent Federal, State and local laws or regulatory agency polices, the Contractor shall adhere to the following precautions during the transport of controlled materials off-site:

- Transported controlled materials are to be covered sufficiently to preclude the loss of

material during transport prior to leaving the site and are to remain covered until the arrival at the selected treatment/recycling/disposal facility.

- All vehicles departing the site are to be properly logged to show the vehicle identification, driver's name, time of departure, destination, and approximate volume, and contents of materials carried.
- No materials shall leave the site unless a treatment/recycling/disposal facility willing to accept all of the material being transported has agreed to accept the type and quantity of waste.

D. Equipment Decontamination

All equipment shall be provided to the work site free of gross contamination. The Engineer may prohibit from the site any equipment that in his opinion has not been thoroughly decontaminated prior to arrival. Any decontamination of the Contractor's equipment prior to arrival at the site shall be at the expense of the Contractor. The Contractor is prohibited from decontaminating equipment on the Project that has not been thoroughly decontaminated prior to arrival.

The Contractor shall furnish labor, materials, tools and equipment for decontamination of all equipment and supplies that are used to handle Controlled Materials. Decontamination shall be conducted at an area designated by the Engineer and shall be required prior to equipment and supplies leaving the Project, between stages of the work, and between work in different AOEC's.

The Contractor shall use dry decontamination procedures. Residuals from dry decontamination activities shall be collected and managed as Controlled Materials. If the results from dry methods are unsatisfactory to the Engineer, the Contractor shall modify decontamination procedures as required.

The Contractor shall be responsible for the collection and treatment/recycling/disposal of any liquid wastes that may be generated by its decontamination activities in accordance with applicable regulations.

Method of Measurement:

The work of "DISPOSAL OF CONTROLLED MATERIALS" will be measured for payment as the actual net weight in tons of material delivered to the treatment/recycling/disposal facility. Such determinations shall be made by measuring each hauling vehicle on the certified permanent scales at the treatment/recycling/disposal facility. Total weight will be the summation of weight bills issued by the facility specific to this Project. Excess excavations made by the Contractor beyond the payment limits specified in Specification Sections 2.02, 2.03, 2.05, 2.06, or the Contract Special Provisions (as appropriate) will not be measured for payment and the Contractor assumes responsibility for all costs associated with the appropriate handling, management and disposal of this material.

The disposal of excavated materials, originally anticipated to be controlled materials, but determined by characterization sampling not to contain concentrations of regulated chemicals (non-polluted or “clean” materials) will not be measured for payment under this item but will be considered as surplus excavated materials and will be paid in accordance with Article 1.04.05.

Any materials, which are determined through characterization sampling to be contaminated but reusable in accordance with the Remediation Standard Regulations, and which are reused within Project limits, will not be measured for payment under this item. This material will be paid for under Item 0202318A – Management of Reusable Controlled Material or in accordance with Article 1.04.05 in the item’s absence.

Equipment decontamination, the collection of residuals, and the collection and disposal of liquids generated during equipment decontamination activities will not be measured separately for payment.

Basis of Payment:

This work will be paid for at the Contract unit price, which shall include the loading and transportation of controlled materials from the WSA to the treatment/recycling/disposal facility; the fees paid to the facility for treatment/recycling/disposal; the preparation of all related paperwork; and all equipment, materials, tools, and labor incidental to this work. **This unit price will be applicable to all of the listed disposal facilities and will not change for the duration of the Project.**

This price shall also include equipment decontamination; the collection of residuals generated during decontamination and placement of such material in the WSA; and the collection and disposal of liquids generated during equipment decontamination activities.

Pay Item	Pay Unit
Disposal of Controlled Materials	Ton

ITEM NO. 0202318A MANAGEMENT OF REUSABLE CONTROLLED MATERIAL

Description:

Work under this item shall include all materials, equipment, tools and labor required to load, transport from the WSA, place, and compact reusable controlled materials in fill areas located within the Project limits. "Reusable controlled material" is soil that contains contaminant concentrations above analytical detection limits, but below the applicable regulatory criteria and controlled material stockpiled at the WSA and later reused within any AOEC within the project limits.

Construction Methods:

Controlled material stored within the WSA which is determined to be reusable following analytical testing shall be loaded, transported, placed and compacted at fill areas located within the Project limits in accordance with the following conditions: (1) such soil is deemed to be structurally suitable for use as fill by the Engineer; (2) such soil is not placed below the water table; 3) the DEEP groundwater classification of the area where the soil is to be reused as fill does not preclude said reuse; and (4) such soil is not placed in an area subject to erosion.

Method of Measurement:

"Management of Reusable Controlled Material" will be measured for payment by the number of cubic yards of material loaded and transported from the WSA and placed at fill areas located within the Project limits in accordance with the Contract.

Basis of Payment:

"Management of Reusable Controlled Material" will be paid for at the Contract unit price, which shall include all materials, equipment, tools and labor necessary to load and transport reusable controlled materials from the WSA to fill areas located within the Project limits and to place and compact the reusable material. This price shall include any decontamination of soil handling equipment, and the treatment/recycling/disposal of wastes generated in conjunction with such decontamination.

No separate payment will be made for consolidating previously tested individual stockpiles that have been deemed reusable, but shall be considered incidental to the work.

The disposal of any reusable controlled material that fails to meet material testing requirements for the intended use in accordance with the Contract requirements, as well as any excess reusable material, will be paid under Item 0202315A, "Disposal of Controlled Material".

Pay Item	Pay Unit
Management of Reusable Controlled Materials	C.Y.

ITEM #0202452A – TEST PIT

Description: Test pits shall be performed for determining the location of underground utilities. This work shall consist of the removal and satisfactory disposal of all materials, the removal of which is necessary for the proper completion of the work, at the locations shown on the plans or as ordered, and backfilling, all in accordance with these specifications.

Utility facilities to be located shall include pipes, conduits, service connections, structures, tanks, utility appurtenances, and any miscellaneous items directed by the Engineer such as telltales/markers on the existing pipes, etc.

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

Wherever portions of existing full-depth bituminous concrete pavement are to be removed in conjunction with test pits, they shall be removed to neat lines. Where the limits of the areas in which such bituminous pavement is to be removed are adjacent to existing bituminous concrete pavement that is to remain in place, the limits shall be cut by a method approved by the Engineer.

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

After the test pit is completed, the Contractor shall notify the Engineer. The test pit shall not be backfilled until directed by the Engineer.

When backfilling is required, the material used shall be of a quality satisfactory to the Engineer and shall be free from large or frozen lumps, wood and other extraneous material. All backfill placed below subgrade shall be placed in layers of not more than 6 inches (150 millimeters) in depth after compaction and shall be thoroughly compacted by means of mechanical rammers or vibrators or by pneumatic tampers. Hand tampers shall be used only upon written permission of the Engineer. Unless otherwise ordered by the Engineer, the backfill shall be brought to the surface of the surrounding ground or subgrade and neatly graded.

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

Method of Measurement: Test pits will be measured as each excavated, backfilled, surveyed, documented and accepted. There will be no separate measurement for mobilization and demobilization associated with this item.

Basis of Payment: Test Pits will be paid for at the contract unit price each complete in place and accepted, which price shall include all materials, equipment, tools, surveys, and labor incidental thereto.

The price shall also include backfilling, patching roadways and sidewalks in kind, restoration of the ground where required and the disposal of surplus material. No additional payment will be made for shoring, bracing, pumping, and bailing or for material or equipment necessary for the satisfactory completion of the work. If “Granular Fill” or “Reuse Stockpiled Materials” are used for backfill, payment will be made at their respective contract unit prices.

<u>Pay Item</u>	<u>Pay Unit</u>
Test Pit	EA.

ITEM NO. 0204213A - HANDLING CONTAMINATED GROUNDWATER

Description:

Under this Item, the Contractor shall collect, manage, treat, and dispose of contaminated groundwater generated during dewatering operations within the designated Groundwater Area of Environmental Concern (GW AOEC) within the project limits.

Contaminated groundwater is defined as “groundwater which has been generated from excavations within the designated GW AOEC containing substances at concentrations that exceed the effluent limits for the DEEP General Permit for the Discharge of Groundwater Remediation Wastewater Directly to Surface Water”. The presence of contaminants removable through control of settleable solids does not constitute contaminated groundwater. Groundwater contamination caused by the Contractor’s activities or work practices is also not considered contaminated groundwater.

The contamination and groundwater depth at the time of the investigation is documented in the reports listed in the “Notice to Contractor – Environmental Investigations”. Contaminants and depth to groundwater is provided for the Contractor’s information and may be influenced by factors such as seasonal groundwater table changes, tidal changes, drought or flooding conditions, local withdrawals from the aquifer, local construction, etc. Additional information with regard to soil descriptions and groundwater observations may also be available if geotechnical investigations were conducted for the project. The Contractor shall contain contaminated groundwater and 1) treat it on-site prior to discharge to sanitary sewer; 2) treat it on-site prior to discharge to surface water; or 3) transport water to an off-site treatment/disposal facility.

This Item does not apply to the possible diversion of existing storm water flow around the construction site during Project activities. Diversion of existing storm water or surface flows shall be completed in accordance with the Contract and all applicable permits. This item also does not include process water or wastewater generated by the Contractor’s work activities.

Construction Methods:

A. General

It is the Contractor’s responsibility to determine the expected groundwater generation rate from construction activities, select the appropriate groundwater management method, and size its system capacity to meet those dewatering needs.

All equipment required as a part of this Item shall be installed in a location and manner acceptable to the Engineer and in accordance with the manufacturer’s recommendations. Equipment shall be decontaminated prior to arrival at the Project, decontaminated prior to

being moved to another area of the project, and then decontaminated before it leaves the Project, at no additional cost to the State. Solids (soil or sediment) generated by on-site dewatering activities shall be brought to the Waste Stockpile Area (WSA) for testing and characterization by the Engineer.

The Contractor is responsible for operating and maintaining the equipment at all times when dewatering in the GW AOEC occurs. This includes providing appropriate supervision during evenings, weekends, and holidays. If the system is intended to operate unattended, a remote alarm system acceptable to the Engineer shall be installed to monitor critical system operating parameters and the Contractor shall be responsible for providing rapid emergency response during non-working hours in the event a system malfunction occurs. A list of names and phone numbers shall be displayed in the immediate vicinity of the system for emergency contacts.

The Contractor shall report releases from the groundwater treatment system due to overfilling or equipment/piping failure to the DEEP Spill Response Unit in accordance with RCSA 22a-450 and provide the Engineer with all information, including the DEEP case number. All costs related to spill response associated with the Contractor's on-site containment or treatment system will be the responsibility of the Contractor.

The Contractor shall collect all samples related to permit compliance in the presence of the Engineer. The Contractor shall provide informational copies of all groundwater analytical results and discharge monitoring reports to the Engineer as they are generated.

The Contractor shall operate the dewatering equipment at a rate that removes the groundwater that naturally infiltrates the excavation. The Contractor shall not cause a hydraulic gradient that draws groundwater into the excavation at an excessive rate. Additional treatment required due to the mobilization of off-site contaminants caused by the Contractor dewatering at an excessive rate will be the responsibility of the Contractor.

Additional treatment related to the Contractor's work activities (i.e. treatment or increased charges due to changes in pH or introduction of different contaminants into the groundwater) and management and disposal of excess water related to the Contractor's process water or waste water will not be included under this item but will be considered a part of the Contractor's cost for the item under which the work is being performed.

B. Groundwater Management Methods

The Contractor shall use one or more of the following methods for the management and disposal of contaminated groundwater. Based on project specifics and site constraints, the Contractor may choose to use more than one of the following methods on a single project. All methods may not be possible at the site due to sanitary sewer or permitting restrictions.

1. On-Site Treatment System with Discharge to Sanitary Sewer

a. Contractor Submittals

At least 14 days prior to any submittal to the Publicly Owned Treatment Works (POTW) or DEEP, the Contractor shall submit the treatment system design, which has been sealed by a Professional Engineer licensed in the State of Connecticut to the Engineer for review and comment. Equipment shall prevent sediments and solids, as well as contaminants in excess of the permit allowable effluent concentrations, from entering the sanitary sewer. This submittal shall include a schematic or diagram that shows all treatment system equipment, well point locations, pump set-ups in excavations, sedimentation control methods, system location, method of conveyance, flow rates, pipe sizes, valve locations, sampling ports, discharge locations, electrical power connection, etc.

The Contractor shall submit the manufacturer's data sheets, assembly details and performance data on all treatment equipment. If dewatering equipment is to remain on site between October 15 and April 15, the Contractor shall include its method to prevent the treatment system equipment from freezing (heat tape, immersion heaters, etc.).

The Contractor shall detail its method to collect and contain water in its excavations. The Contractor shall also describe in detail its methods for limiting the quantity of water entering the excavation, including shoring, location of well points, limiting excavation size, preventing entry of surface water into the excavation, etc. The Contractor shall also include its assumptions and flow rate calculations related to the sizing of the system.

It is the Contractor's responsibility to design and properly size the system to accommodate the anticipated contaminants and dewatering rates based on its construction activities, POTW limitations, and permit requirements. The Contractor is alerted that construction activities may be limited based on permit restrictions or POTW limitations.

No claim for delay or request for additional time will be considered based upon the Contractor's failure to accommodate the review process.

b. Permits

Groundwater generated by construction activities within a GW AOEC shall be appropriately treated and discharged to the sanitary sewer system within Project limits. Management and discharge of contaminated groundwater shall be accomplished in accordance with a DEEP General Permit and POTW requirements. The Contractor shall be responsible for registering under the General Permit, any other necessary State or local permits, and all associated fees.

The DEEP General Permit for the Discharge of Groundwater Remediation Wastewater to Sanitary Sewer is available at www.ct.gov/dep. The Contractor shall submit the most current permit registration form to the DEEP. A minimum lead-time of six (6) weeks can

be expected to process and submit the registration, in addition to coordination time with the POTW. **No claim for delay or request for additional time will be considered based upon the Contractor's failure to accommodate the permitting process.** The Contractor shall not submit the permit registration to the DEEP prior to the Engineer's review of and comment on the treatment system.

The Contractor shall submit a copy of the DEEP permit certificate of registration to the Engineer prior to initiating any discharge.

All testing required by the general permit shall be conducted by a laboratory certified by the Connecticut Department of Public Health (DPH) for the method specified in the permit. The Contractor shall submit copies of the analytical results to the all parties specified in the permit terms and conditions and to the Engineer.

No claim for delay or request for additional time will be considered based upon the Contractor's failure to design a system to meet this performance specification. It is the Contractor's responsibility to properly size the treatment system and temporary containment tanks based on its anticipated flow rates from construction activities and to determine the level of treatment required to meet permit discharge limits.

c. Treatment System Operation

The Contractor shall ensure that all personnel involved in the groundwater treatment operations understand the terms of the General Permit. In the event of a conflict between the requirements of the Contract and the permit, the more stringent will apply.

The Contractor shall not commence work activities within any GW AOEC until such time as:

- i. the temporary groundwater treatment system design is reviewed by the Engineer and comments are adequately addressed,
- ii. the system is installed in accordance with the accepted design and is completely operational, and
- iii. a copy of the Contractor's permit certificate of registration has been submitted to the Engineer.

The Contractor shall make any sanitary sewer tie-in modifications necessary to accommodate the treatment unit only after obtaining approval from the Engineer and the POTW.

The Contractor shall take all meter readings required by the permit and forward them to the appropriate parties.

The Contractor shall collect all samples related to permit compliance in the presence of the Engineer and shall submit copies of the analytical results and discharge monitoring reports to the appropriate agency(ies) as required by the General Permit terms and conditions. The Contractor shall provide informational copies of all analytical results and discharge monitoring reports to the Engineer as they are generated. In the event of an exceedance, the Contractor shall immediately comply with the “*Duty to Correct, Record, and Report Violations*” section of the General Permit. The Contractor shall provide the Engineer a copy of the required DEEP reporting and then document its review of the treatment system and all actions taken to correct the exceedance in writing to the Engineer within 48 hours of receiving laboratory data documenting the exceedance.

If the discharge must be suspended due to an effluent violation, the Contractor shall only restart the discharge after obtaining all necessary approvals from the DEEP/POTW and in full compliance with the General Permit and any amendments imposed thereto.

No claim for delay, request for additional time, or request for additional design/redesign costs for the system will be considered based upon the Contractor’s failure to design/redesign a system to meet this performance specification.

2. On-Site Treatment System with Discharge to Surface Water

a. Contractor Submittals

At least 14 days prior to any submittal to the DEEP, the Contractor shall submit the treatment system design, which has been sealed by a Professional Engineer licensed in the State of Connecticut, to the Engineer for review and comment. Equipment shall prevent sediments and solids, as well as contaminants in excess of the permit allowable effluent concentrations, from discharging. This submittal shall include a schematic or diagram that shows all treatment system equipment, well point locations, pump set-ups in excavations, sedimentation control methods, system location, method of conveyance, flow rates, pipe sizes, valve locations, sampling ports, discharge locations, electrical power connection, etc.

The Contractor shall submit the manufacturer’s data sheets, assembly details and performance data on all treatment equipment. If dewatering equipment is to remain on site between October 15 and April 15, the Contractor shall include its method to prevent the treatment system equipment from freezing (heat tape, immersion heaters, etc.).

The Contractor shall detail its method to collect and contain water in its excavations. The Contractor shall also describe in detail its methods for limiting the quantity of water entering the excavation, including shoring, location of well points, limiting excavation size, preventing entry of surface water into the excavation, etc. The Contractor shall also include its assumptions and flow rate calculations related to the sizing of the system.

It is the Contractor's responsibility to design and properly size the system to accommodate the anticipated contaminants and dewatering rates based on its construction activities and permit requirements. The Contractor is alerted that construction activities may be limited based on permit restrictions.

No claim for delay or request for additional time will be considered based upon the Contractor's failure to accommodate the review process.

b. Permits

Groundwater generated by construction activities within a GW AOEC shall be appropriately treated and discharged to surface water within Project limits. Management and discharge of contaminated groundwater shall be accomplished in accordance with a DEEP General Permit. The Contractor shall be responsible for registering under the General Permit and all associated fees.

The DEEP General Permit for the Discharge of Groundwater Remediation Wastewater Directly to Surface Water is available at www.ct.gov/dep. The Contractor shall submit the most current permit registration form to the DEEP. A minimum lead-time of six (6) weeks can be expected to process and submit the registration. **No claim for delay or request for additional time will be considered based upon the Contractor's failure to accommodate the permitting process.** The Contractor shall not submit the permit registration to the DEEP prior to review of and comment on the treatment system by the Engineer.

The Contractor shall submit a copy of the DEEP permit certificate of registration to the Engineer prior to initiating any discharge.

All testing required by the General Permit shall be conducted by a laboratory certified by the Connecticut Department of Public Health (DPH) for the method specified in the permit. The Contractor shall submit copies of the analytical results to the all parties specified in the permit terms and conditions and to the Engineer.

No claim for delay or request for additional time will be considered based upon the Contractor's failure to design a system to meet this performance specification. It is the Contractor's responsibility to properly size the treatment system and temporary containment tanks based on its anticipated flow rates from construction activities and to determine the level of treatment required to meet permit discharge limits.

For sites where the receiving water body does not qualify the site for registration under the DEEP General Permit for the Discharge of Groundwater Remediation Wastewater Directly to Surface Water and the discharge is anticipated to continue for 30 days or less, the Contractor may qualify for a DEEP Temporary Authorization (TA) to discharge to surface water. The Contractor will be bound to the terms and conditions of the TA the same as if it were a permit. If the Contractor applies for, and receives, a TA from the

DEEP, all other requirements of this specification will apply, except that where the specification refers to a permit, the TA will be substituted.

c. Treatment System Operation

The Contractor shall ensure that all personnel involved in the groundwater treatment operations understand the terms of the General Permit. In the event of a conflict between the requirements of this Item and the permit, the more stringent will apply.

The Contractor shall not commence work activities within any GW AOEC until such time as:

- i. the temporary groundwater treatment system design is reviewed by the Engineer and comments are adequately addressed,
- ii. the system is installed in accordance with the accepted design and is completely operational, and
- iii. a copy of the Contractor's permit certificate of registration has been submitted to the Engineer.

The Contractor shall take all meter readings required by the permit and forward them to the appropriate parties.

The Contractor shall submit copies of the analytical results and discharge monitoring reports to the appropriate agency(ies) as required by the General Permit terms and conditions. The Contractor shall provide informational copies of all analytical results and discharge monitoring reports to the Engineer as they are generated. In the event of an exceedance, the Contractor shall immediately comply with the "***Duty to Correct, Record, and Report Violations***" section of the General Permit. The Contractor shall provide the Engineer a copy of the required DEEP reporting and then document its review of the treatment system and all actions taken to correct the exceedance in writing to the Engineer within 48 hours of receiving laboratory data documenting the exceedance.

If the discharge must be suspended due to an effluent violation, the Contractor shall only restart the discharge after obtaining all necessary approvals from the DEEP and in full compliance with the General Permit and any amendments imposed thereto.

No claim for delay, request for additional time, or request for additional design/redesign costs for the system will be considered based upon the Contractor's failure to design/redesign a system to meet this performance specification.

3. Off-Site Treatment and Disposal

At least 14 days prior to any work involving the dewatering of contaminated groundwater, the Contractor shall submit for the Engineer's review and comment its proposed system to collect and contain the contaminated groundwater. This submittal shall include schematics of proposed pump set-ups in excavations; sedimentation control measures; probable location of temporary containment tanks; schematics of proposed method to transfer liquids from temporary containment tanks to transport vehicles; schematic of proposed method to off-load liquids at the off-site permitted treatment/disposal facility; documentation that transport vehicles hold a "Waste Transportation Permit" for contaminated liquids per CGS 22a-454; and the name of the disposal facility from the following list of Department-approved and DEP-permitted treatment facilities for State-regulated liquid disposal:

Clean Harbors of CT
51 Broderick Rd.
Bristol, CT 06010
(860)224-7600

United Oil Recycling
Gracey Ave.
Meriden, CT 06450
(203)238-6754

Bridgeport United Recycling
50 Cross St.
Bridgeport, CT 06610
(203)238-6754

All testing required to meet facility acceptance parameters shall be conducted by the Contractor in the presence of the Engineer. The Contractor is hereby notified that laboratory turnaround time is expected to be fifteen (15) working days. The Contractor shall provide informational copies of the laboratory results to the Engineer. **No delay claim will be considered based upon the Contractor's failure to accommodate the laboratory turnaround time as identified above or to design its system with sufficient holding capacity to accommodate this requirement.**

The Contractor shall obtain and complete all paperwork necessary to arrange for disposal of the contaminated groundwater (such as disposal facility waste profile sheets). It is solely the Contractor's responsibility to coordinate the disposal with its selected facility. Upon receipt of the final approval from the facility, the Contractor shall arrange for the loading, transport and disposal in accordance with all Federal and State regulations. **No claim will be considered based on the failure of the Contractor's selected disposal facility(s) to meet the Contractor's production rate or for the Contractor's failure to select sufficient facilities to meet its production rate.**

The Contractor will be responsible for disposal of the entire shipment as the Hazardous Waste Generator for water that undergoes a change in waste classification due to the Contractor's work activities or processes (i.e. contaminated groundwater being classified characteristically hazardous for pH due to grouting operations).

Method of Measurement:

Within fourteen (14) calendar days after addressing the Engineer's comments on the proposed system(s) for Handling Contaminated Groundwater, the Contractor shall submit to the Engineer for approval a cost breakdown of its lump sum bid price. The submission must include substantiation showing that the cost breakdown submitted is reasonable based on the Contractor's lump sum bid. The cost breakdown shall be in accordance with the following payment schedule:

- a. The cost to prepare the design for proposed system(s) for Handling Contaminated Groundwater, including preparation and submittal of all permit registration applications, in accordance with these specifications. Design costs shall not exceed 10% of the total cost of the item.
- b. The procurement and installation cost for the proposed system(s) for Handling Contaminated Groundwater in accordance with these specifications. Procurement and installation costs shall not exceed 20% of the total cost of the item.
- c. Equipment decontamination and demobilization and restoration of site. Decontamination and demobilization costs shall not exceed 10% of the total cost of the item.
- d. The remaining costs for operation, monitoring, permit compliance, sampling and analysis, disposal costs, and maintenance of the proposed system(s), including cleaning of the temporary containment tanks of settled solids, transporting of solids to the WSA, and transportation of the contaminated dewatering wastewater to an off-site permitted treatment/disposal facility in accordance with these specifications shall be divided evenly throughout the duration of the project work involving contaminated groundwater at the discretion of the Engineer.

Increased costs directly related to the Contractor's operation (i.e. treatment or increased charges due to changes in pH or additional contaminants, treatment and disposal of excess water related to process or waste water, etc.) will not be paid under this item but will be considered a part of the Contractor's cost for the item under which the work is being performed.

Basis of Payment:

This work will be paid for at the Contract lump sum price for "Handling Contaminated Groundwater" which price shall include: all work and materials involved with handling contaminated groundwater from within GW AOECs and shall include all equipment, materials, tools and labor incidental to removal of the contaminated groundwater from the excavation; conveying contaminated groundwater from the dewatering point to the temporary containment tanks and groundwater treatment facility; treatment; conveying discharge of contaminated wastewater to a sanitary sewer, surface water or off-site disposal at a permitted treatment/disposal facility (including transportation); disposal or recycling of used treatment media (i.e. bag filters and spent carbon); permit applications; disposal and permit fees; POTW fees; electrical costs; sampling and documentation costs; laboratory costs; design and

monitoring; mobilization, operation, and maintenance of the system; site work; all required equipment decontamination; transportation of solids to the WSA; and equipment demobilization.

Sedimentation control associated with work under this Item will be paid under the appropriate items of the Contract.

Pay Item	Pay Unit
Handling Contaminated Groundwater	Lump Sum

ITEM #0216012A - CONTROLLED LOW STRENGTH MATERIAL

Description: Controlled Low Strength Material (CLSM) is a self consolidating, rigid setting material to be used in backfills, fills, structural fills and elsewhere as indicated on the plans, or as directed by the Engineer. The flow and set time characteristics of CLSM shall be designed to meet the specific job conditions. All CLSM material covered by this specification shall be designed to be hand excavatable at any time after placement. It shall be composed of a mixture of portland cement, aggregate, and water with the option of using fly ash, slag cement, air-entraining agents, and other approved admixtures.

Materials: All materials utilized in the CLSM mix design shall be in accordance with the applicable requirements of Article M.03.01

Composition: The composition of the CLSM shall be in accordance with the requirements set forth in Article M.03.01-General Composition of Concrete Mixes, as well as the applicable sections of ACI 229R. The Contractor shall submit each proposed mix design, with all supporting data, to the Engineer for review and approval at least two weeks prior to its use.

The setting time of CLSM materials shall be designed so as to achieve the strength necessary to comply with the time constraints called for under the Maintenance and Protection of Traffic requirements of the project specifications. The use of chloride accelerators is not permitted.

The minimum compressive strength of the CLSM material shall be 30 pounds per square inch (psi) and the maximum compressive strength of the CLSM shall be 150 pounds per square inch (psi) when tested in accordance with ASTM D4832 after 56 days.

The CLSM mix design shall utilize a nominal maximum size of No. 8 aggregate as specified in M.01.01.

CLSM mixes shall have a minimum of 20% entrained air when tested in accordance with AASHTO T152.

Construction Methods: CLSM shall only be placed when the ambient temperature is at least 32° F and rising. CLSM material shall be deposited within 2 hours of initial mixing.

CLSM may be placed by chutes, conveyors, buckets or pumps depending upon the application and accessibility of the site. Should voids or cavities remain after the placement of the CLSM, the Contractor shall modify the placement method or flow characteristics of the CLSM. Voids or cavities which have not been filled properly shall be corrected as directed by the Engineer and at the Contractor's expense.

Method of Measurement: This work will be measured for payment by the actual number of cubic yards of "Controlled Low Strength Material installed and accepted within the pay limits shown on the contract plans or as directed by the Engineer.

Basis of Payment: This work will be paid at the contract unit price per cubic yard “Controlled Low Strength Material,” which price shall include all materials, equipment, tools and labor incidental thereto.

ITEM #0406287A RUMBLE STRIPS – AUTOMATED

ITEM #0406288A RUMBLE STRIPS – MANUAL

Description:

Work under this item shall consist of installing rumble strips on asphalt highway shoulders where shown on the plans or where directed by the Engineer, and in conformance with these specifications.

Construction Methods:

The Contractor shall pre-mark the location of the edge of the cut, and the beginning and ending points of the sections, prior to the installation of the rumble strips. The Engineer shall review and approve the locations.

The Contractor shall arrange for a technical representative, from the company which produces the milling machine to be used on the project, who will be required to be on-site from the beginning of the operation in order to ensure results that meet the requirements of the plans and specifications until such time the Engineer is satisfied.

Rumble strips should not be installed on bridge decks, in acceleration and deceleration lanes, at drainage structures, at loop detector sawcut locations, or in other areas identified by the Engineer.

Automated (Wide Shoulders):

The equipment shall be able to install the rumble strips in sections where the shoulder width from the edge line to an obstruction is greater than or equal to 4 feet. Where there are no obstructions, the equipment shall be used in sections where the shoulder width from the edge line is a minimum of 3 feet. The equipment shall consist of a rotary type cutting head with a maximum outside diameter of 24" and shall be a minimum of 16" long. The cutting head(s) shall have the cutting tips arranged in such a pattern as to provide a relatively smooth cut (approximately 1/16 of an inch between peaks and valleys) in one pass. The cutting head shall be on its own independent suspension from that of the power unit to allow the tool to self align with the slope of the shoulder or any irregularities in the shoulder surface. The equipment shall include suitable provisions for the application of water to prevent dusting. The Contractor shall use a machine capable of creating the finished pattern at a minimum output of 60 rumble strips per minute.

Manual (Narrow Shoulders):

The equipment shall be able to install the rumble strips in sections where the shoulder width from the edge line to an obstruction is between 3 feet and 4 feet. The cutting head(s) shall have the cutting tips arranged in such a pattern as to provide a relatively smooth cut (approximately

1/16 of an inch between peaks and valleys) in one pass. The equipment shall include suitable provisions for the application of water to prevent dusting.

Finished Cut (Automated or Manual)

The rumble strips shall have finished dimensions of 7" (+/- 1/2") wide in the direction of travel and shall be a 16" (+/- 1/2") long measured perpendicular to the direction of travel. The depressions shall have a concave circular shape with a minimum 1/2" depth at center (maximum allowable depth is 5/8" measured to a valley). The rumble strips shall be placed in relation to the roadway according to the patterns shown in the plans or on the Rumble Strip Details. Alignment of the edge of the cut shall be checked and verified by the Engineer.

The cutting tool shall be equipped with guides to provide consistent alignment of each cut in relation to the roadway.

The Contractor shall pick up any waste material resulting from the operation in a manner acceptable to the Engineer. This waste material shall be disposed of in accordance with Subarticle 2.02.03-10(a).

The work area shall be returned to a debris-free state prior to re-opening to traffic.

The Contractor shall provide all traffic control according to the Maintenance and Protection of Traffic Specification included elsewhere in the contract.

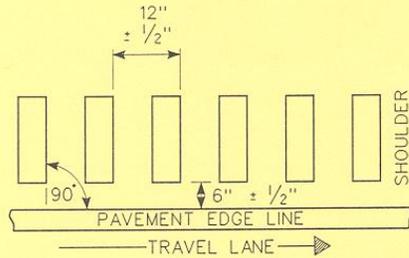
Method of Measurement:

This work will be measured for payment by the actual number of feet of shoulder where the rumble strips are placed and accepted. This distance shall be measured longitudinally along the edge of pavement with deductions for bridge decks, acceleration and deceleration lanes, drainage structures, loop detector sawcut locations, and other sections where the rumble strips were not installed.

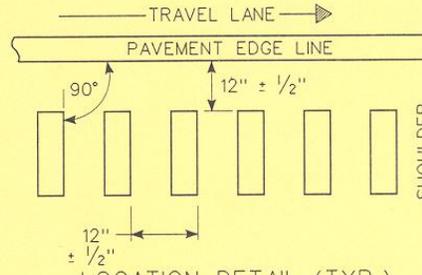
Basis of Payment:

This work will be paid for at the Contract unit price per foot for "Rumble Strips - Automated" or "Rumble Strips - Manual." The price shall include furnishing all equipment, tools, labor, a technical representative and work incidental thereto and also disposal of any waste material resulting from the operation. The Contractor will not be paid under the item "Rumble Strips - Manual" if the field conditions allow for the use of the "Rumble Strips - Automated" item, even if the manual method was used.

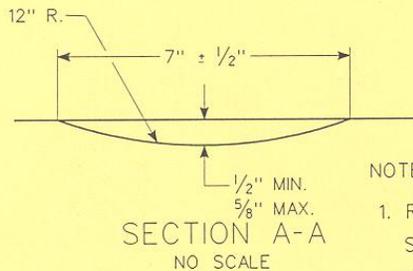
DETAILS AND SECTIONS OF RUMBLE STRIPS



LOCATION DETAIL (TYP.)
LEFT SHOULDER



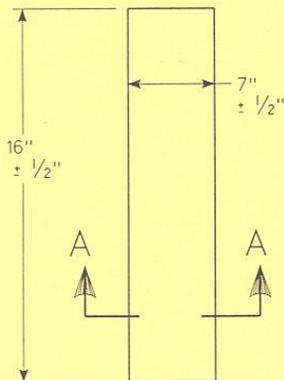
LOCATION DETAIL (TYP.)
RIGHT SHOULDER



SECTION A-A
NO SCALE

NOTES:

1. RUMBLE STRIP ALIGNMENT SHALL GENERALLY BE STRAIGHT AND OFFSET APPROXIMATELY 6" IN THE LEFT SHOULDER AND 12" IN THE RIGHT SHOULDER FROM THE OUTER EDGE OF THE EDGE LINE AND SHALL BE AT LEAST 12" FROM THE LONGITUDINAL JOINT IN COMPOSITE PAVEMENTS. THIS OFFSET MAY BE ADJUSTED TO ACCOMMODATE VARIATIONS IN THE EDGE LINE AND THE SHOULDER WIDTH.



PLAN DETAIL

FILE: RUMBLE.MDS

CONNECTICUT
DEPARTMENT OF TRANSPORTATION
BUR. OF ENGINEERING & HWY. OPERATIONS
DIVISION OF TRAFFIC ENGINEERING

RUMBLE STRIP DETAILS

ENGINEER *Erika B. Smith* DATE 10-18-99

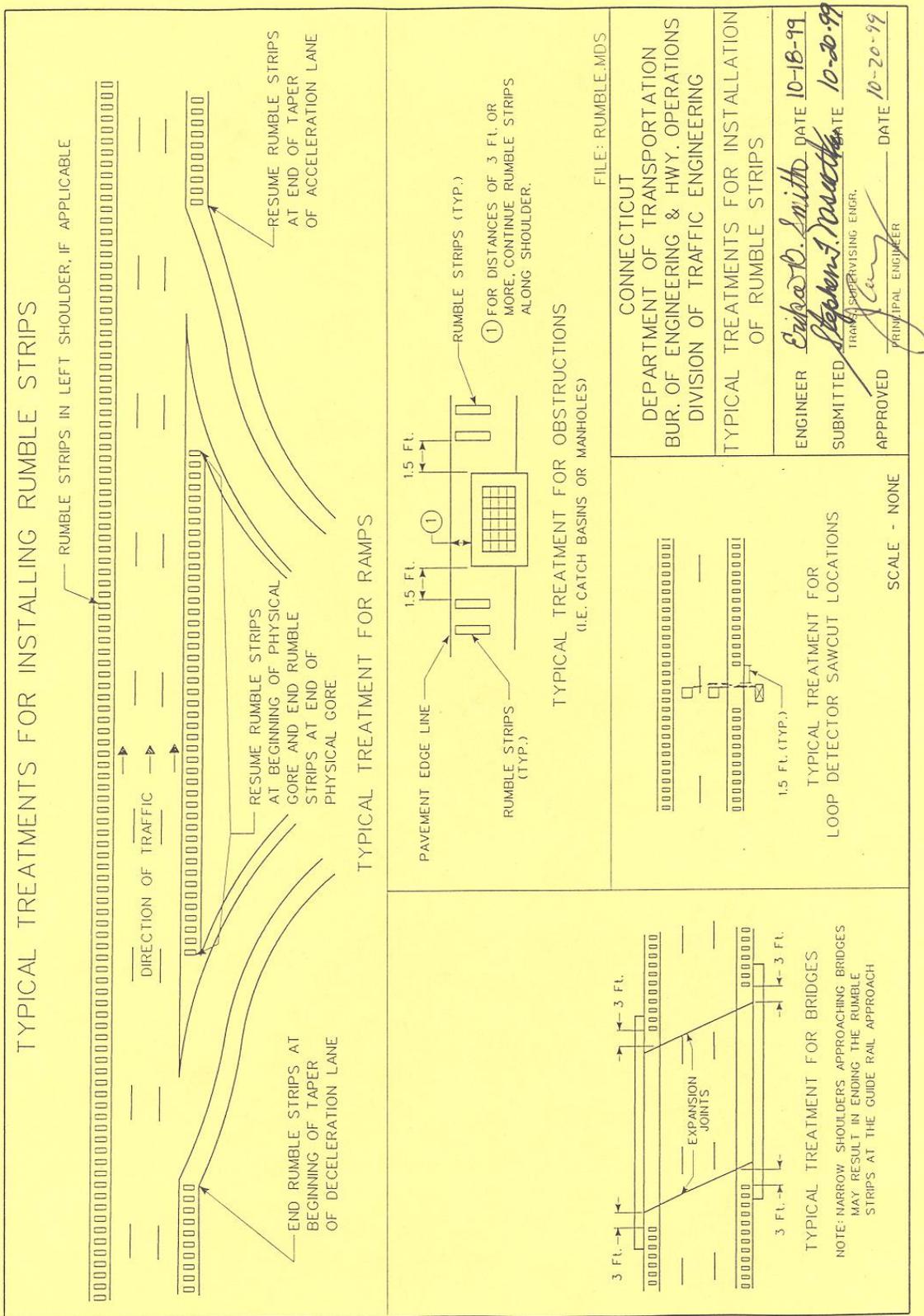
SUBMITTED *Stephen J. Maciatis* DATE 10-20-99
TRANS. SUPERVISING ENGR.

APPROVED *J. Long* DATE 10-20-99
PRINCIPAL ENGINEER

SCALE - NONE

ITEM # 0406287A

ITEM # 0406288A



ITEM #0406289A - REMOVAL OF RUMBLE STRIPS

Description:

Work under this item shall consist of removing rumble strips through milling and repaving the bituminous concrete where shown on the plans or where directed by the Engineer, and in conformance with these specifications.

Materials:

The materials for the bituminous concrete mixture, tack coat, sources of supply, formula for the mix, mix tolerances, approval of mix formula, and control of the mixture shall conform to the requirements of Section M.04. The class of Hot Mix Asphalt to be used is Class 2 or Superpave 0.375 inch mix for the respective design level.

Construction Methods:

The Contractor shall pre-mark the location of the beginning and ending points of the sections, prior to the removal of the rumble strips. The Engineer shall review and approve the limits of removal.

The Contractor shall remove the surface of the existing bituminous pavement between the approved limits to the width and depth indicated elsewhere in this specification or as directed by the Engineer. Precaution should be taken to avoid damage to the existing roadway materials that are to remain in place. If damage occurs, it must be repaired by the Contractor at no additional cost to the State. The methods employed in performing the work and all equipment, tools, machinery and plant used in handling material and executing any part of the work shall be subject to the approval of the Engineer before the work is started; and whenever found unsatisfactory, it shall be changed and improved as required by the Engineer.

The milling machine must include dust control equipment during the removal process.

The removal shall consist of milling the rumble strips for a width of 18 inches and a depth of 1-1/2 to 2 inches from the roadway surface and then resurfacing the milled area.

Tack coat shall be applied in accordance with Subarticle 4.06.03 – 8(a), prior to resurfacing.

The milled area shall be resurfaced with bituminous concrete in conformance with Article 4.06 of the Standard Specifications and any supplementals dated thereto.

The Contractor shall resurface the milled area prior to opening the roadway to traffic.

The Contractor shall pick up any waste material resulting from the operation in a manner acceptable to the Engineer. This waste material shall be disposed of in accordance with Subarticle 2.02.03-10(a).

Method of Measurement:

This work will be measured for payment by the actual number of linear feet of rumble strips removed. This distance shall be measured longitudinally along the edge of pavement with deductions for bridge decks, acceleration and deceleration lanes, drainage structures, loop detector sawcut locations, and other sections where the rumble strips were not previously installed.

Basis of Payment:

This work will be paid for at the Contract unit price per linear foot for "Removal of Rumble Strips." The price shall include the removal of the existing rumble strips, furnishing all materials (including tack coat), placement, and compaction of the HMA, equipment, tools, labor, and work incidental thereto and also disposal of any waste material resulting from the operation.

Pay item	Pay Unit
Removal of Rumble Strips	L.F.

ITEM #0406314A – 80 MIL (2 mm) PAVEMENT MARKING GROOVE 5” WIDE (130 mm)

ITEM #0406315A – 80 MIL (2 mm) PAVEMENT MARKING GROOVE 7” WIDE (180 mm)

ITEM #0406316A – 80 MIL (2 mm) PAVEMENT MARKING GROOVE 9” WIDE (230 mm)

ITEM #0406317A – 80 MIL (2 mm) PAVEMENT MARKING GROOVE 13” WIDE (330 mm)

Description:

Work under this item shall consist of grooving the pavement surface in a continuous or regularly spaced fashion for the placement of recessed pavement markings. Unless otherwise noted, the groove shall be 1 inch (25 mm) wider than the anticipated pavement marking. The groove for double-yellow centerline markings shall be 13 inches (330 mm) wide.

- Groove Width:** 5 inches (130 mm) wide for 4-inch (100 mm) markings
 7 inches (180 mm) wide for 6-inch (150 mm) markings
 9 inches (230 mm) wide for 8-inch (220 mm) markings
 13 inches (330 mm) wide for 12-inch (300 mm) markings and double yellow centerline
- Groove Depth:** 0.080 inches (2 mm) ± 0.010 inches (0.25 mm)

The groove shall not be installed continuously for intermittent pavement markings, but only where markings are to be applied.

The groove shall not be installed on bare concrete bridge decks, on metal bridge decks, on bridge joints, at drainage structures, at loop detector sawcut locations, or in other areas identified by the Engineer.

Equipment:

The grooving equipment shall be equipped with a free-floating, depth-controlled head which provides a consistent groove depth over irregular pavement surfaces. The grooving head shall only be equipped with diamond saw blades. Any ridges in the bottom of the groove shall have a maximum height of 0.015 inches (0.38 mm).

The grooving equipment shall be capable of installing a groove 6 inches (150 mm) away from any vertical or horizontal obstruction.

ITEM #0406314A
 ITEM #0406315A
 ITEM #0406316A
 ITEM #0406317A

Construction Methods:

The pavement marking groove shall be installed in accordance with the current ConnDOT pavement marking standard drawings.

The Contractor shall establish control points for measuring offsets and pre-marks along the entire distance of pavement being grooved. Prior to installation of the groove, the Contractor shall verify the equipment is capable of installing the correct width and spacing of the groove. The control points, pre-marks, and equipment will be reviewed by the Engineer prior to commencement of the work.

The groove will be considered defective if any edge of the groove varies more than 0.25 inch (6.35 mm) in a 10-foot length (3 m), or if the alignment of the groove visibly deviates from the normal alignment of the road.

Final Cleaning: The Contractor shall immediately collect all debris and dust resulting from the grooving operation by vacuuming the pavement groove and adjacent pavement surface. Collected debris and any waste material shall be properly disposed of by the Contractor.

The work area shall be returned to a debris-free state prior to re-opening to traffic.

Repair of Unacceptable Groove:

The Contractor shall repair any defective groove(s) to the satisfaction of the Engineer. All work in conjunction with this repair shall be performed at no additional cost to the State.

Pavement Marking Requirements:

The Contractor is required to install permanent epoxy resin pavement markings in the grooves before the lane or roadway is opened to live traffic. If the permanent pavement markings cannot be installed before the lane or roadway is opened to live traffic, temporary 0.005-inch (0.125 mm) hot-applied waterborne pavement markings without glass beads shall be installed before the lane or roadway is opened to live traffic at no additional cost to the State. Within 10 calendar days, permanent epoxy resin pavement markings shall be applied in the groove over the 0.005-inch (0.125 mm) hot-applied waterborne pavement markings.

Groove Depth Gauge:

The Contractor shall supply the Engineer with two accurate, easily readable gauges with which to verify groove depth for the duration of the project. The gauges shall be delivered no less than one week prior to the anticipated beginning of grooving operations. Gauges shall be accompanied by manufacturer's instructions for their use. The gauges will be returned to the Contractor at the conclusion of the project.

Method of Measurement:

This work will be measured for payment by the number of linear feet (meters) of groove installed in the pavement as ordered and accepted by the Engineer.

ITEM #0406314A
ITEM #0406315A
ITEM #0406316A
ITEM #0406317A

Basis of Payment:

This work will be paid for at the contract unit price per linear feet (meters) of “Pavement Marking Groove” installed in the pavement and accepted. This price shall include cleaning of the pavement, all materials, equipment, tools, depth gauges, and labor incidental thereto, and disposal of any waste material resulting from the operation.

<u>Pay Item</u>	<u>Pay Unit</u>
80 Mil (2 mm) Pavement Marking Groove 5” (130 mm) Wide	L.F. (m)
80 Mil (2 mm) Pavement Marking Groove 7” (180 mm) Wide	L.F. (m)
80 Mil (2 mm) Pavement Marking Groove 9” (230 mm) Wide	L.F. (m)
80 Mil (2 mm) Pavement Marking Groove 13” (330 mm) Wide	L.F. (m)

ITEM #0406314A
ITEM #0406315A
ITEM #0406316A
ITEM #0406317A

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: $HMA \times \frac{PG\%}{100} \times [(Period\ Price - Base\ Price)] = \$ \underline{\hspace{2cm}}$, 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.

ITEM #0601091A - SIMULATED STONE MASONRY

Description:

This item shall consist of furnishing and installing textured and colored formed concrete surfaces using simulated stone molds (form liners) and a color staining system designed to duplicate closely the appearance of natural stone as described herein of the type and size called for on the plans, including accessories and hardware and in accordance with these specifications. The architectural form liner simulated stone masonry shall be monolithically formed with the concrete substructure.

Materials:

1. Quality of Work: The process of form lining, texturing and color staining of the hardened concrete shall be performed in strict accordance with the manufacturer's written recommendations and as approved by the Engineer.
2. The design and pattern of form lined concrete surfaces shall follow the layout shown on the contract plans and the manufacturer's standard drawing. The completed concrete surface shall match the color and texture of the Referee Panel. The Referee Panel is available for inspection at the office of the Engineer. Final coloration of cast stone concrete surfaces shall accurately simulate the appearance of the architectural treatment on the noise barrier wall
3. Quality Assurance:
 - a. Manufacturer of Simulated Stone Molds and Custom Coloring Systems shall have five years experience making custom simulated stone molds and color stains to create formed concrete surfaces to match natural stone shapes, surface textures and colors.
 - b. Contractor/Subcontractor (installer) shall have five years experience pouring vertically formed architectural concrete. The installer shall be trained in the manufacturer's special techniques in order to achieve realistic surfaces.
 - c. Color Stain System Application shall be performed by the manufacturer or manufacturer's authorized representative. The stain shall be applied by an applicator that has experience with similar projects.
 - d. A Pre-installation Meeting shall be scheduled with the manufacturer's representative, installer, designer, and Department inspection personnel to assure understanding of simulated stone masonry use, color-staining application, requirements for construction of mockup, and to coordinate the work.
4. Protection: The contractor is solely responsible for construction methods, means, techniques, and for construction site safety precautions. The contractor shall conduct all construction

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operations in conformance with all applicable local, state and federal safety laws, rules, regulations and codes. All Material Safety Data Sheets (MSDS) shall be available for inspection.

5. Manufacturer: Subject to compliance with the design, referee panel and specification requirements, the contractor shall provide simulated stone masonry and color staining system as manufactured by Custom Rock International, Inc., St. Paul, Minnesota, or approved equivalent.
6. Materials:
 - a. Simulated Stone Molds (form liners) shall be made of reusable elastomeric form liners, made of high-strength urethane and cutable form liners, made of lower grade urethane, easily attachable to forms. Form-liners shall leave crisp, sharp definition of the architectural surface. Recurring textural configurations exhibited by repeating recognizable shadow patterns shall be prevented by proper casting of form-liner patterns. Form liners shall not compress more than ¼ inch when concrete is poured at a rate of ten vertical feet per hour. Form liners shall be removable without causing deterioration of surface or underlying concrete. No substitutions will be permitted.
 - b. The form liner shall conform to the pattern shown on the plans, and including texture and color staining system shall be as manufactured by Custom Rock International, St. Paul, Minnesota, as distributed by Connecticut Bomanite Systems, Inc., Bethel, Connecticut, or approved equivalent.
 - c. The form liner shall be designed to permit 180-degree rotation and interconnection with itself or another pattern liner of differing horizontal dimension. Maximum relief of pattern and the average relief shall be as shown on the contract plans. The simulated stone pattern shall vary in a random manner in the coursing parameters to prevent noticeable multiple duplicate pattern repetition and avoid stacked joints.
 - d. In addition to orthogonal surfaces, the form liner shall be capable of forming curved and/or battered surfaces, if shown on the plans, while maintaining the dimensioned coursing and plumb vertical joints without distortion.
7. Release Agent: The release agent shall be compatible with simulated stone masonry and with color staining system to be applied to surface, as recommended by the manufacturer.
8. Form Ties: Form ties shall be designed to separate at least one inch back from finished surface, leaving only a neat hole that can be plugged with compatible patching material.
9. Color Stain: The color stain shall be a penetrating stain mix as provided by the manufacturer, shall achieve color variations present in the natural stone being simulated for the project, as approved by the Engineer and in accordance Items 1 and 2 above. The stain shall create a

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surface finish that is breathable (allowing water vapor transmission), and that resists deterioration from water, acid, alkali, fungi, sunlight or weathering. The stain mix shall be a water borne, low V.O.C. material, less than 180 grams/liter, and shall meet requirements for weathering resistance of 2000 hours accelerated exposure measured by weather-o-meter in accordance with ASTM G23 with 3-bulb. Scrub test 1000 revolutions. Abrasive resistance (Tabor-CF-10) 500 cycles. Adhesion ASTM D3359 1.OOMM cross cuts on glass pass 3 or higher on a scale of 1 to 5. The contractor shall supply information pertaining to chemical resistance in accordance with ASTM D1308.

Construction Methods:

1. Shop Drawings and Submittals: Before fabricating any materials, the contractor shall submit shop drawings, product data sheets, samples and mock-ups to the Engineer for approval in accordance with Article 1.05.02 for the materials listed in Item 3 below. These drawings and submittals shall include, but not be limited to, the following information: manufacturer's name, listing of product compliance with referenced specification standards, complete details of the assemblies, material designations, and nominal hardness of appropriate materials, design loads, quantities and locations. The Engineer's drawings shall not be reproduced, traced or used for shop drawings or erection purposes.
2. Field Measurements: Prior to ordering or fabricating any materials, the contractor shall take complete and accurate field measurements.
3. Submittals:
 - a. Catalog cuts, manufacturer's literature, and technical data for the materials specified herein, including but not limited to simulated stone mold pattern, form liner, release agent, concrete patching material and color charts for staining of hardened concrete.
 - b. Photographs: Color photographs of three (3) similar past projects of the manufacturer. Include project names, locations and a telephone number of the previous projects Owner's representatives.
 - c. Samples: Form ties, sample and description, showing method of separation when forms are removed.
 - d. Plan, elevation and details to show overall pattern, joint locations, form tie locations, and end, edge and other special conditions.
 - f. Form Lined and Color Stained Concrete Mockup: The mock-up shall be build on site at least four weeks before cast-in-place concrete work to be textured and colored starts, using same materials, methods and work force that will be used for the Project. Location on site for construction of mockup shall be as approved by Engineer. Concrete shall be placed in the mockup, texture constructed and construction

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procedure adjusted until a final texture and color is produced that complies with the color and texture of the Referee Panel.

1. Size: 50 ft² or larger if needed to adequately illustrate the pattern and texture selected.
 2. Include an area to demonstrate simulated stone masonry butt joint, corner and, if appropriate continuation of pattern through expansion joint.
 3. If design includes stone texture across top of wall, include in mockup.
 4. After concrete has cured sufficiently, the contractor shall prepare the surface for color staining. After the Engineer has approved the prepared surface of the cast simulated stone masonry for color staining, the work of form lined cast-in-place concrete may proceed, except that color staining is not yet authorized.
 5. After concrete work on mockup is completed and cured, and after surface is determined by the Engineer to be acceptable for forming and pouring, the contractor shall proceed with mockup as quality standard.
 6. After a 30-day cure of the mockup and the date of last pour of architectural concrete the sample is to be stained. After coloring is determined to be acceptable by the Engineer, construction of the remaining work under this specification section may proceed, using mockup as quality standard.
 7. The contractor shall remove mockup as directed by the Engineer.
4. Scheduling: The contractor shall schedule color-staining application after adjacent earthwork is completed, to avoid contaminating or damaging the surface. Place topsoil and establish turf after staining application is completed. The contractor shall coordinate the work to prevent interference with other trades.
5. Installation:
1. Install liners and apply release agent.
 2. Install concrete as specified elsewhere in the Specifications.
 3. Remove form liners and cure concrete.
 4. Patching, grinding and bush hammering of form liner seams as required.
 5. Provide scaffolding and heat as required and clean water for power washing of the hardened concrete prior to the staining process.
 6. Power washing and patching of form liners.
 7. Power wash wall in preparation for staining.
 8. Apply the color staining process.

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6. Liner to Form Attachment System: The form liners shall be securely attached to forms with wood or sheet metal screws; threaded inserts added to the back of the form liner for bolts to fasten the form liner through the forms, or; bolted through the face of the form liner with flat head bolts inserted in a pattern joint and through the form liner and forming system. Construction adhesives may be used, but not on reusable forms. Place adjacent form liners with less than 6-mm separation between form liners.
7. Release of Form Liners From Hardened Concrete: Only manufacturer recommended form release agents (Lark V or Orna Con) shall be utilized and shall be applied to the form liners before the concrete is poured. Release agents shall be applied in strict accordance with release agent manufacturer recommendations. Hand-charged sprayers will only be allowed if a thin uniform coating of release agent is obtained on the form liner.
8. The form liner shall be removed from the wall within 24 hours of pouring the concrete. The form liners may be detached from the forms and then removed from the concrete, or they may remain attached to the forms and the entire forming system removed from the concrete. Remove the form liners from the top, down. Curing of concrete may be accomplished with form liners and forms placed back against the wall after the initial detachment. Curing shall be performed in accordance with Article 6.01.03-19. Curing compounds shall not be used.
9. Care and Cleaning of Form Liner: Form liners shall be cleaned the same day they are removed from the wall with a power wash and mild detergent. Synthetic brushes with stiff bristles may be used on stubborn areas. Mild acid washes may also be used. Solvents shall not be used. If necessary, patching of holes shall be performed with 100% clear silicone caulk. Form liners shall be stored inside or under a protective, non-transparent cover, in a vertical, upside-down position.
10. Wall Patching and Preparation: After form liners are removed from the hardened concrete, the textured uncolored surface shall be prepared for color staining. All holes larger than 20 mm in greatest principal dimension shall be filled with concrete patching material such as Tamms Speed-crete or equal mixed with latex or acrylic bonder, as approved by the manufacturer and Engineer. All honeycombed areas shall be filled and textured to match surrounding areas. Seam lines and other unnatural protrusions shall be ground down to match adjacent areas with a hand-held power grinder using discs made for concrete. Grinding of seams shall be performed immediately after removal of the form liners. Perform final bush hammering to blend defects and ground areas into the final rock texture. In particular, the process of wall patching and preparation shall be subject to approval of the manufacturer and Engineer.
11. Color Staining: The hardened concrete shall be a minimum of 30 days old before color staining is applied. Power-wash the wall to free it from laitance, dirt, oil and other objectionable materials. After the wall has dried, the color staining process is applied using colors approved by the Engineer. Color staining shall be applied in such a way that the stones shall have individual colorations from one to the other. Water-based stains shall be used in air temperatures between 10 °C and 38 °C. Solvent-based stains shall be used in air

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temperatures of 10 °C and below, but in no case when the temperature of the hardened concrete is below 4 °C and falling. During color staining operations the contractor shall protect property, pedestrians, vehicular and other traffic upon, underneath or in the vicinity of the bridge and also portions of the bridge superstructure and substructure against damage or disfigurement from errant stain materials. The contractor shall comply with all environmental regulations regarding surface cleaning, stain application, ground and watercourse protection and disposal protection of waste materials. For additional information, refer to Section 1.10.

12. Simulated Stone Mold Preparation: The contractor shall clean and make free of buildup the form liners prior to each pour. He shall inspect for blemishes and tears and repair them if needed following manufacturer's recommendations.

Method of Measurement:

This work shall be measured for payment by the actual number of square yards of the face area of accepted Simulated Stone Masonry completed within the neat lines as shown on the plans, or as ordered by the Engineer.

Basis of Payment:

This Work will be paid for at the contract unit price per square yard for “Simulated Stone Masonry”, complete in place, which price shall include all equipment, form-work molds, tools and labor incidental thereto.

This work shall also include the cost of furnishing and applying the color staining system to the simulated stone masonry surface.

Pay Item	Pay Unit
SIMULATED STONE MASONRY	S.Y.

ITEM #0601445A - EMBANKMENT WALL (SITE NO. 1)

Description: This item will consist of designing, furnishing and constructing an embankment retaining wall in the location, grades, and to the dimensions and details shown on the contract drawings, and in accordance with these specifications.

Retaining Wall Selection: The Contractor shall select the proprietary embankment retaining wall from the Department's current approved list shown below. The Engineer will reject any proposed retaining wall that is not listed below.

The following is a list of the proprietary embankment retaining walls for this project:

1. VERSA-LOK Retaining Wall
VERSA-LOK of New England
P.O. Box 6002
Nashua, NH 03063
(603) 883-3042

3. KeySystem I Retaining Wall
Keystone Retaining Wall Systems
13453 County Road 1
Fairhope, AL 36532
(251) 990-5761

2. MESA Retaining Wall System
TENSAR Earth Technology, Inc.
227 Ritter Road
Sewickley, PA 15143
(412) 749-9190

4. Pyramid Modular Blockwall
The Reinforced Earth Company
133 Park Street
North Reading, MA 01864
(978) 664-2830

5. Redi-Rock Retaining Wall-
Cobblestone Face Mold
Redi-Rock Walls-CT Division
68A South Canal Street
Plainville, CT 06062
(860) 793-6805

No other proprietary retaining walls will be allowed for this project.

This listing does not warrant that the individual walls can be designed to meet either the dimensional, structural, or geotechnical constraints at each site.

Design:

1 - Design Computations: It is the Contractor's responsibility for the design, detailing and additional construction specifications required to construct the wall. The actual designer of the retaining wall shall be a qualified Professional Engineer licensed in the State of Connecticut.

2 - Designer's Liability Insurance: The Designer shall secure and maintain at no direct cost to the State, a Professional Liability Insurance Policy for errors and omissions in the minimum amount of Five Hundred Thousand Dollars (\$500,000). The designer may, at his election, obtain a policy containing a maximum One Hundred Twenty Five Thousand Dollars (\$125,000) deductible clause, but if he should obtain a policy containing such a clause, the designer shall be liable to the extent of the deductible amount. The Designer shall obtain the appropriate and proper endorsement to its Professional Liability Policy to cover the indemnification clause in this contract as the same relates to negligent acts, errors or omissions in the work performed by the Designer. The Designer shall continue this liability insurance coverage for a period of three years from the date of the acceptance of the work by the agency head as evidenced by a certificate of acceptance issued to the contractor or for three years after the termination of the contract, whichever is earlier, subject to the continued commercial availability of such insurance.

The designer shall supply the certificate of this insurance to the Engineer prior to the start of construction of the wall. The designer's insurance company shall be licensed in the State of Connecticut.

3 - Preliminary Submissions: Prior to the start of fabrication or construction, the Contractor shall submit to the Engineer a design package, which shall include, but not be limited to the following:

a. Detailed Plans:

- Plan sheets shall be approximately 24" x 36"
- Stamped by a licensed Professional Engineer (Connecticut).
- Full plan view of the wall drawn to scale. The plan view must reflect the horizontal alignment and offset from the horizontal control line to the face of the wall. Beginning and ending stations, all utilities, signs, lights, etc. that affect the construction along with all property lines and easement lines adjacent to the wall shall be shown.
- Full elevation view of the wall drawn to scale. Elevation views should indicate the elevation at the top and bottom of walls, horizontal and vertical break points, and the location of finished grade.
- Typical cross sections drawn to scale including all appurtenances. Detailed cross section should be provided at significant reinforcement transitions such as wall ends.

- Details of all wall components and their connections such as the length, size and type of soil reinforcement and where any changes occur; facing details; connections; etc.
 - Certified test reports indicating the connection strength versus normal load relationship for the block-soil reinforcement connection to be used.
 - Drainage details for embankment backfill including attachment to outlets shown on contract drawings.
 - Details of any roadway drainage pipe projecting through the wall, or any attachments to the wall. Details of the treatment of drainage swales or ditches shown on the contract drawings.
 - Design parameters used along with AASHTO references.
 - Material designations for all materials to be used.
 - Detailed construction methods including a quality control plan. Construction quality control plans should include monitoring and testing frequencies (e.g, for setting batter and maintaining horizontal and vertical control). Construction restraints should also be listed in the details. Specific requirements for construction around obstructions should be included.
 - Details of installation of protective fencing where required.
 - Details of Architectural Treatment where required.
 - Details of Temporary Earth Retaining System(s) where required.
 - Details of wall treatment where the wall abuts other structures.
 - Treatment at underground utilities where required.
- b. Design Computations:
- Stamped by a licensed Professional Engineer (Connecticut).
 - Computations shall clearly refer to the applicable AASHTO provisions as stated in the Notes on the Contract Drawings.
 - Documentation of computer programs including all design parameters.

c. Construction Specifications:

- Construction methods specific to the proprietary retaining wall chosen. These specifications should include construction limitations including vertical clearance, right-of-way limits, etc. Submittal requirements for materials such as certification, quality, and acceptance/rejection criteria should be included. Details on connection of modular units and connection of reinforcements such that assurance of uniform stress transfer should be included.
- Any requirements not stated herein.

The submissions for proprietary retaining walls shall be treated as working drawings according to Section 1.05 amended as follows:

a. Six sets of each submission shall be supplied to the State

b. The Contractor shall allow 21 days for the review of each submission. If subsequent submissions are required as a result of the review process, 21 days shall be allowed for review of these submissions. No extensions in contract time will be allowed for the review of these submissions.

4 - Final Submissions: Once a proprietary retaining wall design has been reviewed and accepted by the Department, the Contractor shall submit the final plans. The final submission shall include one set of full size (approximately 24" x 36") mylar sheets and five sets of full size blue line copies.

The final submission shall be made within 14 days of acceptance by the State. No work shall be performed on the retaining wall until the final submission has been received by the Department.

Acceptance of the final design shall not relieve the Contractor of his responsibility under the contract for the successful completion of the work.

The actual designer of the proprietary retaining wall is responsible for the review of any shop drawings prepared for the fabrication of the wall. One set of full size blue line copies of all approved shop drawings shall be submitted to the Department's permanent records.

5 - General Design Requirements:

a. All designs for proprietary walls and temporary earth retaining systems shall conform to the latest edition of the American Association of State Highway and Transportation Officials (AASHTO) Standard Specifications for Highway Bridges and later interims published except as noted otherwise herein:

b. The wall design shall follow the general dimensions of the wall envelope shown in the contract plans.

c. The top of the concrete leveling pad shall be located at or below the theoretical leveling pad elevation. The minimum wall embedment shall be two feet as measured to the top of the leveling pad or as shown on the plans.

d. If footing steps are required, they shall be kept below the minimum embedment depth. Footing steps in addition to those shown on the plans will be permitted at no additional cost to the State.

e. The wall shall be designed to be within all property lines and easement lines shown on the contract drawings. If additional work areas are necessary for the construction of the proprietary retaining wall, the Contractor shall be responsible for obtaining the rights from the affected property owners. Copies of these rights shall be forwarded to the Department.

f. The top of the wall shall be at or above the top of the wall elevations shown on the plans. The top of the wall may be level or sloped to meet the top of the wall line noted.

g. Cast-in-place concrete will not be an acceptable replacement for areas noted by the wall envelope, except for minor grouting of pipe penetrations.

h. The mechanical wall height for the purposes of design calculations shall be from the top of the leveling pad to the top of the potential failure surface where the failure surface intercepts the ground surface.

i. The minimum length of internal soil reinforcement shall be as specified in AASHTO 5.8.1, except for the minimum eight (8.0') foot length requirement.

i. If there are specific surcharges acting on the wall, they shall also be accounted for. The minimum equivalent fluid pressure used to design the wall shall be 33 lbs./ft² per linear foot of wall.

j. The maximum allowable bearing capacity of the soil shall be assumed to be 4 ksf unless otherwise shown on the plans. If additional soils information is required by the designer, it must be obtained by the Contractor and will not be reimbursed by the State.

k. For limit state allowable stress computations of extensible reinforcements, the combined factor of safety for construction damage and environmental/aging effects shall not be less than 1.75.

Materials: Materials shall conform to the following requirements and those not listed below shall be as prescribed within the Standard Specifications for Roads, Bridges and Incidental Construction, including supplemental specifications and applicable special provisions.

1 – Facing Block: The facing block can be precast or drycast concrete and shall be the color specified on the plans. The block shall meet the following requirements:

a. Drycast Concrete:

- i. The minimum compressive strength of the block shall be 4000 psi measured at 28 days.
- ii. The maximum water absorption shall be less than five percent.

The Contractor shall submit to the Engineer a certified test report confirming the compressive strength and water absorption conform to the requirements of ASTM C-140.

b. Precast Concrete: Shall conform to the requirements of Section M.03 and as follows:

- i. The minimum compressive strength of the block shall be 4000 psi measured at 28 days.
- ii. All precast concrete components shall be air-entrained composed of portland cement, fine and coarse aggregates, admixtures and water. The air-entraining feature may be obtained by the use of either air-entraining portland cement or an approved air-entraining admixture. The entrained-air content shall be not less than four percent or more than seven percent.

2 - Geosynthetic Soil Reinforcement: The minimum strength of the geosynthetic soil reinforcement shall be based on experimental data. The Contractor shall submit to the Engineer a certified test report confirming the strength of the material when tested according to the methods specified in ASTM D5262 and extrapolated according to ASTM D2837 as outlined in AASHTO Article 5.8.7.2.

3 – Metallic Soil Reinforcement: All soil reinforcement and structural connectors shall be hot dipped galvanized according to the requirements of ASTM A123 (AASHTO M-111). The minimum thickness of the galvanizing shall be based on the service life requirements in the AASHTO Specifications.

Steel strip reinforcement shall be hot rolled to the required shape and dimensions. The steel shall conform to AASHTO M223 (ASTM A572) Grade 65 unless otherwise specified.

Welded wire fabric reinforcement shall be shop fabricated from cold-drawn wire of the sizes and spacings shown on the plans. The wire shall conform to the requirements of ASTM A82, fabricated fabric shall conform to the requirements of ASTM A185.

4 - Metal Connectors: All metal hardware shall be hot dipped galvanized according to the requirements of ASTM A123 (AASHTO M-111). The minimum thickness of the galvanizing shall be based on the service life requirements in the AASHTO Specifications.

5 - Backfill Material: The material for backfill shall be Pervious Structure Backfill conforming to the requirements of Articles M.02.05 and M.02.06.

6 - Facing Sealer: The face of all exposed drycast block shall be coated with clear Penetrating Sealer Protective Compound conforming to the requirements of Article M.03.01-11.

Construction Methods: All construction methods for items not listed below shall be in accordance with the detailed requirements prescribed for the construction of the several contract items entering into the completed structure as specified in the Standard Specifications for Roads, Bridges, and Incidental Construction.

1 - Installation: The foundation for the structure shall be graded level for a width equal to or exceeding the length of the soil reinforcements, or as shown on the plans. If rock is encountered in the excavation, it shall be removed to provide a level area equal to or exceeding the length of the soil reinforcements, but not greater than the pay limits shown on the plans.

Prior to wall construction, the foundation, if not in rock, shall be compacted as directed by the Engineer. Any foundation soils found to be unsuitable shall be removed and replaced.

At each foundation level, an unreinforced concrete leveling pad shall be provided as shown on the plans. The leveling pad shall have nominal dimensions of 6 inch thickness and 24 inch width, and shall be cast using minimum 2,000 psi 28-day compressive strength concrete. The leveling pad shall be cast to the design elevations as shown on the plans. Allowable elevation tolerances are +0.01 foot (1/8 inch), and -0.02 foot (1/4 inch), from the design elevation.

The materials for the wall shall be handled carefully and installed in accordance with manufacturer's recommendations and specifications. Special care shall be taken in setting the bottom course of blocks to true line and grade.

All blocks above the first course shall interlock with the lower courses by means of connecting pins. Vertical joints shall be staggered with each successive course as shown on the working drawings. Vertical tolerances and horizontal alignment tolerances measured from the face line shown on the plans shall not exceed 1/2 inch when measured along a 8-foot straightedge. The overall tolerance of the wall from top to bottom shall not exceed 1/2 inch per eight feet of wall height or one inch total, whichever is the lesser, measured from the face line shown on the plans. A bond breaker shall be placed between the blocks and any adjacent cast-in-place concrete.

2 - Backfilling: Backfill placement shall closely follow erection of each course of panels. Backfill shall be placed in such a manner as to avoid any damage or disturbance to the wall

materials or misalignment of the facing panels. Any wall materials which become damaged or disturbed during backfill placement shall be either removed and replaced at the Contractor's expense or corrected, as directed by the Engineer. Any backfill material placed within the reinforced soil mass which does not meet the requirements of this specification shall be corrected or removed and replaced at the Contractor's expense.

Backfill shall be compacted to 95 percent of the maximum density as determined by AASHTO T-99, Method C or D (with oversize correction, as outlined in Note 7).

The moisture content of the backfill material prior to and during compaction shall be uniform throughout each layer. Backfill material shall have a placement moisture content less than or equal to the optimum moisture content. Backfill material with a placement moisture content in excess of the optimum moisture content shall be removed and reworked until the moisture content is uniform and acceptable throughout the entire lift. The optimum moisture content shall be determined in accordance with AASHTO T-99, Method C or D (with oversize correction, as outlined in Note 7).

If 30 percent or more of the backfill material is greater than 19 mm in size, AASHTO T-99 is not applicable. For such a material, the acceptance criterion for control of compaction shall be either a minimum of 70 percent of the relative density of the material as determined by a method specification provided by the wall supplier, based on a test compaction section, which defines the type of equipment, lift thickness, number of passes of the specified equipment, and placement moisture content.

The maximum lift thickness after compaction shall not exceed 10 inches, regardless of the vertical spacing between layers of soil reinforcements. The Contractor shall decrease this lift thickness, if necessary, to obtain the specified density. Prior to placement of the soil reinforcements, the backfill elevation at the face shall be level with the connection after compaction. From a point approximately three feet behind the back face of the panels to the free end of the soil reinforcements the backfill shall be two inches above the attachment device elevation unless otherwise shown on the plans.

Compaction within three feet of the back face of the panels shall be achieved by at least three passes of a lightweight mechanical tamper, roller or vibratory system. The specified lift thickness shall be adjusted as warranted by the type of compaction equipment actually used. Care shall be exercised in the compaction process to avoid misalignment of the panels or damage to the attachment devices. Heavy compaction equipment shall not be used to compact backfill within three feet of the wall face.

At the end of each day's operation, the Contractor shall slope the last level of backfill away from the wall facing to direct runoff of rainwater away from the wall face. The Contractor shall control and divert runoff at the ends of the wall such that erosion or washout of the wall section does not occur. In addition, the Contractor shall not allow surface runoff from adjacent areas to enter the wall construction site.

3 - Face Sealer: After the wall has been erected, the entire exposed face of the wall shall be coated with Penetrating Sealer Protective Compound. The application of the sealer shall conform to the requirements Article 8.18.03.

Several samples of the dry cast block shall be sealed prior to sealing the actual wall to ensure that the sealer will not discolor the block. If the sealer does discolor the block, the Contractor shall change to another approved supplier of sealer.

Method of Measurement: This work will be paid for on a lump sum basis and will not be measured for payment.

Basis of Payment: This work will be paid for at the contract lump sum for "EMBANKMENT WALL (SITE NO.)", complete in place, which price shall include all work shown within the pay limits shown on the plans for the retaining wall including but not limited to the following:

1. Design, detailing, and specifications for the wall.
2. Excavation for the wall
3. Design and Construction of temporary earth retaining systems for the support of the slope during construction.
4. Construction of the Embankment Wall, including the unreinforced concrete leveling pad.
5. The furnishing, placing and compacting of pervious structure backfill within the maximum payment lines.
6. The furnishing and placing of backfill drainage systems for the wall.
7. Any other work and materials shown on the plans for the construction of the wall.

The price shall also include all materials, equipment, tools and labor incidental thereto.

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

If bedrock or large boulders (greater than one cubic yard) are encountered in the excavation, the payment for its removal will be made under the item "Structure Excavation - Rock".

ITEM #0603802A – STRUCTURAL STEEL – SIGN SUPPORTS

Description:

Work under this item shall consist of designing, fabricating, furnishing and installing the structural steel sign supports and hinge plate assembly at the location shown on the plans or as directed by the Engineer. The Breakaway Sign Support Sheets contained within the plan set for this project may be used as a conceptual base for the final design. The Contractor is to submit a final design of the sign supports and their foundations signed and sealed by a Professional Engineer registered in Connecticut.

Materials:

Sign Posts: Steel for sign posts shall conform to the requirements of ASTM A709, Grade 36, and shall be hot dip galvanized after fabrication in accordance with ASTM A123. The post shall be permanently labeled with the post size on the web at the bottom of the lower post.

Hinge Plates: Hinge plates shall be made from alloy steel conforming to AISI 4130 or an equivalent material and shall be galvanized after fabrication in accordance with ASTM A123. The hinge plate shall have a minimum tensile yield strength of 90,000 psi and minimum tensile ultimate strength as follows:

HI-1	7,100 lbs
HI-2	11,300 lbs
HI-3	17,000 lbs

Construction Methods:

The design and fabrication of the structural steel sign supports shall conform to the requirements of AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals – 2001, including the latest interim specifications. The Breakaway Sign Support Detail Sheets included in the contract plans are to be used for bidding purposes only.

Before fabrication, the Contractor shall submit design drawings for approval, in accordance with Subarticle 1.05.02-3.

Design drawings for all sign supports and hinge plates shall be stamped by a Professional Engineer licensed in the State of Connecticut. Each sheet of the design drawings shall be stamped.

No fabrication is to commence on the sign supports until the design drawings are approved by the Engineer. The Contractor shall provide a Materials Certificate to certify that the material and components conform to those shown on the plans and specifications.

Design Computations: With the submission of design drawings, the Contractor shall also submit to the Engineer for review four sets of complete design computations for the sign supports. These computations shall be stamped by a Professional engineer licensed in Connecticut.

The posts shall be securely bolted to their bases and shall be vertical after application of dead load.

The Contractor shall be responsible for all measurements and the final fit of all members.

Method of Measurement:

This will be measured for payment by the hundred weight of the structural steel sign supports and hinge plate assembly, completely installed and accepted. Each structural steel sign support shall have one (1) foundation unit per structural steel post.

Basis of Payment:

This work will be paid for at the contract unit price per hundred weight for "Structural Steel – Sign Supports" complete in place, which price shall include designing, fabricating, furnishing, and erecting the structural steel sign supports and hinge plate assembly, and all materials, equipment, labor, tools and work incidental thereto.

Pay Item	Pay Unit
Structural Steel - Sign Supports	CWT

ITEM #0702048A - OBSTRUCTIONS

**ITEM #0702062A - FURNISHING DRILLED SHAFT DRILLING
EQUIPMENT**

ITEM #0702071A - DRILLED SHAFT (2.5 FT)

ITEM #0702072A - DRILLED SHAFT ROCK EXCAVATION (2.5 FT)

ITEM #0702073A - DRILLED SHAFT EARTH EXCAVATION (2.5 FT)

ITEM #0702774A - ACCESS TUBES

**ITEM #0702078A - DRILLED SHAFT ROCK EXCAVATION (3'
DIAMETER)**

ITEM #0702088A - TRIAL DRILLED SHAFT (2.5' DIAMETER)

ITEM #0702089A - TRIAL DRILLED SHAFT (3.0' DIAMETER)

ITEM #0702090A - DRILLED SHAFT (3.0' DIAMETER)

**ITEM #0702091A - DRILLED SHAFT EARTH EXCAVATION (3.0'
DIAMETER)**

Description: This work shall consist of all labor, materials, equipment and services necessary to perform all operations to complete the drilled shaft installation in accordance with this specification, the special provisions and with the details and dimensions shown on the plans. Drilled shafts shall consist of reinforced or unreinforced concrete.

Related work that may be specified elsewhere:

Integrity Testing – Cross Hole

Materials: Materials for Drilled Shafts shall consist of the following:

1-Portland Cement Concrete: Concrete used in the construction of the shaft shall conform to the plans, Article M.03.01 of the Standard Specifications, and as follows:

- (a) The concrete shall have a minimum initial slump of 8 inches.
- (b) The concrete mix shall maintain a slump of 4 inches or greater for a minimum 3 hours beyond the expected time for placement of concrete and removal of temporary casing (if used), as demonstrated by trial mix and slump loss tests. The trial mix and slump loss tests shall be conducted using concrete and maximum temperatures appropriate for site conditions.
- (c) Admixtures such as water reducers, plasticizers, and retarders shall not be used in the concrete mix unless permitted in the contract documents or by the Engineer. All admixtures, when approved for use, shall be adjusted for the conditions encountered on the job so as to

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conform to the slump loss requirements within this specification and not to adversely affect the timing of, taking of and/or interpretation of any Nondestructive Testing that may be called out for in the contract.

- (d) Coarse aggregate shall conform to Article M.01.01 of the Standard Specifications, No. 8 Gradation.

2-Reinforcing Steel: Reinforcing steel used in construction of the shaft shall conform to the plans and Article M.06.01 of the Standard Specifications.

3- Access Tubes: Access tubes for crosshole acoustic logging shall consist of Schedule 40 steel pipe conforming to ASTM A 53, Grade A or B, Type E, F, or S. The inside diameter shall be at least 1.5 inches. All access tubes shall have a round, regular inside surface free of defects and obstructions, including all pipe joints, in order to permit the free, unobstructed passage of probes to the bottoms of the tubes. The access tubes shall be watertight, free from corrosion and free of deleterious material on the outside that can prevent bonding with the concrete. All access tubes shall be fitted with watertight caps on the bottom and top.

4-Grout: Grout used for filling Access Tubes shall conform to the requirements of Article M.03.01-12 of the Standard Specifications. The grout shall have strength properties equivalent to or better than those of the drilled shaft concrete.

5-Temporary Casing: Casing shall conform to Article M.06.02 of the Standard Specifications. Casings shall be steel, smooth, clean, watertight, and of ample strength to withstand both handling and installation and the pressure of both concrete and the surrounding earth materials. The outside diameter of casing shall not be less than the specified diameter of shaft and the outside diameter of any excavation made below the casing shall not be less than the specified diameter of the shaft.

Construction Methods:

1-Qualifications of Drilled Shaft Contractor and Submittals: The Contractor performing the work described in this specification shall have installed drilled shafts of both diameter and length similar to those shown on the plans for a minimum of three (3) years prior to the bid date for this project.

The Contractor shall submit both a list containing at least three (3) projects completed in the last three (3) years on which the Contractor has installed drilled shafts of a diameter and length similar to those shown on the plans. The list of projects shall contain names and phone numbers of owner's representatives who can verify the Contractors' participation on those projects.

As early as possible as and no later than 30 days prior to constructing drilled shafts, the Contractor shall submit an installation plan for review by the Engineer. This plan shall provide information on the following:

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- (a) A list identifying the on-site supervisor(s) and drill operator(s) for approval by the Engineer. The on-site supervisor(s) shall have a minimum two years experience in supervising the construction of drilled shafts of a diameter and length similar to those shown on the plans. The drill operator(s) shall have a minimum one-year experience in drilling for the construction of drilled shafts of a diameter and length similar to those shown on the plans. The list shall contain a summary of each individual's experience. Should the Contractor elect to change personnel during construction of the shaft, the same approval process will need to be completed for the new personnel prior to them starting work on the project. The Contractor shall not be compensated for any delays resulting from their changing of personnel.
- (b) List of proposed equipment to be used, including cranes, drills, augers, bailing buckets, final cleaning equipment, desanding equipment, slurry pumps, core sampling equipment, tremies or concrete pumps, casing. etc.
- (c) Details of overall construction operation sequence and the sequence of shaft construction in bents or groups.
- (d) Details of shaft excavation methods.
- (e) When the use of slurry is anticipated, details of the mix design and its suitability for the subsurface conditions at the construction site, mixing and storage methods, maintenance methods, and disposal procedures.
- (f) Details of methods to clean the shaft excavation.
- (g) Details of reinforcement placement, including support and centralization methods.
- (h) Details of concrete mix design and test results of both a trial mix and a slump loss test. The tests shall be conducted by an approved testing laboratory using approved methods to demonstrate that the concrete meets slump loss requirements.
- (i) Details of concrete placement, including proposed operational procedures for free fall, tremie or pumping methods, proposed concreting log form and computations for time duration of shaft pour estimates.
- (j) Details of casing installation and removal methods.

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- (k) Details of methods for removal of obstructions. Obstructions the Contractor shall provide details of methods for removal include, but are not necessarily be limited to, boulders, concrete, riprap, steel, timber, etc.

The Engineer will evaluate the drilled shaft installation plan for conformance with the plans, specifications and special provisions and will then notify the Contractor of any additional information required and/or changes necessary to meet the contract requirements. All procedural approvals given by the Engineer shall be subject to trial in the field and shall not relieve the Contractor of the responsibility to satisfactorily complete the work as detailed in the plans and specifications. The Contractor shall not commence construction of the drilled shafts until the Engineer has approved the installation plans.

If integrity and/or load testing of the drilled shafts are called for, this submittal shall be developed in coordination with and submitted concurrently working drawing submittals as required in the testing specifications.

All submittals shall comply with the working drawing submittal requirements as outlined in Article 1.05.02 of the Form 816.

2-Trial Drilled Shaft Installation: If called for in the contract, the Contractor shall demonstrate the adequacy of his methods, techniques and equipment by successfully constructing a trial drilled shaft in accordance with this specification's requirements. This trial drilled shaft shall be a production shaft in the location shown on the plans or as directed by the Engineer. The trial shaft shall be drilled to the maximum depth shown in the plans. Failure by the Contractor to demonstrate to the Engineer the adequacy of methods and equipment shall be reason for the Engineer to require alterations in equipment and/or method by the Contractor to eliminate unsatisfactory results. Any additional trial drilled shaft required to demonstrate the adequacy of altered methods or construction equipment shall be at the Contractor's expense. Once approval has been given to construct production shafts, no changes will be permitted in the materials, methods and/or equipment used to construct the satisfactory trial drilled shaft without written approval of the Engineer.

Unless otherwise shown in the contract documents, the trial drilled shaft will be filled with concrete in the same manner that production shafts will be constructed.

Any type of load testing of the drilled shafts is not required. All trial drilled shafts shall be completed and accepted by the engineer prior to further construction of any production drilled shafts.

3-Protection of Existing Structures: The Contractor shall control his operations to prevent damage to existing structures and utilities in accordance to Articles 1.07.09 and 1.07.10 of the Standard Specifications. Preventive measures shall include, but are not limited to, selecting construction methods and procedures that will prevent caving of the shaft excavation and monitoring and controlling the vibrations from construction activities such as the driving of casing or sheeting,

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drilling of the shaft, or from blasting, if permitted.

If monitoring is called for in the plans, a preconstruction survey of existing facilities should be performed to establish baseline data, including ambient vibration levels and existing structural defects. In general, monumented survey points should be established on structures which are located within a distance of either ten shaft diameters or the estimated shaft depth, whichever is greater. These points should be monitored by the Contractor for vertical and lateral movement in an approved manner to the accuracy determined by the Engineer.

When deformations exceed the predetermined amount included in the plans, the Contractor shall immediately stop work and, if directed by the Engineer, backfill the excavated hole. The Contractor shall be responsible for selecting and using equipment and procedures that keep deformations of existing structures within specified levels.

When vibrations are to be monitored, the Contractor should be directed to engage the services of a professional vibrations consultant to monitor and record vibration levels during drilled shaft construction. In general, vibration monitoring equipment should be capable of detecting velocities of 0.1 inch per second or less. When vibration levels exceed established tolerable levels the Contractor should immediately stop work and take whatever measures are necessary to reduce vibration levels below tolerable levels.

4-Construction Sequence: Excavation to footing elevation shall be completed before shaft construction begins unless otherwise noted in the contract documents or approved by the Engineer. Any disturbance at or below the footing area caused by shaft installation shall be repaired by the Contractor prior to the footing pour.

When drilled shafts are to be installed in conjunction with embankment placement, the Contractor shall construct drilled shafts after the placement of fills unless shown otherwise in the contract documents or approved by the Engineer.

Drilled shafts, constructed prior to the completion of the fills, shall not be capped until the fills have been placed as near to final grade as possible, leaving only the necessary workroom for construction of the caps.

5-General Methods and Equipment: The Contractor shall perform the excavations required for shafts through whatever materials are encountered, to the dimensions and elevations shown in the plans or otherwise required by the specifications and special provisions. The Contractor's methods and equipment shall be suitable for the intended purpose and materials encountered. The permanent casing method shall be used only at locations shown on the plans or when authorized by the Engineer in writing. Blasting shall only be permitted if specifically stated on the plans or authorized in writing by the Engineer.

6-Uncased Construction Method: This method consists of using water or slurry (mineral or

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polymer) to maintain stability of the borehole perimeter while advancing the excavation to final depth, placing the reinforcing cage, and concreting the shaft. Where drilled shafts are located in open water areas, exterior casings shall be extended from above the water elevation into the ground to protect the shaft concrete from water action during placement and curing of the concrete. The exterior casing shall be installed in a manner that will produce a positive seal at the bottom of the casing so that no piping of water or other materials occurs into or from the shaft excavation.

8-Casing Construction Method: The casing method may be used either when shown on the plans or at sites where the uncased construction methods are inadequate to prevent hole caving or excessive deformation of the hole. In this method the casing may be either placed in a predrilled hole or advanced through the ground by twisting, driving or vibration before being cleaned out.

7-Excavation and Drilling Equipment: The excavation and drilling equipment shall have adequate capacity, including power, torque and down thrust to excavate a hole of both the maximum diameter and to a depth of 20 percent beyond the depths shown on the plans.

The excavation and overreaming tools shall be of adequate design, size and strength to perform the work shown in the plans or described herein. When the material encountered cannot be drilled using conventional earth augers with soil or rock teeth, drill buckets, grooving tools, and/or underreaming tools, the Contractor shall provide special drilling equipment, including but not limited to: rock core barrels, rock tools, air tools, blasting materials, and other equipment as necessary to construct the shaft excavation to the size and depth required. Approval of the Engineer is required before excavation by blasting is permitted.

8-Excavation: Shaft excavations shall be made at locations and to the top of shaft elevations, estimated bottom of shaft elevations, shaft geometry and dimensions shown in the contract documents. The Contractor shall extend drilled shaft tip (base) elevations when the Engineer determines that the material encountered during excavation is unsuitable and/or differs from that anticipated in the design of the drilled shaft.

The Contractor shall maintain a construction method log during shaft excavation. The log shall contain information such as: the description and approximate top and bottom elevation of each soil or rock material encountered, seepage or ground water, and remarks, including a description of the tools and drill rigs used and any changes necessitated by changing ground conditions.

Excavated materials that are removed from shaft excavations shall be disposed of by the Contractor in accordance with the applicable specifications for disposal of excavated materials and in conformance with Article 1.10 of the Standard Specifications.

The Contractor shall not permit workers to enter the shaft excavation for any reason unless: both a suitable casing has been installed and the water level has been lowered and stabilized below the level to be occupied, and adequate safety equipment and procedures have been provided to workers entering the excavation.

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9-Drilled Shaft Earth Excavation: Drilled shaft earth excavation is excavation accomplished with conventional tools such as augers, and drilling buckets attached to drilling equipment of the size, power, torque, and down thrust (crowd) as proposed by the Contractor in their construction procedure that has been approved for use by the Engineer and/or successful construction of a trial drilled shaft. Earth excavation may included, but not necessarily be limited to, clay, silt, sand, gravel, cobbles, boulders, weathered rock, and miscellaneous fill.

10-Drilled Shaft Rock Excavation: Drilled shaft rock excavation is excavation of competent rock, accomplished with conventional rock drilling tools, such as core barrels, attached to drilling equipment of the size, power, torque, and down thrust (crowd) as proposed by the Contractor in their construction procedure that has been approved for use by the Engineer and/or successful construction of a trial drilled shaft. Top of competent rock is as defined on the contract drawings.

11-Obstructions: When obstructions are encountered, the Contractor shall notify the Engineer immediately. Obstructions are defined as a impenetrable objects that a) cannot be removed or excavated using conventional augers fitted with soil or rock teeth, underreaming tools, and/or drilling buckets, and b) cause a significant decrease in the rate of excavation advancement, relative to the rate of advancement for the rest of the shaft excavation within the particular strata that the obstruction is located in, if removed using the techniques and equipment used successfully to excavate the shaft.

The Engineer will be the sole judge of the significance of any reduced rate of shaft advancement and the classification of obstruction excavation. The Engineer shall be present to evaluate the occurrence of obstructions, to authorize, and to approve the designation of such. Sloping bedrock and/or higher than anticipated bedrock shall not be considered obstruction excavation. Shallow obstructions are those obstructions located within 5 feet of the top level of the shaft. Shallow obstructions at shaft locations shall be removed at the expense of the Contractor.

The Contractor shall remove all subsurface obstructions at drilled shaft locations. Such obstructions may include man-made materials such as old concrete foundations and natural materials such as boulders. Such special procedures/tools may include but are not limited to: chisels, boulder breakers, core barrels, down the hole hammers, air tools, hand excavation, temporary casing, and increasing the hole diameter. Blasting shall not be permitted unless specifically approved in writing by the Engineer.

12-Lost Tools: Drilling tools that are lost in the excavation shall not be considered obstructions and shall be promptly removed by the Contractor without compensation. All costs due to lost tool removal shall be borne by the Contractor including, but not limited to, costs associated with the repair of hole degradation due to removal operations or an excessive time that the hole remains open.

13-Casing: Casings shall be steel, smooth, clean, watertight, and of ample strength to withstand both

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handling and installation and the pressure of both concrete and the surrounding earth materials. The outside diameter of casing shall not be less than the specified diameter of shaft, and the outside diameter of any excavation made below the casing shall not be less than the specified diameter of the shaft. No extra compensation will be allowed for concrete required to fill an oversized casing or oversized excavation. All casings, except permanent casings, shall be removed from shaft excavations. Any length of permanent casing installed below the shaft cutoff elevation, shall remain in place.

When the shaft extends above ground or through a body of water, the portion exposed above ground or through a body of water may be formed with removable casing except when the permanent casing is specified. Removable casing shall be stripped from the shaft in a manner that will not damage the concrete. Casings can be removed when the concrete has attained sufficient strength provided: curing of the concrete is continued for a 72-hour period; the shaft concrete is not exposed to salt water or moving water for 7 days; and the concrete reaches a compressive strength of at least 2500 psi, as determined from concrete cylinder breaks.

14-Temporary Casing: All subsurface casing shall be considered temporary unless specifically shown as permanent casing in the contract documents. The Contractor shall be required to remove temporary casing before or immediately after completion of concreting the drilled shaft. Casing should never be pulled after the concrete begins to set due to probable entrapment of drilling fluid in the shaft concrete and probable separation of the concrete within the shaft

If the Contractor elects to remove a casing and substitute a longer or larger-diameter casing through casing soils, the excavation shall be either stabilized with slurry or backfilled before the new casing is installed. Other methods, as approved by the Engineer, may be used to control the stability of the excavation and protect the integrity of the foundation materials.

Before the casing is withdrawn, the level of fresh concrete in the casing shall be a minimum of 5 feet above either the hydrostatic water level in the formation or the level of drilling fluid in the annular space behind the casing, whichever is higher. As the casing is withdrawn, care shall be exercised to maintain an adequate level of concrete within the casing so that fluid trapped behind the casing is displaced upward and discharged at the ground surface without contaminating or displacing the shaft concrete.

Temporary casings that become bound or fouled during shaft construction and cannot be practically removed shall constitute a defect in the drilled shaft. The Contractor shall be responsible to improve such defective shafts to the satisfaction of the Engineer. Such improvement may consist of, but is not limited to, removing the shaft concrete and extending the shaft deeper to compensate for loss of frictional capacity in the cased zone, providing straddle shafts to compensate for capacity loss, grouting around the exterior of the shaft, or providing a replacement shaft. All corrective measures including redesign of footings caused by defective shafts shall be done to the satisfaction of the Engineer by the Contractor without either compensation or an extension of the completion date of the project. In addition, no compensation will be paid for casing remaining in place.

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15-Excavation Inspection: The Contractor shall check the dimensions and alignment of each shaft excavation. Final shaft depths shall be measured with a suitable weighted tape or other approved methods after final cleaning. The Contractor shall provide equipment and access to the Engineer for confirming dimension, alignment, and bottom cleanliness. Required shaft cleanliness will be determined by the Engineer.

16-Construction Tolerances: The following construction tolerances apply to drilled shafts unless otherwise stated in the contract documents:

- (a) The center of the drilled shaft shall be within 3 inches of plan position in the horizontal plane at the plan elevation for the top of the shaft.
- (b) The vertical alignment of a vertical shaft excavation shall not vary from the plan alignment by more than 1/4 inch per foot of depth.
- (c) After all the concrete is placed; the top of the reinforcing steel cage shall be no more than 6 inches above and no more than 3 inches below plan position.
- (d) All casing diameters shown on the plans refer to outside diameter (OD) dimensions. The dimensions of casings are subject to American Pipe Institute tolerances applicable to regular steel pipe. When approved, the Contractor may elect to provide a casing larger in diameter than shown in the plans.
- (e) The top elevation of the shaft shall have a tolerance of plus 1 inch or minus 3 inches from the plan top-of-shaft elevation.
- (f) Excavation equipment and methods shall be designed so that the completed shaft excavation will have a planar bottom. The cutting edges of excavation equipment shall be normal to the vertical axis of the equipment within a tolerance of $\pm 3/8$ inch per foot of diameter.

Drilled shaft excavations and completed shafts not constructed within the required tolerances are unacceptable. The Contractor shall be responsible for correcting all unacceptable shaft excavations and completed shafts to the satisfaction of the Engineer. Materials and work necessary, including engineering analysis and redesign, to complete corrections for out-of-tolerance drilled shaft excavations shall be furnished without either cost to the State or an extension of the completion date of the project.

17-Reinforcing Steel Cage Construction and Placement: The reinforcing steel cage, consisting of

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longitudinal bars, ties, cage stiffener bars, spacers, centralizers, and other necessary appurtenances, shall be completely assembled and placed as a unit immediately after the shaft excavation is inspected and accepted, and prior to concrete placement. Internal stiffeners shall be removed as the cage is placed in the borehole so as not to interfere with the placement of concrete.

The reinforcing steel in the shaft shall be tied and supported so that the reinforcing steel will remain within allowable tolerances given in this specification. Concrete spacers or other approved noncorrosive spacing devices shall be used at sufficient intervals near the bottom and at intervals not exceeding 10 feet up the shaft to ensure concentric spacing for the entire cage length. Spacers shall be constructed of approved material equal in quality and durability to the concrete specified for the shaft. The spacers shall be of adequate dimension to insure a minimum 3 inch annular space between the outside of the reinforcing cage and the side of the excavated hole. Approved cylindrical concrete feet (bottom supports) shall be provided to insure that the bottom of the cage is maintained the proper distance above the base.

The elevation of the top of the steel cage shall be checked before and after the concrete is placed. If the upward displacement of the rebar cage exceeds 2 inches or if the downward displacement exceeds 6 inches per 20 feet of shaft length, the drilled shaft will be considered defective. Corrections shall be made by the Contractor to the satisfaction of the Engineer. No additional shafts shall be constructed until the Contractor has modified his rebar cage support in a manner satisfactory to the Engineer.

18-Concrete Placement: Concrete placement shall be performed in accordance with the applicable portions of the general specifications on concrete materials of this specification and with the requirements herein.

Concrete shall be placed as soon as possible after reinforcing steel placement and after the Engineer has accepted the cleanliness of the shaft. The Engineer may re-inspect the shaft for cleanliness should there be any delays between initial acceptance of shaft cleanliness and commencement of the concrete pour. If during the delay the Engineer has determined that shaft cleanliness has deteriorated, the Engineer may require the Contractor to re-clean the shaft. If necessary, the Contractor may be required to remove the cage, should it be necessary to achieve the required shaft cleanliness. The Contractor shall not be compensated for any cost and/or lost of time due to the need for re-cleaning of the shaft.

Concrete placement shall be continuous from the bottom to the top elevation of the shaft. Concrete placement shall continue after the shaft excavation is filled until good quality concrete is evident at the top of shaft. Concrete shall be placed either by free fall or through a tremie or concrete pump. The free fall placement shall only be permitted in dry holes. Concrete placed by free fall shall fall directly to the base without contacting either the rebar cage or hole sidewall. Drop chutes may be used to direct concrete to the base during free fall placement.

The Contractor shall maintain a Concreting Logs during all pours. The log shall include, but not necessarily be limited to, concreting curves that shall plot Depth to Top of Concrete vs. Volume

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of Concrete Poured (for both theoretical and actual volumes of concrete poured) The Contractor shall provide the Engineer a copy of each log upon completion of each drilled shaft pour. A sample of the proposed log to be used by the Contractor shall be submitted as part of the installation plan working drawing submittal.

19-Tremies: Tremies may be used for concrete placement in either wet or dry holes. Tremies used to place concrete shall consist of a tube of sufficient length, weight, and diameter to discharge concrete at the shaft base elevation. The tremie shall not contain aluminum parts that will have contact with the concrete. The tremie inside diameter shall be at least 6 times the maximum size of aggregate used in the concrete mix but shall not be less than 10 inches. The inside and outside surfaces of the tremie shall be clean and smooth to permit both flow of concrete and unimpeded withdrawal during concreting. The wall thickness of the tremie shall be adequate to prevent crimping or sharp bends, which restrict concrete placement.

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

If at any time during the concrete pour, the tremie line orifice is removed from the fluid concrete column and discharges concrete above the rising concrete level, the shaft shall be considered defective. All costs of repair or replacement of defective shafts shall be the responsibility of the Contractor.

20-Pumped Concrete: Concrete pumps and lines may be used for concrete placement in either wet or dry excavations. All pump lines shall have a minimum 4 inch diameter and be constructed with watertight joints. Concrete placement shall not begin until the pump line discharge orifice is at the shaft base elevation.

For wet excavations, a plug or similar device shall be used to separate the concrete from the fluid in the hole until pumping begins. The plug shall either be removed from the excavation or be of a material, approved by the Engineer, that will not cause a defect in the shaft if not removed.

The discharge orifice shall remain at least 5 feet below the surface of the fluid concrete. When lifting the pump line during concreting, the Contractor shall temporarily reduce the line pressure until the orifice has been repositioned at a higher level in the excavation.

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If at any time during the concrete pour the pump line orifice is removed from the fluid concrete column and discharges concrete above the rising concrete level, the shaft shall be considered defective. All costs of repair or replacement of defective shafts shall be the responsibility of the Contractor.

21-Drop Chutes: Drop chutes may be used to direct placement of free-fall concrete in excavations where the maximum depth of water does not exceed 3 inches. Free fall placement is not permitted in wet excavations. Drop chutes shall consist of a smooth tube of either one piece construction or sections that can be added and removed. A drop chute can also be a hopper with a short tube to direct the flow of concrete. Concrete may be placed through either the hopper at the top of the tube or side openings as the drop chute is retrieved during concrete placement. If concrete placement causes the shaft excavation to cave or slough, or if the concrete strikes the rebar cage or sidewall, the Contractor shall reduce the height of free fall and/or reduce the rate of concrete flow into the excavation. If caving or sloughing of the borehole walls occurs during free-fall placement of concrete, the shaft shall be considered defective. All costs of repair or replacement of defective shafts shall be the responsibility of the Contractor. If concrete placement cannot be satisfactorily accomplished by free fall in the opinion of the Engineer, the Contractor shall use either tremie or pumping techniques to accomplish the pour.

22-Access Tubes for Cross Hole Acoustic Logging: Access tubes for crosshole acoustic logging shall be placed on each reinforcing cage designated in the contract documents in the position and at the frequency shown on the plans. Access tubes must be firmly secured to the cage. Normally, the tubes should extend from 6 inches above the bottom of the shaft to at least 3 feet above the top of the shaft, or 2 feet above the ground surface if the shaft is cut off below the ground surface. If crosshole acoustic tests are to be performed, the access tubes should be filled with clean water no later than 4 hours after placement of the concrete and the tubes capped during concrete placement to keep out concrete and debris. In all cases the access tubes should be as nearly parallel as possible and should be placed as far from the longitudinal steel bars as possible.

Prior to the beginning of downhole logging, the Contractor shall assure that the CSL test probes can pass through every tube to the bottom. If a tube is obstructed, the entire length of the obstructed access tube will not be measured for payment. The Engineer may also require the Contractor to core a hole within the drilled shaft near the obstructed tube to the full depth of the obstructed access tube. The cored hole shall be large enough to accommodate the test probe for the full length of the hole. The coring equipment, coring procedure and location of the core hole shall be approved by the Engineer prior to beginning the coring process. The coring method shall provide for complete core recovery and shall minimize abrasion and erosion of the core. The core hole shall be placed at a position in the shaft that will not produce damage to the reinforcing steel in the shaft. The core hole shall be logged, voids or defects indicated on the log and the log submitted to the Engineer. Cores shall be preserved and made available for inspection by the Engineer. The core

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hole will be treated as an access tube and downhole testing shall then commence. Core holes that are drilled for the purpose providing a substitution for a blocked access tube shall be measured and paid for at the contract unit price for Access Tubes.

Upon completion of all tests involving access tubes and after acceptance of the drilled shaft, the access tubes and core holes shall be filled with grout.

23-Evaluation and Acceptance/Rejection of Drilled Shafts: Upon completion and testing (if called for) of a drilled shaft, the Engineer shall review all available drilling logs, drilled shaft construction logs, concreting logs, inspection reports, load test results, and/or integrity test results to determine the acceptability of the drilled shaft. If the Engineer determines that available data is inconclusive, the Engineer may call for additional testing, coring, or other appropriate actions necessary for evaluating the acceptability of the drilled shaft. Should the additional testing confirm the presence of anomalies, the Contractor shall not be compensated for the cost of the additional testing (even if the anomalies are determined to be non-critical and the shaft is found to be acceptable). Should additional testing demonstrate that anomalies are not present (prior to any remedial work); the additional testing shall be paid for by the Department. The Contractor may continue to construct drilled shafts before receipt of notice of acceptance of the tested shaft or shafts by the Engineer. If the Engineer finds previously constructed shaft(s) to be unacceptable, the Contractor shall be required to repair, at the Contractor's expense, the unacceptable shaft(s) to the satisfaction of the Engineer. The Contractor shall prove to the satisfaction of the Engineer, at no expense to the State, the acceptability of all shafts constructed since the time that the unacceptable shaft was constructed and the acceptability of the procedure to construct future shafts. If the Engineer deems the construction procedure to be unacceptable, the Contractor shall cease all drilled shaft construction until a new construction procedure is submitted by the Contractor and accepted by the Engineer.

The Contractor shall submit any repair procedures to the Engineer for review and approval. If these plans involve change or impact the structural design of the shafts or shaft caps, or to the geometry of the shafts, any redesign proposed in the Contractor's plan shall be performed at the Contractor's expense by a qualified Professional Engineer registered in the State of Connecticut.

The Engineer may require that additional shafts be tested. If the testing of the additional shaft(s) indicates the presence of a defect in any additional shaft, the testing cost for that shaft will be borne by the Contractor and the Contractor shall repair the shaft at the Contractor's expense, as above. Any additional testing required by the Engineer on repaired drilled shafts shall be considered part of the Contractor's remediation plan and its cost shall be borne by the Contractor.

Method of Measurement:

1-Furnishing Drilled Shaft Drilling Equipment: There will be no measurement of the work performed under this item.

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2-Drilled Shaft: The quantities to be paid for shall be the length in feet of the completed and accepted concrete drilled shaft of the diameter and containing the reinforcement shown on the plans. The length shall be determined as the difference between the plan top of shaft elevation and the final bottom of shaft elevation.

3- Drilled Shaft Earth Excavation: The quantities to be paid shall be the length in feet of completed earth excavation of the diameter shown on the plans measured in linear feet along the centerline of the shaft either from the top of exiting grade elevation prior to drilling or from the bottom of the drilled shaft cap elevation (whichever is lower) to either the top competent rock elevation (if the drilled shaft extends onto or into competent rock) or to the bottom of the shaft elevation (if the shaft does not extend onto or into competent rock).

4- Drilled Shaft Rock Excavation: The quantity to be paid shall be the length in feet of completed rock excavation of the diameter shown on the plans measured in linear feet along the centerline of the shaft from the top of competent rock elevation to the bottom of the shaft elevation.

5-Obstructions: The quantities to be paid shall be the number of hours of work, or fraction thereof per obstruction, after designation as an obstruction by the Engineer, required to remove the obstruction.

6-Trial Drilled Shaft: The quantity to be paid shall be the authorized linear feet of trial shaft holes drilled to the diameter shown on the plans, completed (including backfill when required) and accepted. The linear feet of trial shaft holes shall be determined as the difference between the existing ground surface elevation at the center of the trial shaft hole prior to drilling and the authorized bottom elevation of the hole.

7-Access Tubes: The quantity to be paid will be per linear foot of unobstructed access tube, installed and accepted in the drilled shafts, to the depths shown on the plans.

Basis of Payment:

1-Furnishing Drilled Shaft Drilling Equipment: Payment for this item when made at the contract lump sum amount will be full and complete payment for furnishing and moving the drilling equipment to the project site, setting the equipment up at the locations removing the equipment from the project site. Payment of 60 per cent of the amount bid for this item will be made when all drilling equipment is on the project site, assembled and ready to drill foundation shafts. Payment for the remaining 40 per cent of the bid amount will be made when all shafts have been drilled, all shaft concrete has been placed up to the top of the shaft, all defects are repaired, and all drilled shafts have

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been accepted by the State.

2-Drilled Shaft: Drilled shafts shall be paid for at the contract unit price per linear foot for drilled shaft of the diameter specified. Such payment shall include the cost of concrete and reinforcing steel, all labor, materials, equipment, temporary casings, slurry, blasting, protection of existing facilities/utilities and incidentals necessary to complete the drilled shaft.

3- Drilled Shaft Earth Excavation: Earth excavation shall be paid at the contract unit price per linear foot for drilled shaft earth excavation of the diameter specified. Such payment shall be full compensation for all labor, materials, water control, disposal of excavated material and equipment necessary to complete the work in an acceptable fashion.

4-Drilled Shaft Rock Excavation: Drilled shaft rock excavation shall be paid at the contract unit price per linear foot for drilled shafts rock excavation of the diameter specified. Such payment shall be full compensation for all labor, materials, water control, disposal of excavated material and equipment necessary to complete the work in an acceptable fashion. No payment will be made for additional rock excavation or placement of additional shaft concrete resulting from blasting overbreak.

5-Obstructions: Removal of obstructions shall be paid at the contract unit price per hour for obstructions. Such payment shall be full compensation for all labor, materials, excavation of obstructions, water control, disposal of excavated material, and equipment necessary to complete the work.. If the Contractor chooses to use a larger shaft diameter for obstruction excavation, no additional compensation will be provided to perform this oversized obstruction excavation. The contract unit price shall not be greater than the minimum allowable contract unit price nor higher than the maximum allowable contract unit price as shown on the plans or in the contract documents.

6-Temporary Casings: Temporary casings shall not be paid for directly, instead Temporary Casings shall be paid for under the item “Drilled Shaft”.

7-Trial Drilled Shaft: Trial drilled shafts of the specified diameter will be paid for at the contract unit price per linear foot for trial drilled shaft. Such payment shall be full compensation for excavating the trial drilled shaft through whatever materials are encountered to the bottom of shaft elevation shown on the plans or as authorized by the Engineer (using slurry approved by the Engineer as necessary), providing inspection facilities, backfilling the hole, restoring the site as required and all other expenses to complete the work.

8-Access Tubes: This item will be paid for at the unit contract price per linear foot of unobstructed access tube, installed in the drilled shafts, to the depths shown on the plans and the post test grouting

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of the access tubes.

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ITEM #0702772A – INTEGRITY TESTING – CROSS HOLE

Description

General

- A. Work under this item shall consist of furnishing all materials and labor necessary to test the structural integrity of the drilled shafts by non-destructive geophysical methods. Cross-Hole Sonic Log (CSL) testing shall be provided for the drilled shafts. 3-D Cross-Hole testing (Tomographic Survey – CTS) will be required when an anomaly is found during integrity testing. The 3-D Cross-Hole testing shall be used to improve location accuracy and to further characterize the anomaly. No additional payment will be made when 3-d Cross-Hole testing is required.
- B. Every other production drilled shaft shall be tested.

Quality Assurance

- A. The contractor shall employ a testing firm that has successfully completed integrity testing on no less than three projects of a similar nature. The field personnel performing the testing shall have successfully completed integrity testing on no less than three projects of similar nature. The qualifications of the testing firm and field personnel shall be submitted to the Engineer for approval.
- B. The testing firm shall utilize “state-of-the-art” digital systems for data collection.
- C. The contractor shall submit a testing plan which outlines the test setup, data collection system, procedures, analyses and final report format to the Engineer for approval.
- D. Testing shall be performed no later than ten days after the completion of the concrete pour.
- E. A summary of the preliminary test results shall be submitted to the Engineer the day the test is performed. The contractor shall submit the final results and analyses of the CSL testing within three working days of completion of the tests and shall include dimensions and locations of any anomalies encountered.
- F. The engineer will determine final acceptance of the shaft, based on an elevation of the CSL and CTS (if required) test results and analyses for the tested shaft.

Construction Methods

Cross-Hole Testing

- A. Cross-hole testing shall consist of lowering an acoustic transmitter down a water filled steel access tube installed in the drilled shaft while simultaneously lowering a receiver(s) to the same depth in other water filled steel access tubes installed in the drilled shaft,

determining the velocity of the wave and noting any anomalies indicating defective concrete.

B. All possible tube combinations shall be tested at 2 inch intervals.

3-D Cross Hole Testing (CTS)

If CSL test results indicate the presence of anomalies, perform 3-D velocity TS analyses using CSL data to accurately define the geometry and location of the anomalous area. Tomographic Survey is a technique for imaging physical property variation within a medium from seismic rays projected through the medium. CTS shall use multiple angle source-receiver combinations to cover a zone up to 45 degrees below and above the anomaly.

Method of Measurement

Integrity testing of drilled shafts will be measured for payment by the actual number of tests completed and accepted.

Basis of Payment

Integrity tests will be paid for at the contract unit price each for “Integrity Testing – Cross Hole” which price shall include the procurement, installation, conducting of the tests, removal of the test apparatus, and preparation of the test report.

ITEM #0813021A – 6” GRANITE STONE CURBING

ITEM #0813031A – 6” GRANITE CURVED STONE CURBING

Description: The work under this section shall consist of the excavation for and furnishing and placing of curved or straight granite curbing on a prepared gravel and concrete base in conformity with these specifications and details, at the locations and to the lines, grades, dimensions and as directed by the Engineer.

Materials: All granite curbing shall be furnished by the Contractor and conform to Article M.12.06-1 of the Standard Specifications.

Prior to ordering any curbing under this Section the Contractor shall submit a sample of the proposed curbing to the Engineer for approval. The sample curb sections shall not be less than one (1) foot in length.

Curved granite curbing shall be cut to the curve required and their ends shall be cut on radial lines with the length of the curved pieces being not less than 4 feet.

Mortar shall conform to the requirements of Article M.11.04 of the Standard Specifications.

Gravel for the base shall conform to the requirements of Article M.02.03 for grading “C” of the Standard Specifications.

Concrete shall conform to the requirements of Article M.03.01, Class “C” of the Standard Specifications.

Construction Method: Construction methods of this work shall conform to the following requirements:

Excavation: A sufficiently wide trench, to permit thorough tamping, shall be excavated to the depth, as indicated on the Contract Drawings, to permit the installation of the curb on a gravel and concrete base. The trench bottom and gravel shall be thoroughly compacted to a firm, even surface and shall be approved by the Engineer.

Base: The curbing shall be set on a gravel and concrete base in accordance with the details shown on the Contract Drawings at the locations indicated thereon. The gravel base shall be a minimum depth of 6 inches below the curb and shall be installed for the full length of curbing. The concrete base shall have a minimum depth of 6 inches and shall extend 18” minimum each side of the joint of each curb section. The concrete base shall be placed on a minimum depth of 6 inches of compacted gravel which shall be installed for the full length of curbing.

Setting Curbing: On a gravel base, the curbing shall be set on edge and settled into place with a heavy wooden hand rammer, to the line and grade required. Curbing to be placed on a gravel and concrete base shall be blocked to true line and grade prior to placing concrete.

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All curbing shall be straight and true to the full length and depth of the curb. True line and grade shall mean within ¼ inch of the line and grade shown on the Contract Drawings. The upper and front faces of adjacent curb sections shall have a ½ inch joint between them which shall be pointed with mortar for the full depth and width of the curb. At approximately 50 foot intervals, the ½” joint shall have a ½” performed joint filler with a ½” x ½” joint sealant. The ends of the curbing at driveways and intersections shall be cut at a level or rounded, as shown on the drawings or called for.

Backfilling: The trench for the curbing shall be backfilled with approved base material. The first layer shall not exceed 4 inches in depth and shall be thoroughly rammed; the remaining layers shall not be more than 6 inches in depth and shall be thoroughly rammed until the trench is filled. Where the curbing is placed on a gravel and concrete base, no backfilling shall be done until the concrete has been allowed to set for a minimum of 48 hours.

Granite Curb: The exposed face of the curb shall be smoothly dressed, bush hammered or axed; the back also shall be smoothly dressed so the sidewalk, driveway and pedestrian ramp may fit closely against the curb.

Color: The color of the granite curb shall match as close as possible to the existing granite curbing in the area.

Method of Measurement: This work will be measured for payment along the top of the curb and will be the actual number of linear feet of curbing completed and accepted.

Basis of Payment: Payment will be made at the contract unit price per linear foot for 6” Granite Stone Curbing and 6” Granite Curved Stone Curbing, which price includes all excavation, materials, class “C” concrete, ¾” crushed stone base, equipment, tools and labor incidental thereto.

<u>Pay Item</u>	<u>Pay Unit</u>
6” Granite Stone Curbing	l.f.
6” Granite Curved Stone Curbing	l.f.

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ITEM #0912700A-WOOD GUIDE RAIL

DESCRIPTION: The work under this section consists of furnishing and installing wood guide rail, in accordance with the manufacturer's recommendations, at locations shown on the Contract Drawings, or as directed by the Engineer.

MATERIALS: All materials shall be furnished and constructed in accordance with the manufacturer's specifications.

The wood posts shall be 10"x10" Tapered by 6' Post with 1" Chamfered Top.

The wood rails shall be 5"x 8"x 8' Pressure Treated Rails.

All Timbers shall be #2 SYP (0.40 CCA)

Bolts: 3/4" x 12" Galvanized Carriage Bolts

CONSTRUCTION METHODS: All installation shall be performed in accordance with the details shown on the plans and/or manufacturer's recommendations and specifications. Contractor shall submit the manufacturer's installation methods and surface treatments of the wood rail to the Engineer for review and comment.

Excavation: Dig holes for posts of size and spacing as shown in the contract drawing. Post spacing shall be at 8'-0" on center (max). Excavate holes to minimum depth of 48" as recommended by the manufacturer. Compact backfill material around posts.

Setting Posts: Set all wood posts at 24" above finish grade.

All rail panels shall be installed at least 18" above the finished ground.

METHOD OF MEASUREMENT: The installation of wood guide rail as shown on the Contract Drawings will be measured for payment by the actual number of linear feet of rail installed.

BASIS OF PAYMENT: This work will be paid for at the contract unit price per linear foot for "Wood Guide Rail". The price shall include, but not be limited to, rail, posts, excavation, wood preservative, hardware, fasteners, backfilling, equipment, tools, labor, materials and all work incidental thereto.

Pay Item

Wood Guide Rail

Pay Unit

l.f.

ITEM #0916126A – NOISE BARRIER WALL

Section 9.16 Noise Barrier Wall is hereby deleted in its entirety and replaced with the following:

Description:

Work under this item shall consist of designing, fabricating, furnishing and erecting noise barrier wall systems in the locations, elevations, and dimensions shown on the plans, and in accordance with these specifications or as directed by the Engineer. Specific types of walls may be required by the Contract drawings; the Contractor may select any one of the types listed and detailed on the plans.

Materials:

The noise wall chosen shall be selected from a list provided on the Contract drawings specific to each site. This list appearing on the Contract drawings will identify all manufactured noise barrier walls that are considered appropriate and acceptable for each specific project site. This does not warrant that all listed noise walls can be designed to meet either the dimensional, structural, or geotechnical constraints at each site. The Engineer will reject any proposed noise barrier wall that is not listed on the Contract drawings.

Within seven (7) days after the bid opening, the Contractor shall identify by the type and name, in his proposal, the specific type of the wall for each location upon which his bid is based. All noise barriers selected for each location shall be furnished from the same manufacturer and shall be on the same type pattern and color.

The list shown on the Contract drawings has been derived from the following general list of acceptable manufactured noise barrier walls for Department projects; no other noise barrier walls will be allowed.

- | | |
|---|--|
| 1. <u>NB 15</u>
Armtec Ltd.
8270 Greensboro Drive
McLean, VA 22102
(860)-873-1737
www.armtec.com | 2. <u>Whisper Wall</u>
Concrete Innovation Services
4212 Lafayette Center Drive Suite 1-A
Chantilly, VA 20151
703-222-9702
www.whisper-wall.com |
| 3. <u>Soundsorb</u>
Concrete Solutions, Inc.
3300 Bee Cave Road, Suite 650
Austin, TX 78746
512-327-8481
www.soundsorb.com | 4. <u>Acousta Crete</u>
Faddis Concrete Products
3515 Kings Highway
Downingtown, PA 19335
610-269-4685
www.faddis.com |

Some of these walls are specifically suited for use in special locations where there are structural concerns or the surrounding area warrants a certain type or style of wall to be used. **Note: See the Contract drawings for the specific noise barrier walls that are acceptable for each site.**

Material(s) used for the noise barrier wall shall durable, and not prone to developing openings, cracks or gaps from loading, warping, splitting, shrinkage, delamination, or weathering. Noise barrier wall panels shall be U.V. resistant, flame retardant, and resist degradation from ozone, hydrocarbons and freeze/thaw cycling. The sound absorbing portions of the wall shall be durable, resistant to erosion of material and damage from moderate abrasion. The noise barrier wall shall have a minimum 20 year life cycle free from peeling, rotting or visible deterioration.

Absorptive noise barrier wall(s) shall be able to provide a minimum Sound Transmission Class (S.T.C.) rating of 34 measured by ASTM E90. The Noise Reduction Coefficient (N.R.C.) shall have a minimum rating of 0.70, as measured by ASTM C423 and E 795.

Specific textured surface patterns have been approved for use by the Department. The selected pattern for each wall location shall be as shown on the Contract drawings. Other patterns will not be acceptable.

The noise barrier wall shall have a textured surface pattern on both sides if not noted otherwise in the Contract drawings. If both sides of the noise barrier wall contain a textured surface pattern, the more textured or sound absorptive side (covered by sound-absorbing material) shall consistently face the roadway throughout the project. The bottom panel of an absorptive noise barrier wall shall not have sound-absorbing material installed on the exposed face due to potential damage from traffic and snow plowing operations.

The color of the noise barrier wall exposed to traffic will be indicated on the plans, conforming to Federal Standard 595 Colors except if specified otherwise on the Contract plans. Only one color may be used on the wall components to maintain uniformity, except where specified otherwise on the Contract plans.

Federal Standard 595 Color No.	Color
FS 36492	Gray
FS 36622	Gray
FS 34230	Green
FS 30215	Brown

The noise barrier wall panels shall be integrally-pigmented (meeting the requirements of ASTM C979,) a significant depth into its cross-section so as to produce a uniform color should the panel become scratched, chipped or otherwise surface damaged. Variation in color or shading from

panel to panel shall not be acceptable during construction. Field staining or painting to achieve a uniform overall color is not allowed during construction.

Individualized design panels may vary from standard noise barrier wall colors, textures, and patterns, as depicted in the Contract drawings.

The manufacturer of the noise barrier wall shall provide an aesthetic coating warranty to the Department of Transportation for a minimum of 10 years.

The noise barrier wall shall have a suitable surface for repainting, staining, sandblasting or other acceptable method of returning panels to their original color and texture should it become damaged after construction. Touching up, restaining, repainting, or sandblasting portions of the panel shall not result in visible color variation. Additionally, the noise wall manufacturer shall supply the Department with 25 gallons of matching color paint or stain to repair surface damage or vandalism. The matching color paint or stain shall be supplied along with the supplier name, wall location, project number, and a color identification number.

The Contractor shall also supply four (4) full panel sections of noise barrier wall, measuring 4 feet high each to the Department. These sections of noise barrier wall shall be of the same color and pattern as the noise barrier wall. The Contractor shall deliver and unload the materials at the recommended D.O.T. Maintenance Facility. The noise wall sections and matching color paint/stain shall be delivered and unloaded at the recommended D.O.T. Maintenance facility that will be ultimately responsible for the noise barrier wall.

Reinforcing steel shall conform to the requirements of Article M.06.01. Additionally, all steel components, including fasteners and anchor bolts shall be completely hot-dip galvanized, after fabrication, in accordance with ASTM A123 or ASTM A153, as applicable. Zinc-rich field primer for touch up shall conform to the requirements of ASTM A780. The use of aerosol spray cans shall not be permitted.

Concrete for footings shall have a minimum 28 day compressive strength f'_c , of 3000 psi and conform to the requirements of Article M.03.01.

Wall sections which are mounted on a structure or used to maintain a grade difference on each side of the wall (earth retaining panels), as identified in the Contract drawings shall be designed and manufactured for those purposes. Specific calculations and details will be required when these types of walls are specified. Noise Barrier Wall mounted on a structure shall conform to the requirements of the special provision for "Noise Barrier Wall (Structure)."

Noise Barrier Wall (Structure) (additional requirements):

Noise barrier wall on structures shall have the same color, pattern, and texture on visible portions as the other sections of noise barrier wall unless otherwise specified in the Contract plans or

special provision for Noise Barrier Wall (Structure). Due to the presence of a parapet, for absorptive walls, the acoustic covering shall be on the entire wall facing traffic.

Noise Barrier Wall (Earth Retaining Panels) (additional requirements):

Earth retaining panels produced by the noise wall manufacturer will be allowed where specified in the Contract Drawings, where the grade difference between the front and back of the noise barrier wall does not exceed 3 feet.

Noise barrier wall (earth retaining panels) shall have the same color, pattern, and texture on visible portions as the other sections of noise barrier wall. Integrated sections shall be designed and reinforced to withstand any earth retaining lateral loads. Other necessary materials such as drainage holes, subdrain, filter fabric, or stone necessary to properly construct the integral retaining wall shall conform to manufacturer's specifications.

Other:

Crushed Stone, if required to be placed under or adjacent to the barrier associated with drainage and erosion control shall conform to No. 3 Crushed Stone per Article M.01.01.

Backfill for Noise Barrier Wall (Earth Retaining Panels) shall be pervious structure backfill conforming to the requirements of Articles M.02.05 and M.02.06.

All other materials shall conform to the requirements as indicated on the individual noise barrier wall plans and approved working drawings.

Experience:

The Noise Barrier Wall Designer shall submit to the Engineer documentation specifying a minimum of five years of experience designing the type of Noise Barrier Walls specified in the Contract Plans. The Contractor shall submit to the Engineer evidence of experience constructing Noise Barrier Walls. This documentation needs to be reviewed and approved by the Engineer prior to commencing the design of the Noise Barrier Walls.

Construction Methods:

Design:

Noise barrier walls shall be designed in accordance with the AASHTO Guide Specifications for Structural Design of Sound Barriers (1989), including interim specifications dated 1992 and 2002.

The noise barrier wall shall also be designed in accordance with the manufacturer's requirements, details and specifications for the noise barrier chosen.

General Design Requirements:

The top of the noise barrier wall shall be at the top of the wall elevations (at a minimum) shown on the Contract drawings.

The bottom panel shall be a minimum height of 54 inches and shall be precast reinforced concrete. It shall be uncolored and without pattern or acoustic material on either face.

If the Contractor is required to use different types of wall, or transition at structures, based on the Contract plans, he shall design the transition or connection of the two types.

Noise Barriers shall have a reinforced integral cap with a minimum height of 6" on the top panels. Caps shall not be cast with sound absorptive material.

For aesthetic purposes, except in cases of significant changes in grade, horizontal joint lines between panels shall match for a minimum distance of 60 feet, and if steps are required, the elevation difference between the horizontal joints of adjacent panels shall not be less than 3" or greater than 1'-0". These requirements shall also apply to the top elevation of the noise barrier wall. Strict adherence to these requirements is not necessary at angle breaks greater than 30 degrees or as approved by the Engineer.

Crushed stone shall be placed adjacent/under the noise barrier wall as depicted in the Contract Drawings to allow for cross drainage from one side of the wall to the other, to prevent erosion, or to function as a splash pad.

Submittals:

The Contractor is fully responsible for the design, detailing and additional specifications required for the selected noise barrier wall. All submitted drawings shall conform to section 1.05.02 of Form 816 regarding working drawings with the following additions:

Preliminary Submissions for Proprietary Noise Barrier Walls:

Prior to the start of fabrication or noise barrier wall construction, the Contractor shall submit to the Engineer a design package, which shall include six (6) sets of working drawings and four (4) sets of design calculations for review in accordance with Article 1.05.02. The design package shall conform, but not be limited to the following:

Detailed Plans and Computations:

1. Plans shall be submitted on 22" x 34" paper sheets.
2. All submittals (plans and computations) shall be stamped by a licensed Professional Engineer in the State of Connecticut, who shall also be available for consultation in interpreting his computations and drawings, and in the resolution of any problems, which may occur during the performance of his work.
3. Full plan view of the noise barrier wall, drawn to scale. This view shall show:

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- a. beginning and end of the wall, as well as any angle points;
 - b. posts shall be identified and numbered, with proposed coordinates of where each post will be placed;
 - c. roadway baseline with 100-ft stations labeled;
 - d. location of existing and/or proposed cantilever and truss sign supports;
 - e. location of existing and/or proposed drainage systems/utilities. (Any existing drainage systems and/or utilities which are shown on the plans should be field verified.)
4. Full elevation view (roadway side) of the noise barrier wall, drawn to scale, and including:
- a. elevations of the finished top and bottom of the noise barrier wall panels at all locations;
 - b. finished grade against the wall (on both sides);
 - c. panel sizes;
 - d. location of horizontal angle points;
 - e. post length and post embedment dimension.
 - f. transitions between different wall styles or types;
 - g. the approximate locations of 100' baseline stations (perpendicular);
 - h. location of access for fire hoses or other appurtenances as applicable.
5. Details shall include:
- a. detail and description of the pattern, color, and texture of the proposed noise barrier wall;
 - b. details for any individualized design panel depicting pattern, dimensions, depth of pattern, textures, and colors;
 - c. details for noise barrier wall foundations/footings, for all expected soil conditions (soil, rock, partial soil/rock);
 - d. transitions between different wall styles or types;
 - e. details for excavating holes for foundations including drilling and dewatering methods (if required);
 - f. reinforcement details for the bottom precast concrete panel;
 - g. details of stepped installations on longitudinal slopes (as required);
 - h. detail for methods of constructing the noise barrier wall in the vicinity of any existing or proposed drainage systems in the vicinity of the wall;
 - i. detail for methods of protection of the existing facilities during the construction of the noise barrier wall;
 - j. drainage details:
 - i. crushed stone placed adjacent to and/or under the wall panels where proposed on the Contract;
 - ii. provisions for swaling longitudinally along walls;
 - iii. structural drainage systems for transporting runoff from one side of the wall to the other side for noise barrier walls and for earth retaining panels;

- k. details of any falsework required to temporarily support the components during construction.
6. Plans shall also include:
- a. specifications for all materials used in the construction of the noise barrier wall system;
 - b. detailed construction and installation procedures;
 - c. allowable fabrication tolerances for wall panels and posts;
 - d. allowable installation tolerances for posts, including for allowable variations of horizontal spacing and from plumb.
7. Calculations shall include:
- a. computations shall clearly comply with and reference applicable AASTHO provisions;
 - b. calculations for the noise barrier wall foundations/footings, modeling all expected soil conditions (soil, rock, partial soil/rock);
 - c. calculations for vertical loading of the bottom precast concrete panels (supported on the ends with a uniform load of the total panel weight above.)
 - d. documentation of computer programs utilized, including all design parameters;
 - e. computations for earth retaining panels shall conform to the latest edition of the AASHTO Standard Specifications for Highway Bridges including the latest Interims published except as noted herein. Additionally:
 - i. earth retaining panels will only be allowed where the grade difference between the front and back of the noise barrier wall does not exceed 3 feet;
 - ii. noise barrier walls with earth retaining panels shall be designed for a minimum 4 foot embedment;
 - iii. consider a minimum live load surcharge equal to two feet of soil at a unit weight of 125 pounds per cubic foot. If there are a specific live load surcharges, acting on the wall, they shall also be accounted for;
 - iv. the minimum equivalent fluid pressure used to design the wall shall be 33 pounds per cubic foot per linear foot of wall.

Final Submissions of Noise Barrier Wall Drawings:

Once the working drawings have been reviewed and accepted by the Department, the Contractor shall submit the final plans. The final submission shall be made within 14 days of acceptance by the Department. No work shall be performed on the wall until the final submission has been received. Acceptance of the final design shall not relieve the Contractor of his responsibility under the Contract for the successful completion of the work.

One CD containing the final approved drawings in .pdf format and five (5) sets of full size paper copies shall be submitted for final working drawings and shop drawings for the Department's use and permanent records. Submissions in electronic format shall be created on ANSI D (22' x 34" full scale (1" electronic file = 1" paper) sheets. The purpose of creating these drawings on ANSI D sheets is so that they may be printed/plotted at that size or smaller without loss of legibility.

Construction Specifications:

1. Construction tolerances, methods and material specifications specific to the noise barrier walls chosen shall be provided. Submittal requirements for materials such as certification, quality, and acceptance/rejection criteria should be included.
2. Any manufacturer requirements specific to the noise barrier wall not stated herein shall also be included.

Tolerances:

All noise barrier wall components shall conform to the following:

Posts

Post Dimension Tolerances:

1. Post Height = $\pm 1/2''$

Post Vertical Sweep:

1. Posts $\leq 16'$ long = $\pm 1/8''$
2. Posts $> 16'$ long = $\pm 1/4''$

Post Installation:

1. In horizontal plane from plan location = $\pm 1''$
2. In horizontal plane from center of cylindrical footing = $\pm 1''$
3. In horizontal plane from adjacent post = $\pm 1/2''$
4. Post plumb = $\pm 1''$ per 10' of wall height

Panels

Panel Dimension Tolerances:

1. Panel Length and Height = $\pm 1/4''$
2. Panel Structural Thickness = $\pm 1/4''$
3. Panel Absorptive Material Thickness = $\pm 1/4''$
4. Panel Horizontal Sweep = $\pm 1/8''$
5. Panel Vertical Sweep = $\pm 1/8''$

Position of Lifting Inserts:

1. Along Panel Length = $\pm 1''$
2. Along Panel Thickness = $\pm 1/4''$

Reinforcing Steel Tolerances:

1. Splice = +1" from Standard Lap Splice Requirement
2. Concrete Cover = +2"

Other

There shall be no visible openings in the wall or under the wall, which would allow sound transmission.

Fabrication of Panels:

Textured Surface Treatment: Formed surfaces other than the exposed face shall not require a textured finish. If a textured surface finish is proposed for the wall, before proceeding with production, two (2) noise barrier wall panel samples (matching in surface treatment and color) shall be created:

1. one 24" x 24" x full thickness shall be provided by the fabricator for the Engineer's approval of color and surface treatment(s). Regular panel production may not commence without the Engineer's approval;
2. one full width x full thickness x four (4) feet high model panel, to use as a guide and standard for the color and finish to be furnished on production panels. This model panel shall be kept at the fabricator's plant to be used for comparison purposes during production. It may be used on the project at the end of precasting operations with permission from the Engineer.

If the proposed noise barrier wall is being used to replace an existing noise barrier wall, the existing wall(s) shall be removed and properly disposed of. All permits for its disposal shall be obtained by the Contractor and included in the cost. In this case, the proposed noise barrier wall shall be constructed no lower than to the top elevation of the existing wall or as shown on the Contract plans unless specifically noted otherwise.

Unexpected Obstructions:

Prior to any excavation, the Contractor shall field verify the location of all existing utilities, sewers and culverts shown on the Contract plans. Should a sewer, or culvert be damaged by the Contractor's omission or negligence, the Contractor shall replace the damaged sections at his own cost.

If during construction, the avoidance of unexpected utilities, drainage or other obstructions requires the use of closer post spacing than that shown on the Contract plans, the Contractor shall furnish additional foundations, posts, and panels as directed by the Engineer. The additional foundations, posts, and panels shall conform to the Contract documents and other approved drawings and specifications. Field cutting of posts or panels will not be accepted.

For noise barrier walls installed on grade, the posts shall be set in concrete in predrilled holes unless alternate methods are proposed by the noise barrier wall designer and approved by the

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Engineer. The concrete shall fill the bore to the full depth of the hole and shall be slightly crowned at the top for drainage. The drilled hole shall be reasonably true and plumb to the stated diameter and depth. Precautions shall be taken in the operational procedures to protect the hole from collapse. Should rock or other obstructions be encountered in making the hole, this material shall be removed and any space outside the designed pier diameter shall be replaced with concrete. The concrete shall be placed in the dry, against the existing soil or rock. All disturbed material around the concrete shall be compacted.

The Contractor shall plan his operations such that access is not required to areas behind the wall once access is difficult or once these areas have been stabilized. The Contractor, having caused his own access to be restricted, through finished grades or stabilized slopes shall not be allowed to use this as an acceptable reason to not perform required work. Should the Contractor need access to these areas, all reestablishment of grades, stabilizing slopes, or turf establishment shall be done at his own cost.

All ground beyond the limits disturbed by the installation of the wall shall be restored to its proposed finished condition and all excess material shall be removed from the site.

On Site Representative:

A qualified and experienced representative from the wall supplier shall be at the site at the initiation of the wall construction to assist the Contractor and the Engineer. The representative shall also be available for consultation on an as needed basis, as requested by the Contractor or the Engineer.

Installation:

Panel units shall be installed in accordance with manufacturer's recommendations. Special care shall be taken in setting the bottom course of units properly and to true line and grade.

Assembly of the various components shall be performed in such a manner that no undue strain or stress is placed on any of the members that constitute the completed structure.

Inspection and Rejection:

Marking: The date of manufacture, the production lot number, and the piece-mark shall be clearly marked on the side of each panel or module.

The quality of materials, the process of manufacture, and the finished units shall be subject to inspection by the Engineer prior to shipment.

Panels with textured surface treatments shall be rejected if there are variations in the exposed face that deviates from the approved model as to color or texture as determined by the Engineer.

Acceptance Criteria for Noise Barrier Wall:

Precast components shall be accepted for use in wall construction provided the concrete strength meets or exceeds the minimum compressive strength requirement, and the panel or module dimensions are free from any chipping, cracks, honeycomb surface treatment, open texture concrete, broken corners or other defects as determined by the Engineer.

The Contractor shall be responsible for ensuring a completed sound barrier system free of discoloration, cracks or objectionable marks which may adversely affect the barriers performance, aesthetics, or serviceability as determined by the Engineer. All structurally cracked panels, as determined by the Engineer, will be rejected either at the fabrication shop or at the construction site, even after installation, but prior to acceptance of the job.

Rejected panels deemed to require repair or replacement shall be replaced at the Contractor's expense. No payment shall be made for removing, temporarily storing, or reinstalling panels to enable access to the panel to be replaced. Any panels which are damaged during panel replacement shall also be replaced or repaired per the direction of the Engineer.

Method of Measurement:

Noise barrier wall and noise barrier wall (structure) shall be measured for payment from center to center of each vertical column supporting the wall by the number of square feet of wall system completed and accepted within the limits indicated on the plans or as ordered by the Engineer. The vertical pay limit shall be from the bottom of the barrier panel section to the top of the barrier panel. Each span between columns shall be measured for payment separately, as stepping may be required.

Noise barrier wall (earth retaining panels) shall be measured for payment by the actual number of square feet of Noise barrier wall (earth retaining panels) installed and accepted. The vertical pay limit for each panel section shall extend from the bottom of the lowest panel, up to the top of the barrier panel above, specifically identified and constructed to retain earth.

Work or features for underdrainage associated with noise barrier wall (earth retaining panels) such a sweep holes, underdrains, filter fabric, pervious structure backfill, and stone backfill for piping shall not be measured for payment but included in the item: Noise barrier wall (earth retaining panels).

Matching color paint or stain shall not be measured for payment but included in the price for the noise barrier wall.

The four (4) full panel sections of noise barrier wall delivered to the D.O.T. Maintenance Facility, shall be measured and paid for as Noise Barrier Wall (sf).

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Crushed Stone used under and/or adjacent to the Noise barrier wall will be measured and paid separately under the appropriate Contract item.

Basis of Payment:

Payment for this work will be made at the Contract unit price per square foot for Noise Barrier Wall or Noise barrier wall (earth retaining panels), and noise barrier wall (structure) complete in place, which price shall include engineering, all materials utilized for the fabrication and installation of the wall itself (panel sections, stepping blocks, anchoring mechanisms, support columns and all necessary hardware), facing panels, excavation, grading, disposal of surplus material, equipment, tools, labor and work incidental to the installation of the wall. Payment shall also include the pigmentation of the wall and coatings.

Any additional material ie: fill, reuse or borrow necessary to construct an access road, temporary pads or any other method for the removal of noise barrier wall or the installation of any portion of the noise barrier wall will not be measured for payment but included in the item or in the overall cost of the work. This extra material shall be disposed of at no additional cost to the State. Final grades in the front and back of the wall will conform to the proposed cross sections and final approved working drawings.

Additional foundations, posts, and panels required due to unexpected field changes of the approved design directed by the Engineer shall be paid for at the square foot Contract price for that item.

No payment shall be made for weepholes, subdrainage, filter fabric or stone backfill for underdrainage associated with the noise barrier wall (earth retaining panels). These items shall be included in the cost of the wall.

No payment shall be made for survey, field verification, preparation of working drawings or for paint or stain required to repair vandalism.

PAY ITEM
Noise Barrier Wall

PAY UNIT
ft²

ITEM # 0917010A – REPAIR GUIDERAIL

Description: Work under this item shall consist of the repair of newly installed guiderail. It shall be repaired in the locations originally installed and fabricated in conformity with the lines, designations, dimensions, and details shown on the plans or as ordered by the Engineer.

Materials: The material for guiderail shall meet the requirements as specified within the original applicable contract items.

When repairing guiderail, the Contractor shall reuse any undamaged existing guiderail elements, timber rail, wire rope, appropriate posts, delineators, lap bolts, and other hardware within the project limits as approved by the Engineer to repair the guiderail. The Contractor shall use new materials when any components of the existing railing are damaged or missing and cannot be obtained from other guiderail systems being removed or converted within the Project limits.

Construction Methods: The repair of guiderail shall be in accordance with contraction methods as specified within the original applicable contract items.

Guiderail, including end anchors, which has been installed in final condition and accepted by the Engineer, shall be eligible for reimbursement for repairs subject to the conditions described below. If multiple runs are to be installed in a single stage as indicated in the contract documents, determination for reimbursement shall be made when all runs within the stage are complete and accepted as previously described. On projects without designated stages, guiderail installations must be complete and serving the intended function as determined by the Engineer.

When newly installed guiderail is damaged by public traffic, the following conditions must be satisfied prior to reimbursement for payment;

1. The damage must have been caused solely by the traveling public.
2. The contractor shall provide satisfactory evidence that such damage was caused by public traffic. Such as accident reports obtained from the Connecticut Department of Public Safety, police agencies or insurance companies; statements by reliable, unbiased eyewitnesses; or identification of the vehicle involved in the accident.
3. The contractor shall attempt to collect the costs from the person or persons responsible for the damage and provide documentation of those efforts to the satisfaction of the Engineer.
4. If such evidence cannot be obtained, the Engineer may determine that the damage was not caused by the Contractor and reimbursement for payment is warranted.

This repair provision does not relieve the Contractor of the requirements of Section 1.07, any other contractual requirements for maintenance and protection of traffic and final acceptance and relief of responsibility for the project.

The contractor shall remain responsible for the safety and integrity of the guiderail system for the duration of the project. In the event the guiderail is damaged, the Contractor shall provide sufficient cones, drums and other traffic control devices to provide safe passage by the public. When ordered by the Engineer, the Contractor shall furnish replacement parts and immediately repair the guiderail, but in no case more than 24 hours after notification from the Engineer. In non-emergency situations, the guiderail shall be repaired within 72 hours. The repaired guiderail or anchorages, when completed, shall conform to these specifications for a new system. The Contractor shall be responsible for the removal and the proper disposal of all damaged material and debris.

Method of Measurement: Guiderail damaged solely by the traveling public will be measured for payment. Damage caused by the Contractor's equipment or operations will not be measured for payment.

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

Basis of Payment: Repair of guiderail will be paid for in accordance with Article 1.09.04 as required to restore the rail to its full working condition in conformance with these specifications for a new system. There will be no payment for maintenance and protection of traffic for work associated with this item unless, in the opinion of the Engineer, the sole purpose of the maintenance and protection of traffic is for repair of the guiderail.

<u>Pay Item</u>	<u>Pay Unit</u>
Repair Guiderail	est. (est.)

ITEM #0922999A – INLAID THERMOPLASTIC PAVEMENT MARKING SYSTEM

Description: This work shall consist of a thermoplastic pavement marking system that provides a textured, highly attractive and durable topical treatment to the surface of asphalt pavement. The system will replicate, in relief, the grout lines common to brick or other types of unit pavers or other patterns. The pattern shall be approved by the Engineer prior to installation.

Materials: The thermoplastic surfacing systems shall consist of the following:

- A. Thermoplastic shall consist of homogeneously mixed non-hazardous polymer resins, pigments, fillers consisting of TiO² and CaCO³, glass beads and at least 12% coarse aggregate particles sized 6-14 mesh, with a negligible VOC level and be resistant to deterioration when exposed to sunlight, gasoline, oil, salt, water or adverse weather conditions.
- B. Thermoplastic shall be supplied as precut panels at a standard thickness of 180 mils +/- 10 mils. Thermoplastic for transverse lines shall be supplied as pre-formed, white thermoplastic line stripe material 90 mils thick.
- C. Thermoplastic shall exhibit the following typical properties:

Characteristic	Test Method	Typical Results of Thermoplastic
Water Absorption	ASTM D570	<0.5%
Binder Content	AASHTO T250	18.8% - 20.0%
Low Temp. Resistance @ 15°F	AASHTO T250	No Cracking
Specific Gravity	ASTM D 792	2.0 -2.16
Indentation Resistance @ 46.1°C	ASTM D 2240	44-52
Impact Resistance	ASTM D256, Mtd A	<20
Flash Point	ASTM D92	>440°F
Bond Strength	ASTM D4796	316+psi
Friction	British Pendulum	BPN >65

Construction Methods:

General

The work shall be carried out in accordance with manufacture's recommended application procedure guide and specifications or as directed by the Engineer. Installation shall not begin without written confirmation of applicator accreditation or authorization.

Surface Preparation

The asphalt pavement surface shall be dry and free from all foreign matter, including but not limited to dirt, dust, de-icing materials, and chemical residue.

Heating the Asphalt Pavement

The optimal pavement temperature for imprinting the template is dependent upon mix design, modifiers used in the mix, and the age of the pavement. Care must be taken to avoid over heating the pavement; excessive blue smoke emanating from the asphalt pavement must be avoided. Typically, the surface temperature of the pavement should not exceed 325°F as determined by reading a calibrated infra-red thermometer.

Surface Imprinting

Once the asphalt pavement has reached imprinting temperature, the first (3/8" diameter wire rope) template shall be placed in position then pressed into the surface using vibratory plate compactors. Once the top of the template is level with the surrounding asphalt pavement, the template can be removed. Areas that have an imprint depth less than the depth of the template shall be re-heated and re-stamped prior to installing the thermoplastic.

Installing the Thermoplastic and Sand

- A. The area must be thoroughly cleaned and dried before installing the thermoplastic.
- B. Do not install during periods of precipitation.
- C. Both the ambient air temperature and the pavement temperature must be above 45°F (7°C). Do not install when there is frost still on the ground.
- D. Place the thermoplastic sheets over top of the imprinted asphalt pavement and in-line with the pattern. The sheets are to be butted together without overlap and cover the entire area designated to receive the surfacing system.
- E. Using the manufacturer's recommended equipment, heat shall be applied to the thermoplastic to gradually raise the temperature so that the thermoplastic is melted all the way through and begins to flow into the grout lines and fuse with both the surface of the asphalt pavement and the edges of the neighboring thermoplastic sheet.

- F. As the thermoplastic starts to flow and adhesion to the pavement surface is attained, the sand is seeded evenly into and on top of the thermoplastic at an approximate rate of 50 pounds per 200 sf of surface.
- G. Using a vibratory plate compactor, the thermoplastic shall be post-printed using the second (1/4" diameter wire rope) template to clearly define the pattern.

Protection and Opening to Traffic

The melted thermoplastic is to be protected until it cools and hardens. Water may be introduced to the surface as a way to help accelerate the cooling of the thermoplastic. No debris such as dust, excessive water, pollen, etc shall be permitted to come in contact with the melted thermoplastic.

The road may be opened to traffic once the thermoplastic has cooled to adjacent pavement temperature.

Method of Measurement:

Architectural pavement will be measured for payment by the actual number of square feet of thermoplastic marking system installed on the pavement and accepted by the Engineer.

No deduction will be made for the area(s) occupied by manholes, inlets, drainage structures, bollards or by any public utility appurtenances within the areas.

Basis of Payment:

This work will be paid for at the contract unit price per square foot for “ Inlaid Thermoplastic Pavement Marking System” installed on the pavement and accepted. This price shall be for all the work required by this section and all materials, equipment, tools and labor incidental thereto.

Pay Item	Pay Unit
Inlaid Thermoplastic Pavement Marking System	s.f.

ITEM #0950019A – TURF ESTABLISHMENT - LAWN

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

Materials: The materials for this work shall conform to the requirements of Section 9.50 of Standard Specification Form 816. The following mix shall be used for this item:

Turf Seed Mix:

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

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

Construction Methods: Construction Methods shall be those established as agronomically acceptable and feasible and that are approved by the Engineer. Rate of application shall be field determined in Pure Live Seed (PLS) based on the minimum purity and minimum germination of the seed obtained. Calculate the PLS for each seed species in the mix. Adjust the seeding rate for the above composite mix, based on 250 lbs. (274 kg.) per acre (hectare). The seed shall be mulched in accordance with Article 9.50.03.

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

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

<u>Pay Item</u>	<u>Pay Unit</u>
Turf Establishment - Lawn	S.Y.

ITEM # 0969062A - CONSTRUCTION FIELD OFFICE, MEDIUM

Description: Under the item included in the bid document, adequate weatherproof office quarters will be provided by the Contractor for the duration of the work, and if required, for a maximum of ninety days thereafter for the exclusive use of ConnDOT forces and others who may be engaged to augment ConnDOT forces with relation to the contract. The office quarters shall be located convenient to the work site and installed in accordance with Article 1.08.02, this office shall be separated from any office occupied by the Contractor. Ownership and liability of the office quarters shall remain with the Contractor.

Materials: Materials shall be in like new condition for the purpose intended and shall be approved by the Engineer.

Office Requirements: The Contractor shall furnish the office quarters and equipment as described below.

	Description:
400 SF	Sq. Ft. of floor space with a minimum ceiling height of 7 ft. and shall be partitioned as shown on building floor plan as provided by the Engineer.
2 EA	Minimum number of exterior entrances.
7 EA	Minimum number of parking spaces.

Office layout: The office shall have a minimum square footage as indicated in the table above, and shall be partitioned as shown on building floor plan as provided by the Engineer. The underside of the office shall be fully skirted to the ground.

Lavatory Facilities: The Contractor shall furnish lavatory and toilet facilities at a location convenient to the office quarters for the use of Department personnel and such assistants as they may engage. He shall also supply lavatory and sanitary supplies as required.

Windows and Entrances: The windows shall be of a type that will open and close conveniently, shall be sufficient in number and size to provide adequate light and ventilation, and shall be fitted with locking devices, blinds and screens. The entrances shall be secure, screened, and fitted with a lock for which four keys shall be furnished. All keys to the construction field office shall be furnished to the Department and will be kept in their possession while State personnel are using the office. Any access to the entrance ways shall meet applicable building codes and be slip resistant, with appropriate handrails.

Lighting: The Contractor shall equip the office interior with electric lighting that provides a minimum illumination level of 100 foot-candles at desk level height, and electric outlets for each desk and drafting table. The Contractor shall also provide exterior lighting that provides a minimum illumination level of 2 foot-candles throughout the parking area and for a minimum distance of 10 ft. on each side of the field office.

The Contractor shall provide the following additional equipment, facilities, and/or services at the Field Office on this project to include at least the following to the satisfaction of the Engineer:

Parking Facility: Adequate parking spaces with adequate illumination on a paved surface, with surface drainage if needed. If paved parking does not exist adjacent to the field office, the Contractor shall provide a parking area of sufficient size to accommodate the number of vehicles indicated in the table above. Construction of the parking area and driveway, if necessary, will consist of a minimum of 6 inches of processed aggregate base graded to drain. The base material will be extended to the office entrance.

Field Office Security: Physical Barrier Devices - This shall consist of physical means to prevent entry, such as: 1) All windows shall be barred or security screens installed; 2) All field office doors shall be equipped with dead bolt locks and regular day operated door locks; and 3) Other devices as directed by the Engineer to suit existing conditions.

Electric Service: The field office shall be equipped with an electric service panel to serve the electrical requirements of the field office, including: lighting, general outlets, computer outlets, calculators etc., and meet the following minimum specifications:

- A. 120/240 volt, 1 phase, 3 wire.
- B. Ampacity necessary to serve all equipment. Service shall be a minimum 100 amp dedicated to the construction field office.
- C. The electrical panel shall include a main circuit breaker and branch circuit breakers of the size and quantity required.
- D. Additional 120 volt, single phase, 20 amp, isolated ground dedicated power circuit with dual NEMA 5-20 receptacles will be installed at each computer workstation location.
- E. Additional 120 volt, single phase, 20 amp, isolated ground dedicated power circuit with dual NEMA 5-20 receptacles will be installed, for use by the Telephone Company.
- F. Additional 120-volt circuits and duplex outlets as required meeting National Electric Code requirements.
- G. One exterior (outside) wall mounted GFI receptacle, duplex, isolated ground, 120 volt, straight blade.
- H. After work is complete and prior to energizing, the State's ConnDOT electrical inspector, must be contacted at 860-594-2240. (Do Not Call Local Town Officials)
- I. Prior to field office removal the ConnDOT Data Communications office must be notified to deactivate the communications equipment.

Heating, Ventilation and Air Conditioning (HVAC): The field office shall be equipped with sufficient heating, air conditioning and ventilation equipment to maintain a temperature range of 68°-80° Fahrenheit within the field office.

The Following Furnishings and Equipment Shall Be Provided In The Applicable Field Office Type:

Qty	Description:
3 EA	Office desks (2.5 ft x 5 ft) with drawers, locks, and matching desk chairs that have

Qty	Description:
	pneumatic seat height adjustment and dual wheel casters on the base.
2 EA	Office Chairs.
1 EA	Fire resistant cabinets (legal size/4 drawer), locking.
1 EA	Drafting type tables (3 ft x 6 ft) and supported by wall brackets and legs; and matching drafters stool that have pneumatic seat height adjustment, seat back and dual wheel casters on the base.
2 EA	Personal computer tables (4 ft x 2.5 ft).
1 EA	Hot and cold water dispensing unit and supply of cups and bottled water shall be supplied by the Contractor for the duration of the project.
2 EA	Electronic office type printing calculators capable of addition, subtraction, multiplication and division with memory and a supply of printing paper.
2 EA	Telephone.
1 EA	Telephone answering machine.
1 EA	Plain paper facsimile (FAX) machine capable of transmitting via telephone credit card. All supplies, paper and maintenance shall be provided by the Contractor.
1 EA	Copier/Scanner - dry, plain paper with automatic feeder and reducing capability. All supplies, paper and maintenance shall be provided by the Contractor.
2 EA	Computer systems as specified below under <u>Computer Hardware and Software</u> . All supplies and maintenance shall be provided by the Contractor.
1 EA	Laser printer as specified below under <u>Computer Hardware and Software</u> . All supplies, paper and maintenance shall be provided by the Contractor.
2 EA	Digital Camera as specified below under <u>Computer Hardware and Software</u> . All supplies and maintenance shall be provided by the Contractor.
1 EA	Wastebaskets - 30 gal., including plastic waste bags.
3 EA	Wastebaskets - 5 gal., including plastic waste bags.
2 EA	Electric pencil sharpeners.
* EA	Fire extinguishers - provide and install type and number to meet applicable State and local codes for size of office indicated, including a fire extinguisher suitable for use on a computer terminal fire.
1 EA	Vertical plan racks for 2 sets of 2 ft x 3 ft plans for each rack.
1 EA	Infrared Thermometer, including certified calibration, case, cleaning wipes.
1 EA	Concrete Curing Box as specified below under <u>Concrete Testing Equipment</u> .
1 EA	Concrete Air Meter as specified below under <u>Concrete Testing Equipment</u> .
1 EA	Concrete Slump Cone as specified below under <u>Concrete Testing Equipment</u> .

The furnishings and equipment required herein shall remain the property of the Contractor. Any supplies required to maintain or operate the above listed equipment or furnishings shall be provided by the Contractor for the duration of the project.

Telephone Service: This shall consist of the installation of two (2) telephone lines: one (1) line for phone/voice service and one (1) line dedicated for the facsimile machine. The Contractor shall pay all charges except for out-of-state toll calls made by State personnel.

Data Communications Facility Wiring: Contractor shall install a Category 5e 468B patch panel in a central wiring location and Cat 5e cable from the patch panel to each PC station, terminating in a (category 5e 468B) wall or surface mount data jack. The central wiring location shall also house either the data circuit with appropriate power requirements or a category 5 cable run to the location of the installed data circuit. The central wiring location will be determined by the ConnDOT Data Center staff in coordination with the designated field office personnel as soon as the facility is in place. The ConnDOT Project Engineer will provide the Contractor with a copy of the current PC specifications, approved printer list and data wiring schematic as soon as possible after the contract is awarded.

Contractor to run a CAT 5e LAN cable a minimum length of 25 feet for each computer to LAN switch area leaving an additional 10 feet of cable length on each side with terminated RJ45 connectors. Each run / jack shall be clearly labeled with an identifying Jack Number.

The installation of a data communication circuit between the field office and the ConnDOT Data Communication Center in Newington will be coordinated between the ConnDOT District staff, ConnDOT Office of Information Systems and the local phone company. The ConnDOT District staff will coordinate the installation of the data communication service with ConnDOT PC Support once the field office phone number is issued. The Contractor shall provide the field office telephone number(s) to the ConnDOT Project Engineer as soon as possible to facilitate data line and computer installations.

Computer Hardware and Software:

The ConnDOT Project Engineer will provide the Contractor with a copy of the current PC specifications, approved printer list and data wiring schematic as soon as possible after the contract is awarded.

Before ordering the computer hardware and software, the Contractor must submit a copy of their proposed PC specifications and the type of printer to the ConnDOT Project Engineer for review by the ConnDOT Data Center. If the specification meets or exceeds the minimum specifications listed below, then the Contractor will be notified that the order may be placed.

Before any equipment is delivered to the Data Center, arrangements must be made a minimum of 24 hours in advance by contacting 860-594-3500. All software, hardware and licenses listed below shall be clearly labeled, specifying the (1) Project No., (2) Contractor Name, (3) Project Engineer's Name and (4) Project Engineer's Phone No., and shall be delivered to the ConnDOT Data Center, 2710 Berlin Turnpike, Newington, CT, where it will be configured and prepared for field installation. Installation will then be coordinated with ConnDOT field personnel and the computer system specified will be stationed in the Department's project field office.

The computer system furnished shall have all software and hardware necessary for the complete installation of the latest versions of the software listed, and therefore supplements the minimum specifications below. The Engineer reserves the right to expand or relax the specification to adapt to the software and hardware limitations and availability, the compatibility with current

agency systems, and to provide the Department with a computer system that can handle the needs of the project. This requirement is to ensure that the rapid changing environment that computer systems have experienced does not leave the needs of the project orphan to what has been specified. There will not be any price adjustment due to the change in the minimum system requirements.

The Contractor shall provide the Engineer with a licensed copy registered in the Department's name of the latest versions of the software listed and maintain customer support services offered by each software producer for the duration of the Contract. The Contractor shall deliver to the Engineer all supporting documentation for the software and hardware including any instructions or manuals. The Contractor shall provide original backup media for the software.

The Contractor shall provide the computer system with all required supplies, maintenance and repairs (including labor and parts) throughout the Contract life.

Once the Contract has been completed, the computer will remain the property of the Contractor. Prior to the return of any computer(s) to the Contractor, field personnel will coordinate with the Data Center personnel for the removal of Department owned equipment, software, data, and associated equipment.

A) Computer – Minimum Specification:

Processor – Intel® Core 2 Duo Processor (2.00 GHz, 800 MHz FSB 2MB L2 Cache)

Memory – 2 GB DIMM DDR2 667MHz.

Monitor – 19.0 inch LCD color monitor.

Graphics – Intel Graphics Media Accelerator 3100. or equivalent.

Hard Drive – 160 GB Ultra ATA hard drive (Western Digital, IBM or Seagate).

Floppy Drive – 3.5 inch 1.44MB diskette drive.

Optical Drive – CD-RW/DVD-RW Combo.

Multimedia Package – Integrated Sound Blaster Compatible AC97 Sound and speakers.

Case – Small Form or Mid Tower, capable of vertical or horizontal orientation.

Integrated Network Adapter – comparable to 3COM PCI 10/100 twisted pair Ethernet.

Keyboard – 104+ Keyboard.

Mouse – Optical 2-button mouse with scroll wheel.

Operating System – Windows XP Professional Service Pack 2; Windows Vista Capable.

Application Software – MS Office 2007 Professional Edition.

Additional Software (Latest Releases, including subscription services for the life of the Contract.–

- Norton Anti-Virus and CD/DVD burning software (ROXIO or NERO),
- Adobe Acrobat Standard

Resource or Driver CD/DVD – CD/DVD with all drivers and resource information so that computer can be restored to original prior to shipment back to the contractor.

Uninterrupted power supply – APC Back-UPS 500VA.

Note A1: All hardware components must be installed before delivery. All software documentation and CD-ROMs/DVD for Microsoft Windows XP Professional, Microsoft

Office 2007 Professional Edition, and other software required software must be provided. Computer Brands are limited to Dell, Gateway and HP brands only. No other brands will be accepted. The ConnDOT Project Engineer will provide the Contractor with a copy of the current PC specifications and approved printer list as soon as possible after the contract is awarded.

Note A2: As of June 30, 2008, Microsoft will no longer distribute Windows XP for retail sale, although the date for specific computer manufacturers may be different. Please consult your manufacturer for details. The Department still requires Windows XP on all PCs. Microsoft has stated that any PCs that are purchased with either Windows Vista Business, or Vista Ultimate are automatically entitled to “downgrade rights”, which allow the PC to be rolled back to Windows XP. Please consult the specific manufacturer for details on downgrading new PCs to Microsoft Windows XP after June 30, 2008.

B) Laser Printer – Minimum Specification:

Print speed – 20 ppm.
Resolution – 1,200 x 1,200 dpi.
Paper size – Up to 216 mm x 355 mm (8.5 in x 14 in).
RAM – 16 MB.
Print Drivers – Must support HP PCL6 and HP PCL5e.
Printer cable – 1.8 m (6 ft).

Note B1: Laser printer brands are limited to Hewlett-Packard and Savin brands only. The ConnDOT Project Engineer will provide the Contractor with a copy of the current PC specifications and approved printer list as soon as possible after the contract is awarded.

Note B2: It is acceptable to substitute a multi-function all-in-one printer/copier/scanner/fax machine listed on the approved printer list in place of the required laser printer and fax machine.

C) Digital Camera – Minimum Specification:

Optical – 5 mega pixel, with 3x optical zoom.
Memory – 2 GB.
Features – Date/time stamp feature.
Connectivity – USB cable or memory card reader.
Software – Must be compatible with Windows XP and Vista.
Power – Rechargeable battery and charger.

The Contractor is responsible for service and repairs to all computer hardware. All repairs must be performed with-in 48 hours. If the repairs require more than a 48 hours then a replacement must be provided. All supplies, paper and maintenance for the computers, laptops, printers, copiers, and fax machines shall be provided by the Contractor.

Concrete Testing Equipment: If the Contract includes items that require compressive strength cylinders for concrete, in accordance with the Schedule of Minimum Testing Requirements for

Sampling Materials for Test, the Contractor shall provide the following. All testing equipment will remain the property of the Contractor at the completion of the project.

- A) Concrete Cylinder Curing Box – meeting the requirements of Section 6.12 of the Standard Specifications.
- B) Air Meter – The air meter provided shall be in good working order and will meet the requirements of AASHTO T 152.
- C) Slump Cone Mold – Slump cone, base plate, and tamping rod shall be provided in like-new condition and meet the requirements of AASHTO T119, Standard Test Method for Slump of Hydraulic-Cement Concrete.

Insurance Policy: The Contractor shall provide a separate insurance policy, with no deductible, in the minimum amount of twenty thousand dollars (\$20,000.00) in order to insure all State-owned data equipment and supplies used in the office against all losses. The Contractor shall be named insured on that policy, and the Department shall be an additional named insured on the policy. These losses shall include, but not be limited to: theft, fire, and physical damage. The Department will be responsible for all maintenance costs of Department owned computer hardware. In the event of loss, the Contractor shall provide replacement equipment in accordance with current Department equipment specifications, within seven days of notice of the loss. If the Contractor is unable to provide the required replacement equipment within seven days, the Department may provide replacement equipment and deduct the cost of the equipment from monies due or which may become due the Contractor under the contract or under any other contract. The Contractor's financial liability under this paragraph shall be limited to the amount of the insurance coverage required by this paragraph. If the cost of equipment replacement required by this paragraph should exceed the required amount of the insurance coverage, the Department will reimburse the Contractor for replacement costs exceeding the amount of the required coverage.

Maintenance: During the occupancy by the Department, the Contractor shall maintain all facilities and furnishings provided under the above requirements, and shall maintain and keep the office quarters clean through the use of weekly professional cleaning to include, but not limited to, washing & waxing floors, cleaning restrooms, removal of trash, etc. Exterior areas shall be mowed and clean of debris. A trash receptacle (dumpster) with weekly pickup (trash removal) shall be provided. Snow removal, sanding and salting of all parking, walkway, and entrance ways areas shall be accomplished during a storm if on a workday during work hours, immediately after a storm and prior to the start of a workday. If snow removal, salting and sanding are not completed by the specified time, the State will provide the service and all costs incurred will be deducted from the next payment estimate.

Method of Measurement: The furnishing and maintenance of the construction field office will be measured for payment by the number of calendar months that the office is in place and in operation, measured to the nearest month.

There will not be any price adjustment due to any change in the minimum computer system requirements.

Basis of Payment: The furnishing and maintenance of the construction field office will be paid at the listed unit price per month for the item “Construction Field Office, Medium”, which price shall include all material, equipment, labor, utility services and work incidental thereto.

The cost of providing the parking area, external illumination, trash removal and snow and ice removal shall be included in the monthly unit price bid for the respective item “Construction Field Office, Medium”.

The State will be responsible for payment of data communication user fees and for toll calls by State personnel.

<u>Pay Item</u>	<u>Pay Unit</u>
Construction Field Office, Medium	Month

ITEM #0970006A - TRAFFICPERSON (MUNICIPAL POLICE OFFICER)
ITEM #0970007A - TRAFFICPERSON (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

Article 9.71.01 – Description: is supplemented by the following:

The Contractor shall maintain and protect traffic as follows and as limited in Section 1.08 “Prosecution and Progress” of the Special Provisions,

ROUTE 8 NB

The Contractor shall maintain and protect the minimum number of through lanes and shoulders as dictated in the Special Provision for Section 1.08 Prosecution and Progress “Limitations of Operations Minimum Number of Lanes to Remain Open” Chart, on a paved travel path not less than 11 feet in width per lane.

ROUTE 8 EXIT 18 NB OFF RAMP

The Contractor shall maintain and protect existing traffic operations

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 one lane of traffic on a paved travel path not less than 12 feet in width.

WESTFIELD AVENUE AND DIVISION STREET

The Contractor shall maintain and protect a minimum of one lane of 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 shall maintain and protect at least an alternating one-way traffic operation on a paved travel path not less than 11 feet in width. The length of the alternating one-way traffic operation shall not exceed 300 feet and there shall be no more than one alternating one-way traffic operation per roadway within the project limits without prior approval of the Engineer.

The Contractor shall be allowed to halt traffic for a period of time not to exceed 10 minutes for the purpose of removing and installing traffic signal span wires, transverse drainage runs and mobilization of equipment. . If more than one 10 minute period is required, the Contractor shall allow all stored vehicles to proceed through the work area prior to the next stoppage.

ALL OTHER ROADWAYS

The Contractor shall maintain and protect 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 and there shall be no more than one alternating one-way traffic operation within the project limits without prior approval of the Engineer.

Full Depth Roadway Reconstruction

The Contractor shall be allowed to maintain and protect traffic on an unpaved surface during full depth reconstruction as dictated in the Special provision Section 1.08 Prosecution and Progress.

COMMERCIAL AND RESIDENTIAL DRIVEWAYS

The Contractor shall maintain access to and egress from all commercial and residential driveways and walkways throughout the project limits with existing or temporary passageways. The Contractor will be allowed to close said driveways and or walkways to perform the required work during those periods when businesses are closed unless permission is granted from business owner to close the driveway during business hours. If a temporary closure of a residential driveway or walkway is necessary, the Contractor shall coordinate with the owner to determine the time period of the closure.

The Contractor shall submit plans and procedures in accordance and conforming with typical details (attached) of the Manual on Uniform Traffic Control Devices (MUTCD) for maintaining pedestrian sidewalk access during the reconstruction of the sidewalk to the Engineer for approval. When a sidewalk or pedestrian route has to be closed, pedestrians must be detoured or temporary sidewalk (minimum 4 feet wide) must be provided. The pedestrian detour and temporary walkway must meet ADA requirements. The appropriate signs for pedestrian detour shall be installed in accordance with MUTCD. Temporary bituminous sidewalk and ramps if required will be paid under Contract Item "Bituminous Concrete Sidewalk" and all necessary pedestrian detour signage will be paid under Contract Item "Construction Signs – Bright Fluorescent Sheeting.

GENERAL

Unpaved travel paths will 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 duration not to exceed 10 calendar days. The unpaved section shall be full width of

the roadway and perpendicular to the travel lanes. Opposing traffic lane dividers shall be used as a centerline.

The Contractor is required to delineate all 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 removed and roadway resurfacing shall be completed full width across a roadway (bridge) 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 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.

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.

Article 9.71.03 – Construction Method: is supplemented by the following:

Requirements For Winter

The Contractor shall schedule a meeting with representatives from the Department including the offices of Maintenance and Traffic, and the Cities of Ansonia and Derby to determine what interim traffic control measures the Contractor must accomplish for the winter to provide safety to the motorist and permit adequate snow removal procedures. This meeting shall be held prior to October 31 of each year and will include, but not be limited to, discussion of the status and schedule of the following items: lane and shoulder widths, pavement restoration, traffic signal work, pavement markings, and signing. detection must be provided within 24 hours of the termination of the existing loop detectors.

Signing Patterns

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

Existing Signing

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

Sign Inventory

Prior to the commencement of construction, the Contractor and the Engineer shall conduct a joint inventory of signs, delineators and object markers. Signs, delineators or object markers that are knocked down or destroyed by the Contractor during the construction of the project shall be replaced by the Contractor at no cost to the State.

Pavement Markings - Limited Access Highways, Turning Roadways and Ramps

During construction, the Contractor shall maintain all pavement markings throughout the limits of the project.

Interim Pavement Markings

The Contractor shall install painted pavement markings, which shall include lane lines (broken lines), shoulder edge lines, stop bars, lane-use arrows and gore markings, on each intermediate course of bituminous concrete pavement and on any milled surface by the end of the work day/night. All painted pavement markings will be paid under the appropriate items.

If the Contractor does not install permanent Epoxy Resin Pavement Markings by the end of the work day/night on exit ramps where the final course of bituminous concrete pavement has been installed, the Contractor shall install temporary 12 inch wide white stop bars. The temporary stop bars shall consist of Temporary Plastic Pavement Marking Tape and shall be installed by the end of the work day/night. 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 these markings when the permanent Epoxy Resin Pavement Markings are 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.

**Pavement Markings -Non-Limited Access Multilane Roadways
Secondary and Local Roadways**

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.

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 DOT Construction, Connecticut State Police (Local Barracks), Municipal Police, the Contractor (Project Superintendent) and the Traffic Control Subcontractor (if different than the prime Contractor) to review the traffic operations, lines of responsibility, and operating guidelines which will be used on the project. Other work zone safety meetings during the course of the project should be scheduled as needed.
- 1.b) A Work Zone Safety Meeting Agenda shall be developed and used at the meeting to outline the anticipated traffic control issues during the construction of this project. Any issues that can't be resolved at these meetings will be brought to the attention of the District Engineer and the Office of Construction. The agenda 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 State Police, 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.

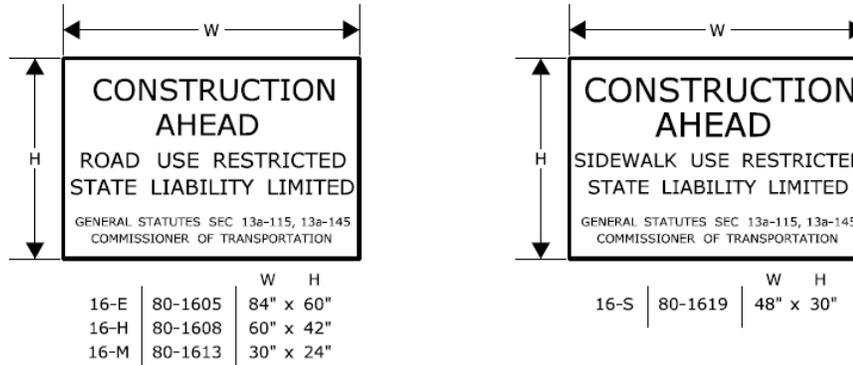
- 7.b) CMS should not be installed within 1000 feet of an existing CMS.
- 7.c) On non-limited access roadways, the use of CMS for lane closures is optional. The roadway geometry, sight line distance, and traffic volume should be considered in the decision to use the CMS.
- 7.d) The advance CMS is typically 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° 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. For special signs, please coordinate with the Office of Construction and the Division of Traffic Engineering for the proper layout/dimensions required.
- 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.

SERIES 16 SIGNS



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

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

THE LOCATION OF SERIES 16 SIGNS CAN BE FOUND ELSEWHERE IN THE PLANS OR INSTALLED AS DIRECTED BY THE ENGINEER.

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

SIGN 16-E SHALL BE USED ON ALL EXPRESSWAYS.

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

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

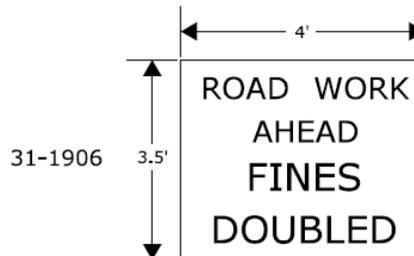
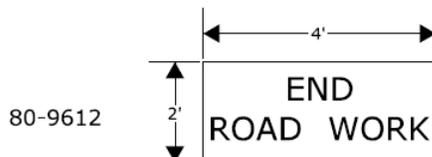
REGULATORY SIGN "ROAD WORK AHEAD, FINES DOUBLED"

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

"END ROAD WORK" SIGN

THE LAST SIGN IN THE PATTERN 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. Harlow* Charles S. Harlow
2012.06.05 11:35:43-04'00'
PRINCIPAL ENGINEER

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

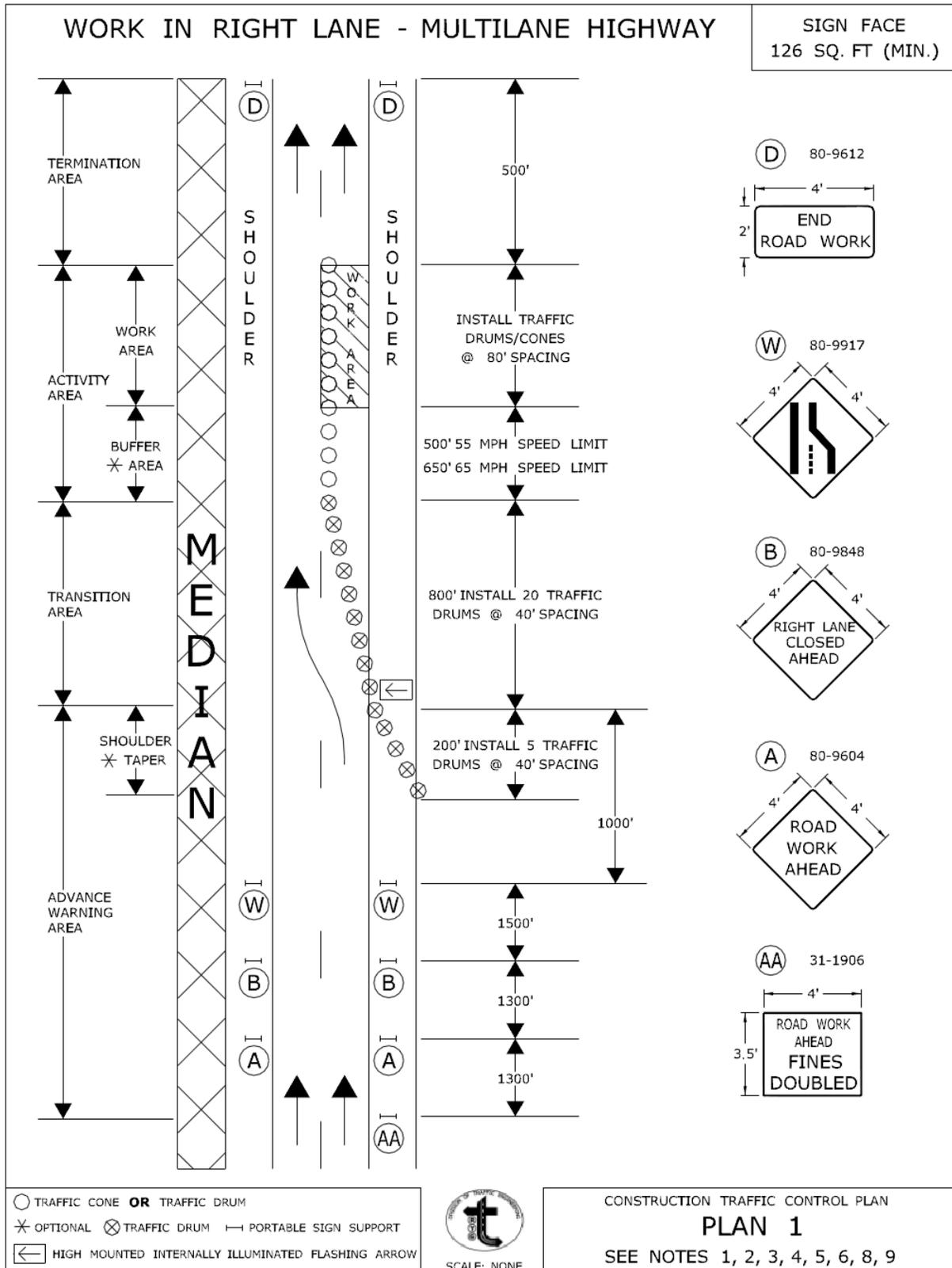
CONSTRUCTION TRAFFIC CONTROL PLAN NOTES

CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION

APPROVED

Charles S. Harlow
PRINCIPAL ENGINEER

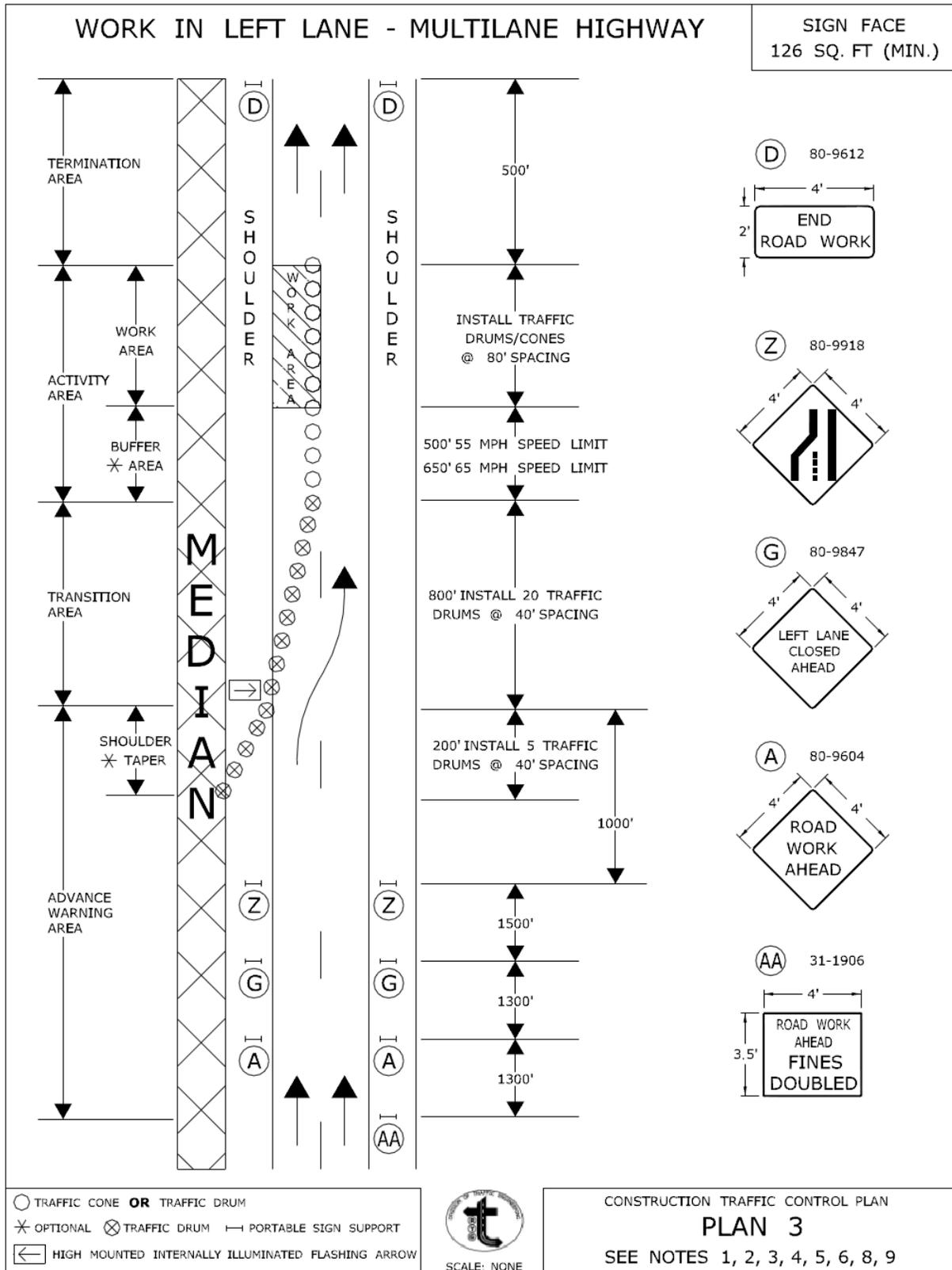
Charles S. Harlow
2012.06.05 15:50:35-0400



CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION

APPROVED

Charles S. Harlow
 Charles S. Harlow
 2012.06.05 15:51:00-0400
 PRINCIPAL ENGINEER

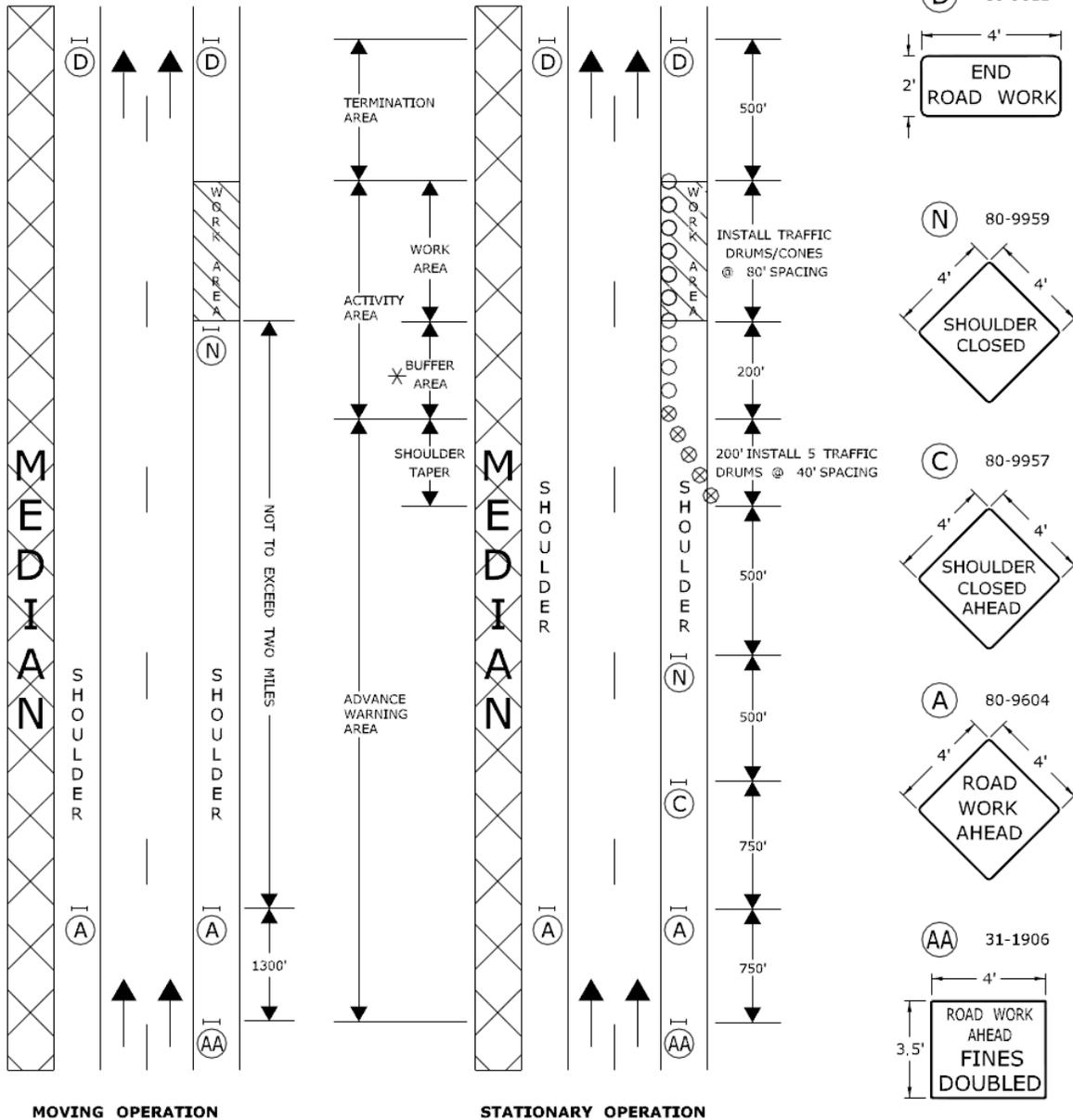


CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION

APPROVED *Charles S. Harlow* Charles S. Harlow
2012.06.05 15:51:46-0400
PRINCIPAL ENGINEER

WORK IN SHOULDER AREA - MULTILANE HIGHWAY

SIGN FACE
94 SQ. FT (MIN.)



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



SCALE: NONE

CONSTRUCTION TRAFFIC CONTROL PLAN

PLAN 6

SEE NOTES 1, 2, 4, 8

APPROVED

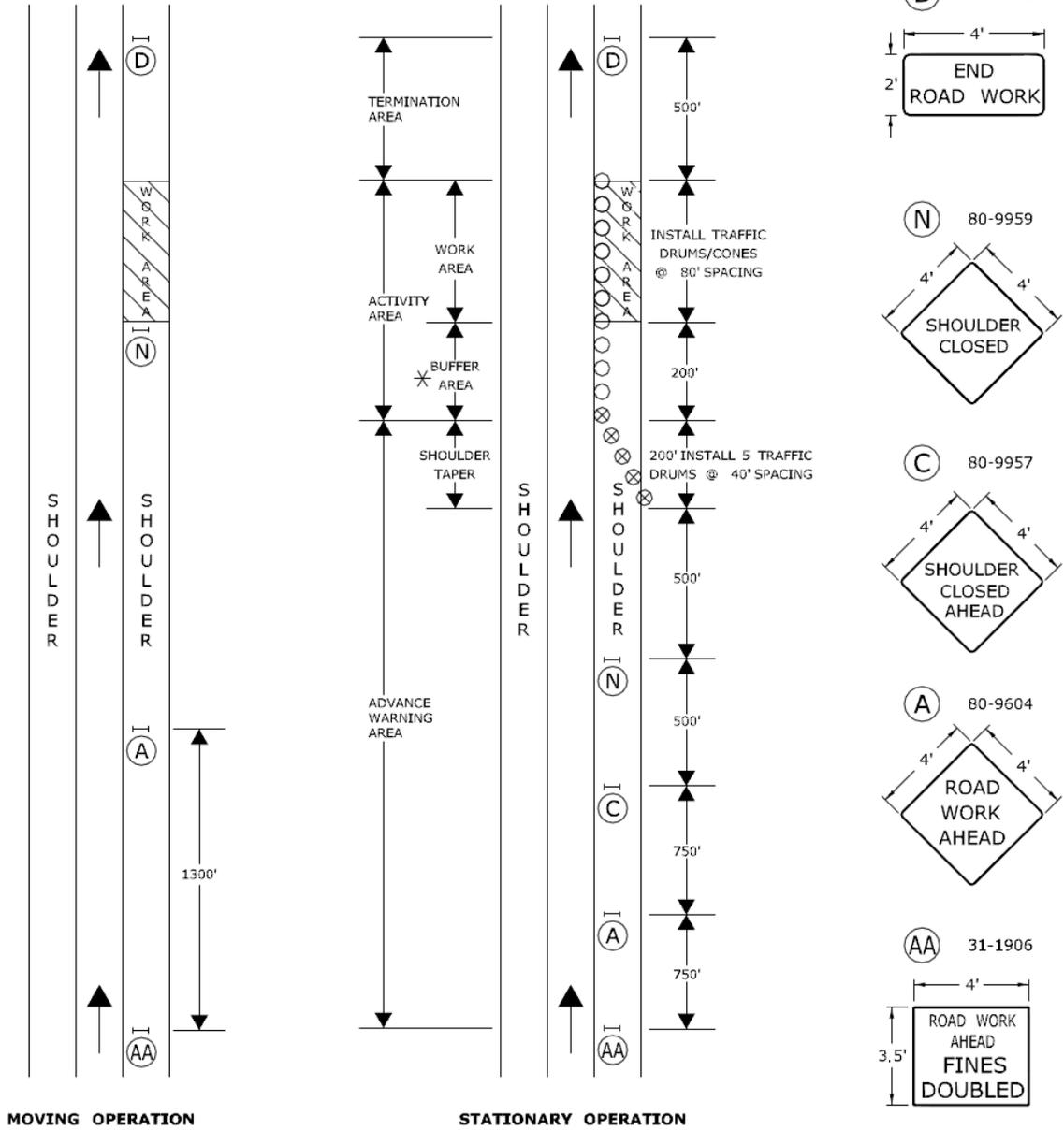
Charles S. Harlow
PRINCIPAL ENGINEER

Charles S. Harlow
2012.06.05 15:52:38-04'00'

CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION

WORK IN SHOULDER AREA - TURNING ROADWAYS / RAMPS

SIGN FACE
70 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

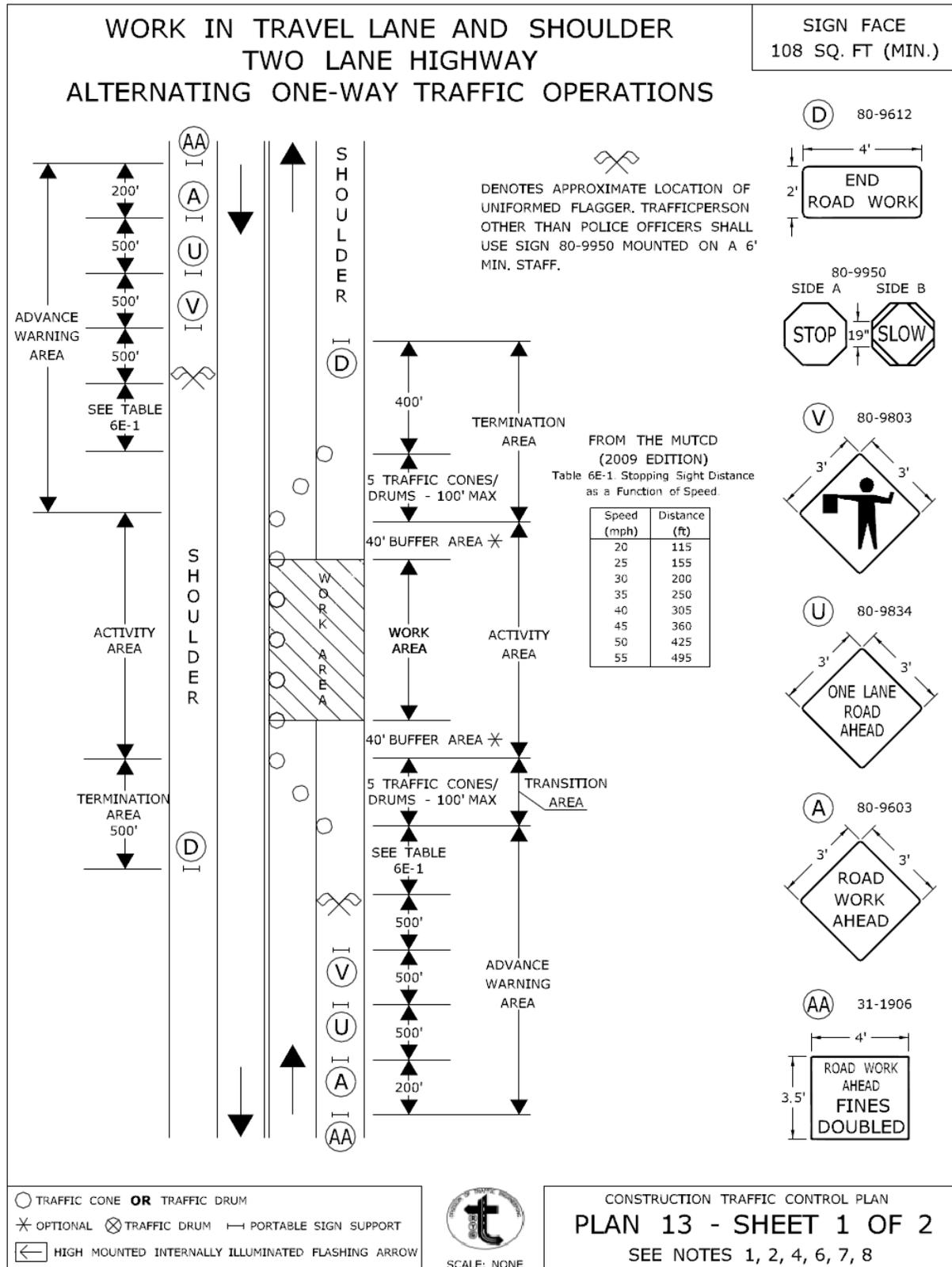
PLAN 9

SEE NOTES 1, 2, 4, 8

CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION

APPROVED

Charles S. Harlow
2012.06.05 15:53:53-0400
PRINCIPAL ENGINEER



CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION

APPROVED Charles S. Harlow
2012.06.05 15:55:23-04:00
PRINCIPAL ENGINEER

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

SIGN FACE
108 SQ. FT (MIN.)

HAND SIGNAL METHODS TO BE USED BY UNIFORMED FLAGGERS

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

A. TO STOP TRAFFIC

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



B. TO DIRECT TRAFFIC TO PROCEED

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



C. TO ALERT OR SLOW TRAFFIC

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



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



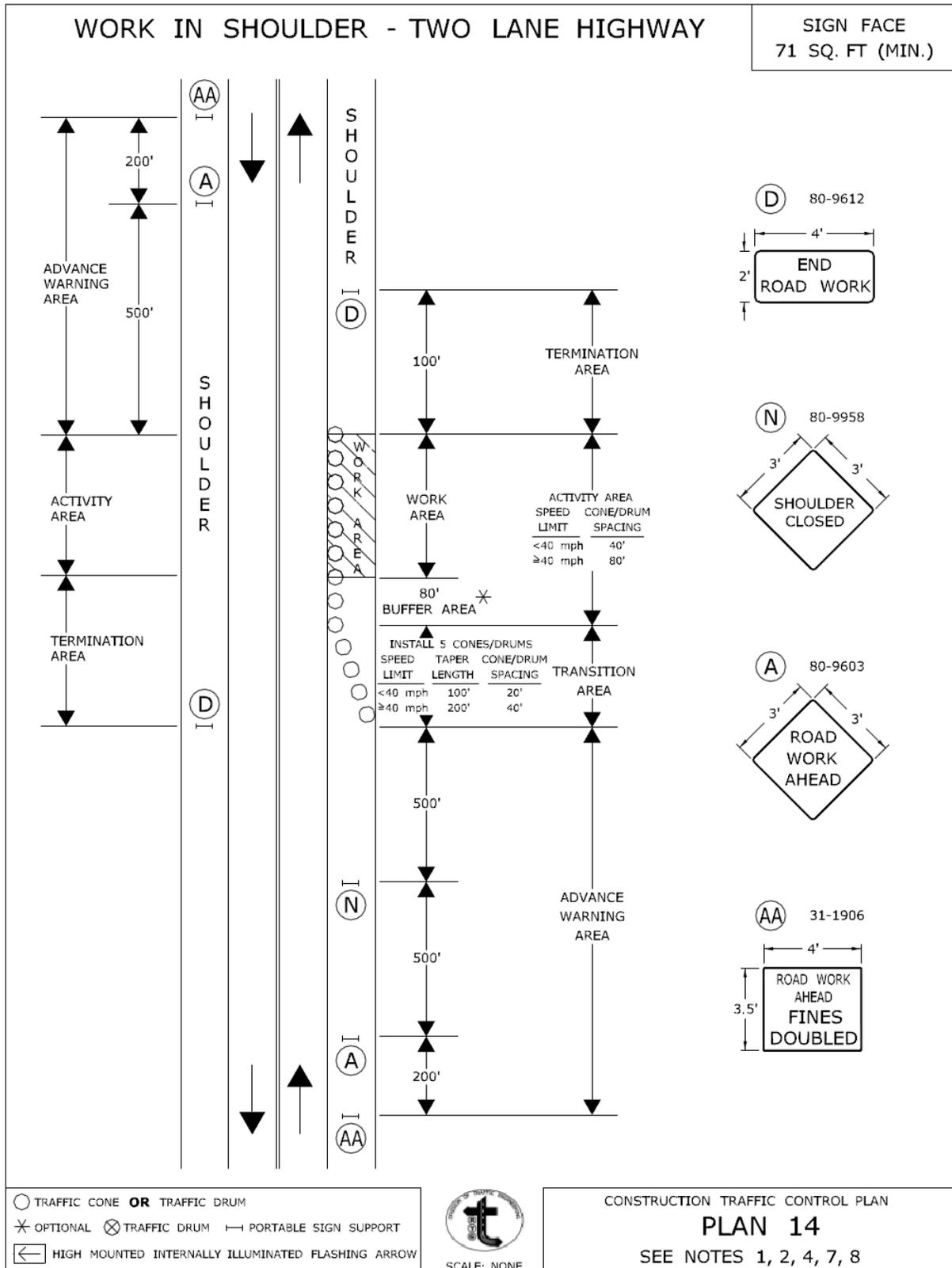
SCALE: NONE

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

CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION

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

ITEM #0971001A



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



SCALE: NONE

CONSTRUCTION TRAFFIC CONTROL PLAN

PLAN 14

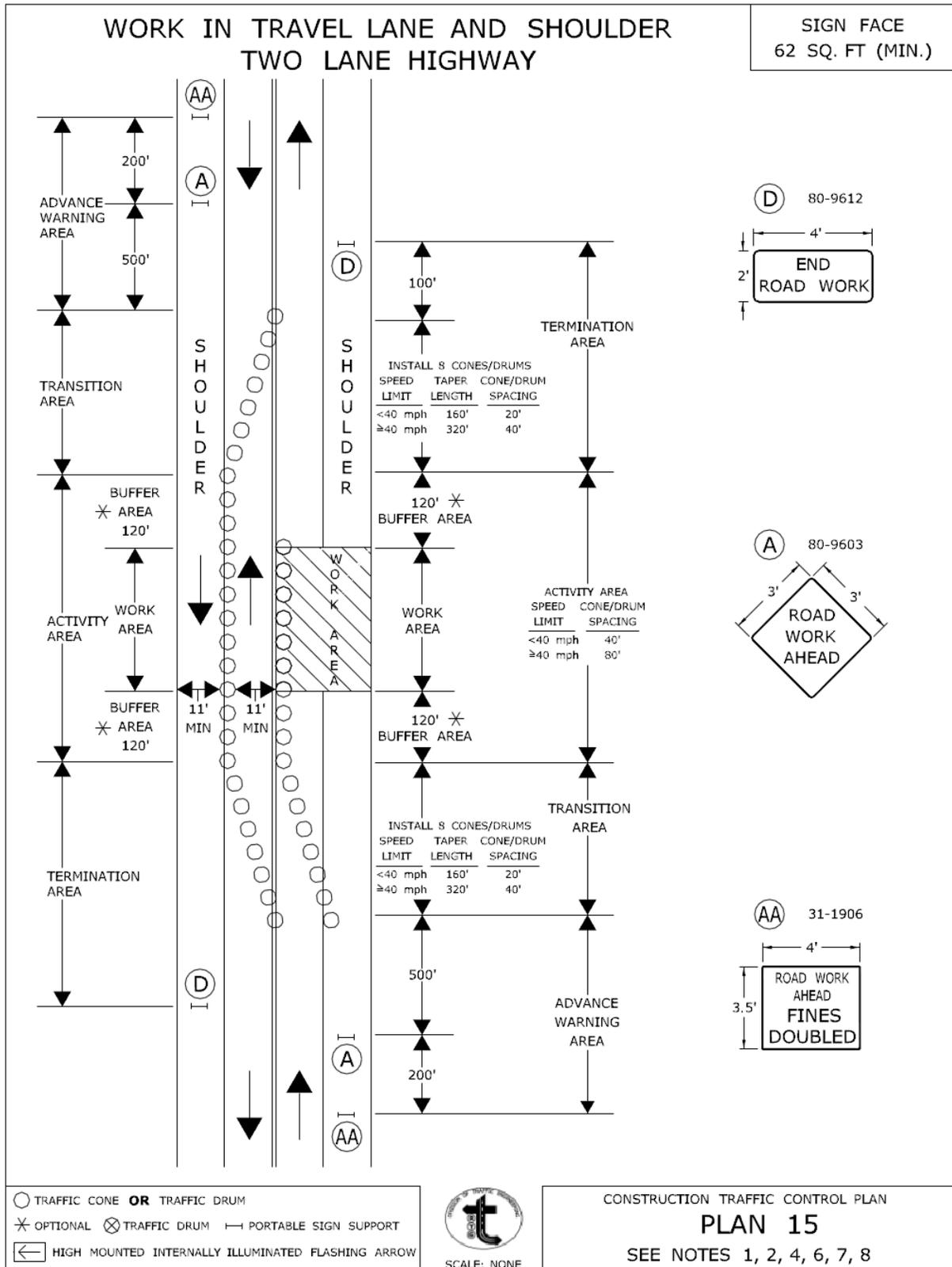
SEE NOTES 1, 2, 4, 7, 8

CONNECTICUT DEPARTMENT OF TRANSPORTATION
 BUREAU OF ENGINEERING & CONSTRUCTION

APPROVED

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

ITEM #0971001A



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



SCALE: NONE

CONSTRUCTION TRAFFIC CONTROL PLAN

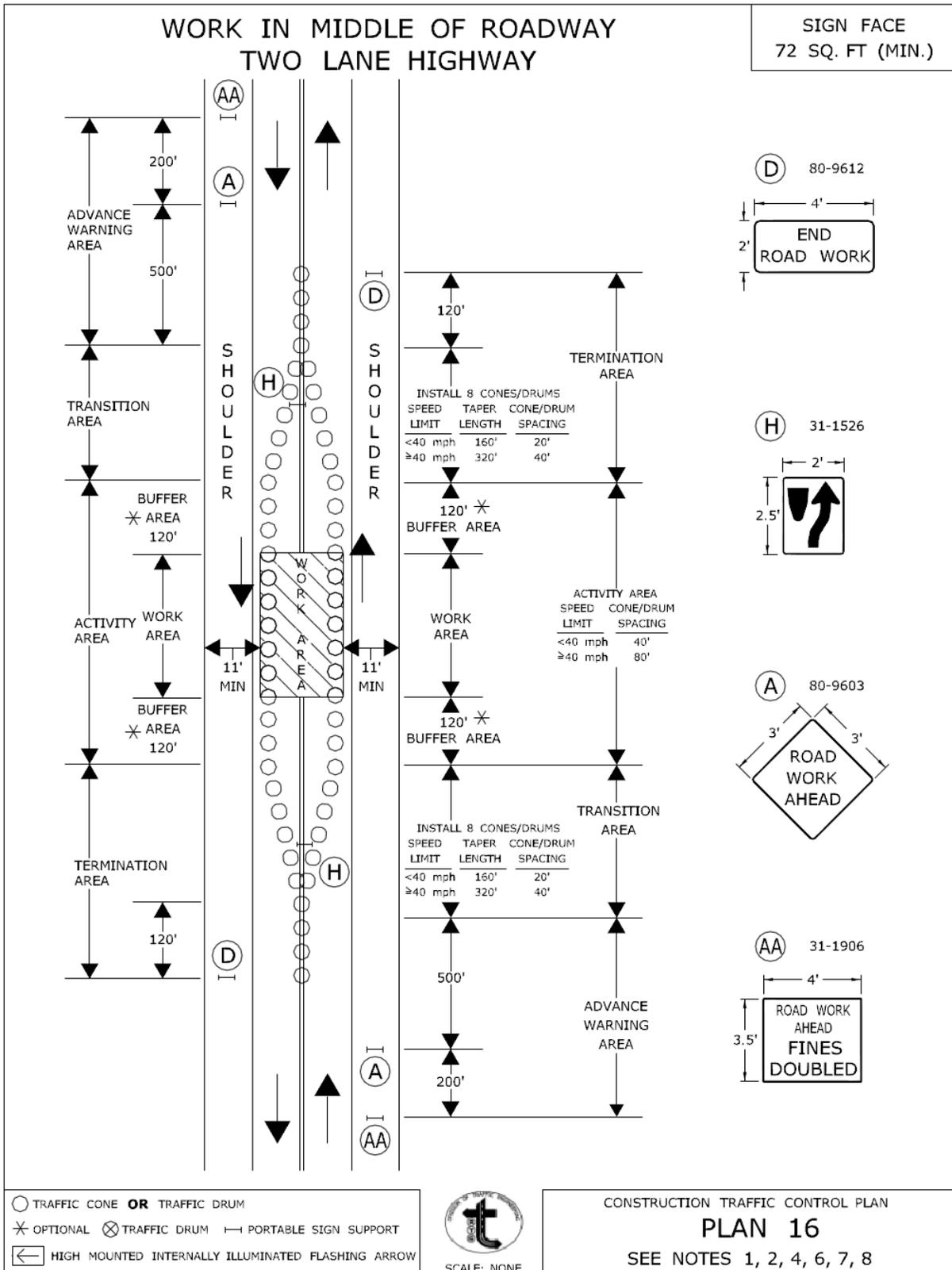
PLAN 15

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

CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION

APPROVED

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

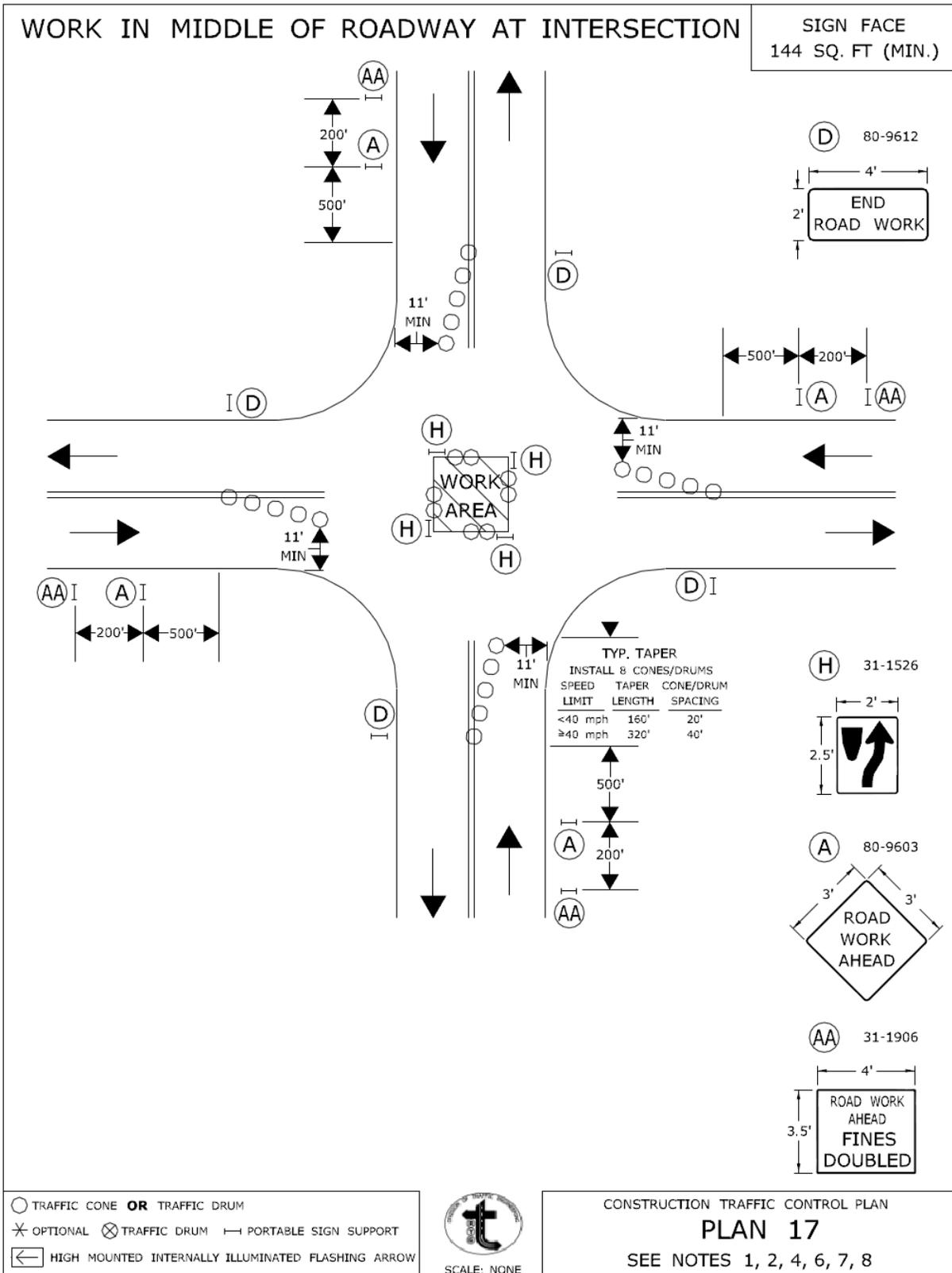


CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION

APPROVED

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

ITEM #0971001A



CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION

APPROVED *Charles S. Harlow* Charles S. Harlow
2012.06.05 15:57:16-04'00"
PRINCIPAL ENGINEER

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, installation, and removing the material for the 4H:1V traversable slope shall be paid under the item “Maintenance and Protection of Traffic”.

ITEM #0975004A - MOBILIZATION AND PROJECT CLOSEOUT**9.75.01 – Description:**

This item shall consist of all work necessary for the movement of personnel and furnishing equipment to the project site, and for the establishment of all Contractors' field offices, buildings and other facilities necessary to the performance of the work. In addition, this item shall include the preparation of work plans and submittals necessary to facilitate the commencement of physical construction. These initial submittals are identified elsewhere in the contract and may include project schedules, project management plans, safety plans, quality plans, erosion and sedimentation control plans and similar submittals addressing the general sequencing and management of the project. This item shall also include demobilization of plant and equipment, completion of all punchlist work, and administrative closeout items necessary to satisfy all contract requirements.

This item may not be subcontracted, in whole or part.

9.75.04 – Method of Measurement:

This work will be measured for payment in the manner described hereinafter; however, the determination of the total contract price earned shall not include the amount of mobilization earned during the period covered by the current monthly estimate - but shall include amounts previously earned and certified for payment.

1. When the first payment estimate is made, 25 percent of the lump sum bid price for this item or 2.5 percent of the total original contract price, whichever is less, shall be certified for payment.
2. When the initial project submittals necessary to begin construction are accepted by the Engineer, 50 percent of the lump sum bid price for this item or 5.0 percent of the total original contract price, whichever is less, minus any previous payments, shall be certified for payment.
3. When the initial project submittals are accepted by the Engineer, and 15 percent of the total original contract price is earned, 70 percent of the lump sum price of this item or 7.0 percent of the total original contract price, whichever is less, minus any previous payments, will be certified for payment.
4. When 30 percent of the total original contract price is earned 85 percent of the lump sum price of this item or 8.5 percent of the total original contract price, whichever is less, minus any previous payments, will be certified for payment.
5. When the requirements of Article 1.08.13 have been satisfied 95 percent of the lump sum price of this item, minus any previous payments, will be certified for payment.

6. When the requirements of Article 1.08.14 have been satisfied 100 percent of the lump sum price of this item, minus any previous payments, will be certified for payment.

Nothing herein shall be construed to limit or preclude partial payments otherwise provided for by the contract.

9.75.05 – Basis of Payment:

This work will be paid for at the contract lump sum price for “Mobilization and Project Closeout” which price shall include materials, equipment, tools, transportation, labor and all work incidental thereto.

This item shall not be paid more than one time. If the Contractor is required to mobilize equipment or facilities more than one time, due to reasons solely the responsibility of the Department, any additional efforts will be paid as Extra Work under Section 1.04.05.

Pay Item	Pay Unit
Mobilization and Project Closeout	l.s. (l.s.)

ITEM #0979003A - CONSTRUCTION BARRICADE TYPE III

Article 9.79.01 – Description: The Contractor shall furnish construction barricades to conform to the requirements in National Cooperative Highway Research Program (NCHRP) Report 350 or the AASHTO Manual for Assessing Safety Hardware (MASH) and to the requirements stated in Article 9.71 “Maintenance and Protection of Traffic,” as shown on the plans and/or as directed by the Engineer.

Article 9.79.02 – Materials: Prior to using the construction barricades, 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 have been crash tested and have approval in writing from FHWA conforming to the requirements in National Cooperative Highway Research Program (NCHRP) Report 350 or the AASHTO Manual for Assessing Safety Hardware (MASH), as appropriate.

Alternate stripes of white and orange Type III or Type VI reflective sheeting shall be applied to the horizontal members as shown on the plans. Application of the reflective sheeting shall conform to the requirements specified by the reflective sheeting manufacturer. Only one type of sheeting shall be used on a barricade and all barricades furnished shall have the same type of reflective sheeting. Reflective sheeting shall conform to the requirements of Article M.18.09.01.

Construction barricades shall be designed and fabricated so as to prevent them from being blown over or displaced by the wind from passing vehicles. Construction barricades shall be approved by the Engineer before they are used.

Article 9.79.03 – Construction Methods: Ineffective barricades, 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.

Barricades that are no longer required shall be removed from the project and shall remain the property of the Contractor.

Article 9.79.04 – Method of Measurement: Construction Barricade Type III will be measured for payment by the number of construction barricades required and used.

Article 9.79.05 – Basis of Payment: “Construction Barricade Type III” required and used will be paid for at the Contract unit price per each. Each barricade will be paid for once, regardless of the number of times it is used.

Pay Item	Pay Unit
Construction Barricade Type III	EA.

ITEM #0980001A – CONSTRUCTION STAKING

9.80.01—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, except property lines, highway lines, or non-access lines.

9.80.02—Materials: All stakes used for control staking shall be of the same quality as used by the Department for this purpose. For slope limits, pavement edges, gutter lines, etc., where so-called "green" or "working" stakes are commonly used, lesser quality stakes will be acceptable, provided the stakes are suitable for the intended purpose.

9.80.03—Construction Methods: The Department 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 by Department forces 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. On all projects with an original contract value greater than \$25 million and bridge rehabilitation and reconstruction projects greater than \$10 million, 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 Department or by others. If, as a result of these inaccuracies, the Department is required to make further studies, redesign, or both, all expenses incurred by the Department 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.

For roadways where the existing pavement markings need to be reestablished:

Prior to any resurfacing or obliteration of existing pavement markings, the Contractor and a representative of the Engineer must establish and document pavement marking control points from the existing markings. These control points shall be used to reestablish the positions of the lanes, the beginnings and endings of tapers, channelization lines for on and off ramps, lane use arrows, stop bars, and any lane transitions in the project area. The Contractor shall use these control points to provide appropriate premarking prior to the installation of the final markings.

The Contractor shall provide and maintain reference stakes and/or markings at 100 foot intervals immediately off the edge of pavement to be used to reestablish the existing pavement markings. The Contractor shall also provide and maintain reference stakes and/or markings at any point where there is a change in pavement markings to reestablish the existing pavement markings.

For non-limited access roadways

On non-limited access roadways it may be necessary to adjust the final locations of the pavement markings to accommodate pedestrians and bicyclists where feasible. Prior to any resurfacing or

obliteration of existing pavement markings, the Contractor, a representative of the Engineer, and a representative of the Division of Traffic Engineering must establish and document pavement marking control points from the existing markings as described above. The control points at that time may be adjusted to provide minimum shoulder widths of 4 to 5 feet wherever possible while maintaining travel lane widths of no less than 11 feet and no more than 12 feet.

9.80.04—Method of Measurement: Construction staking will be at the Contract lump sum for construction staking.

When no price for "Construction Staking" is asked for on the proposal form, the cost of the work described above shall be included in the general cost of the work and no direct payment for "Construction Staking" will be made.

9.80.05—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.

Pay Item	Pay Unit
Construction Staking	l.s.

ITEM #0981101A - OPPOSING TRAFFIC LANE DIVIDER

Article 9.81.01 - Description:

This item shall include furnishing, installing, resetting, and removing Opposing Traffic Lane Dividers. Opposing Traffic Lane Dividers will be used to separate opposing traffic on a two-lane two-way roadway. The legend on the divider shall be two opposing arrows.

The Opposing Traffic Lane Divider shall meet the requirements of Federal Highway Administration's Strategic Highway Research Program (SHRP). The Opposing Traffic Lane Divider shall be 12 inch wide by 18 inch high sign panels mounted back to back on a flexible support post. The post shall be mounted to a base.

A series of these devices shall be placed on the center line of a temporary two-way operation. The support shall be designed to recover automatically to a vertical position if struck by a vehicle.

The opposing Traffic Lane Divider is covered in Section 6F.76 of the Manual on Uniform Traffic Control Devices (2009 Edition).

Article 9.81.02 - Materials:

- 1) Panel - The vertical panel shall be constructed of a flexible material resistant to ultraviolet light, ozone and hydrocarbons. The surface shall be smooth and suitable for adherence of appropriate reflective sheeting. The reflective sheeting shall be Type III or Type VI reflective sheeting in accordance with Section M.18.09.01.
- 2) Support Post - The support post shall be made of a material resistant to ultraviolet light, ozone, and hydrocarbons. The post shall have sufficient stiffness to remain rigid in windy conditions. The support shall be designed to recover automatically to a vertical position or manually restored (when fastened to the roadbed), if struck by a vehicle.
- 3) Base - The base shall consist of a metal ballast plate fastened to a rubber base. For long-term use, the metal ballast plate can be fastened directly to the roadbed. When fastened to the roadbed, the post will need to be manually reset when hit. The base shall meet the requirements of the Federal Highway Administration's Strategic Highway Research Program (SHRP).

Article 9.81.03 - Construction Methods:

The Opposing Traffic Lane Dividers shall be spaced every 30 feet apart or as directed by the Engineer. The Contractor shall insure that the devices are kept clean and bright. Any devices that are missing, damaged, or defaced so that they are not effective, as determined by the Engineer and in accordance with the American Traffic Safety Services Association (ATSSA) guidelines contained in "Quality Standards for Work Zone Traffic Control Devices", shall be replaced by the Contractor at no cost to the State. When no longer required, they shall remain the property of the Contractor.

Article 9.81.04 - Method of Measurement:

This work will be measured for payment by the number of opposing traffic lane dividers furnished, installed and accepted on the project. Replacement devices shall not be measured for payment. Devices relocated to a different location in accordance with the Engineer shall not be measured.

Article 9.81.05 - Basis of Payment:

This work will be paid for at the contract unit price each for "Opposing Traffic Lane Divider" which price shall include all materials, equipment, tools, labor and work incidental to furnishing, installing, maintaining and removing the units.

ITEM #1010052A – CAST IRON HANDHOLE COVER

Article 10.10.05 - Basis of Payment:

After the words “Cast Iron Handhole Cover, insert the phrase “of the type called for”.

Add to the list of pay items:

Pay Item	Pay Unit
Cast Iron Handhole Cover	EA.

ITEM# 1017032A - SERVICE (METERED)

Description:

Furnish and install a metered electric service at the location shown on the plans or as directed by the Engineer.

Materials:

- Meter Socket
 - UL listed
 - Manual lever bypass
 - Locking metal cover for the glass enclosure
 - Contact the serving utility company for a list of approved meter sockets
- Conduit Bond Clamp
 - UL listed
 - Rated for direct burial

Locations served by United Illuminating (UI) or Wallingford Electric Division (WED)

Meter socket rated at 100 amps

Locations served by Connecticut Light and Power Co. (CL&P)

Meter socket rated at 200 amps

Enclosure capable of accepting a 3 inch (75 mm) rigid metal conduit (RMC)

Construction Methods:

Comply with the National Electric Code (NEC), the Department of Public Utility Regulatory Authority (PURA), and the serving power company requirements. Install a meter socket with associated equipment on the outside of the controller cabinet, as shown on the plans. Mount the enclosure approximately 54 inches (1.37 meters) above the ground. Install an expansion fitting in the RMC between the ground and the enclosure. Attach a direct-buried bond clamp to the service RMC below ground level, adjacent to the foundation. Bond the service conduit to the controller cabinet ground rod. Install a continuous nylon pull rope of at least 200 lbs (90 Kg) breaking strength in the conduit between the meter socket and the service source. Ensure all circuit breakers are off when service is connected by the utility company. The work must be inspected and approved by the Engineer or his designated representative prior to scheduling a service connection. Record the meter number and the date service is connected for billing purposes.

Service Request

- Traffic Signal on State Road: Contact the CT DOT Traffic Electrical office to complete the necessary service request forms.
- Traffic Signal on Town Road: Complete all necessary request forms and forward to the appropriate power company office.
- Incident Management Site: Complete all necessary request forms and forward to the appropriate power company office.

Locations served by United Illuminating

Contact the UI office to have a Job Number assigned. When the work is complete notify the Engineer to inspect and confirm that the work is according to the National Electric Code. Request that the Engineer contact the United Illuminating, Work in Progress office, to report the job number and to schedule a service connection.

Locations served by Wallingford Electric Division

Contact the Electric Division, Engineering Office to arrange for service and/or to schedule work by the Electric Division on utility poles above 10 feet (3 meters). When the work is complete notify the Engineer to inspect and confirm that the work is according to the National Electric Code. Request that the Engineer contact the Electric Division 24 hours prior to the desired connection date.

Locations served by Connecticut Light and Power Co. and all other electric power providers

Contact the power company engineering representative for exact requirements of the service. All riser fees and any other installation charges required of an underground metered service are the responsibility of the Contractor. When the work is complete notify the Engineer to inspect and confirm that the work is according to the National Electric Code. Request that the Engineer contact the power company to schedule the connection.

Method of Measurement:

The installation of the Service (Metered) will be measured for payment by the number of metered electric services of the type specified, completed, with service connected, and accepted in place.

Basis of Payment:

This work will be paid for at the contract unit price each for "Service (Metered)" complete and accepted in place. The price shall include all material above ground such as the meter socket enclosure, surface conduit, expansion fitting, coupling, and load side service conductors. The price shall also include the direct-buried ground clamp, bonding wire, pull rope, all material, equipment, tools, labor and incidentals necessary.

The power company will provide the line-side conductors and the meter.

ITEM #1105001A - 1 WAY, 1 SECTION SPAN WIRE TRAFFIC SIGNAL

ITEM #1105003A - 1 WAY, 3 SECTION SPAN WIRE TRAFFIC SIGNAL

ITEM #1105007A - 2 WAY, 3 SECTION SPAN WIRE TRAFFIC SIGNAL

Article 11.05.03 – Construction Methods:

Add the following paragraph:

Circular indications that have an identification mark (such as an arrow) on the top of the lens shall be installed with that mark at the 12 o'clock position.

Article M.16.06 - Traffic Signals

Sub Article 3 - Housing:

In the last sentence, between the words “housing” and “shall” add “and all internal hardware”.

Add the following after the last paragraph.

Each section of the housing shall be provided with a removable visor. The visor shall be the cap type, unless otherwise noted on the plan. The visor shall be a minimum .05 inch (.13 mm) thick. The visor shall be the twist on type and secured to the signal by four equidistant flat tabs screwed to the signal head.

Sub Article 4 - Brackets:

Add the following at the end of the last paragraph:

Install a 2” wide yellow retroreflective strip (Type IV sheeting) along the perimeter of the face of the backplate.

Delete Sub Article 5 - Optical Unit and Sub Article 6 – Lamp Socket and replace with the following:

Optical Unit, Light Emitting Diode:

(a) General:

Only Optical Units that meet the requirements contained herein supplied by the below manufacturers that have been tested by the Department’s Signal Lab will be accepted. Final approval for model numbers will be done at the time of the catalog cut submittals.

ITEM #1105001A, 1105003A, 1105007A

Duralight
Trastar, Inc.
860 N. Dorothy Dr., Suite 600
Richardson, TX 75081

GE Lighting Solutions
Corporate Headquarters
1975 Noble Road Building 338E
East Cleveland, OH 44112-6300

Dialight
1501 Foute 34 South
Farmingdale, NJ 07727

Leotek
726 South Hillview Drive
Milpitas, CA 95035

The materials for Light Emitting Diode (LED), Optical Unit, circular and arrow, shall conform to the following:

- The ITE Performance Specification for Vehicle Traffic Control Signal Heads – Light Emitting Diode (LED) Circular Signal Supplement for circular indications dated June 27, 2005.
- The ITE Performance Specification for Vehicle Traffic Control Signal Heads – Light Emitting Diode (LED) Vehicle Arrow Traffic Signal Supplement for arrow indications dated July 1, 2007.

Section 4, Adjustable Traffic Signals and General Housing sections of the **Department of Transportation Functional Specifications for Traffic Control Equipment, current edition governs**. Where the Department of Transportation Functional Specifications conflict with this Special Provision or the 2005/2007 ITE Performance Specifications, this Special Provision and the 2005/2007 ITE Performance Specifications shall govern.

The Optical Unit shall have an Incandescent look and be made up of a smooth surfaced outer shell, multiple LED light sources, a filtered power supply and a back cover, assembled into a sealed unit. The Optical Unit shall be certified as meeting the 2005/2007 ITE Specifications by Intertek Testing Services, Inc. (ITSNA, formerly ETL) or another organization currently recognized by the Occupational Safety and Health Administration (OSHA) as a Nationally Recognized Testing Laboratory (NRTL.) The Optical Unit shall perform to the requirements of the ITE Specification for a minimum of 60 months.

A “Swing Test” will be performed by the Department to ensure no significant dimming or blanking occurs, until the lamp is obscured by the visor. All L.E.D Lamps will be subjected to further field testing for reliable operation.

The Arrow Optical Unit shall be “Omni-Directional” so that it may be oriented in a right, left or straight configuration without degradation of performance.

(b) Electrical Requirement:

Operating voltage:

80 to 135 Volts AC with cutoff voltage (no visible indication) below 35Volts AC.

Power requirements:

Circular Indications: 12", (300 mm) – no more than 16 Watts

Circular Indications: 8", (200mm) - no more than 16 Watts

Arrows Indications: 12", (300mm) - no more than 16 Watts

Power Supply:

Fused and filtered to provide excess current protection and over voltage protection from electrical surges and transient voltages.

(c) Photometric Requirement:

Beam Color:

Meet 2005/2007 ITE Specifications

(d) Mechanical Requirements:

Diameter:

The Circular Optical Unit shall fit into standard 12" (300mm) or 8" (200mm) housing.

The Arrow Optical Unit shall fit 12" (300mm) housings only.

Enclosure:

UV (Ultraviolet) stabilized polycarbonate back cover.

Clear lens cover for all Red, Yellow and Green Circular Optical Units.

For Arrow Optical Units the arrow indication segment of the lens shall be clear.

Enclosure sealed and waterproofed to eliminate dirt contamination and be suitable for installation in all weather conditions.

Clearly mark on the housing the following information:

- Manufacturer & model number
- Date of manufacture (must be within one year of installation)

The model number shall end with the number of LEDs used to comprise the unit as the last digits of the model number. Example, if the unit comprised of 3 LEDs and the model is x12y, then the new model number shall read x12y3.

Operating temperature:

Meet 2005/2007 ITE Specification

Wiring: L.E.D. lamps shall have **color coded 16 AWG wires** for identification of heads as follows:

RED L.E.D. Lamps	RED with WHITE neutral
YELLOW L.E.D. Lamps	YELLOW with WHITE neutral
GREEN L.E.D. Lamps	GREEN or Brown with WHITE neutral

RED L.E.D. ARROWS	RED/WHITE with WHITE neutral
YELLOW L.E.D. ARROWS	YELLOW/WHITE with WHITE neutral
GREEN L.E.D. ARROWS	GREEN/WHITE or BROWN/WHITE with WHITE neutral
GREEN/YELLOW L.E.D. ARROWS	GREEN/WHITE or BROWN/WHITE, YELLOW/WHITE, with WHITE neutral

Wires shall be terminated with a Block Spade, 6-8 stud/ 16-14 wire size.

All Circular Optical Units shall be supplied with a minimum 40” pigtail and all Arrow Optical Units Supplied with a minimum 60” pigtail.

Sub Article 9 - 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.

At intersections at Merritt Parkway interchanges, all brackets and hardware shall be painted dark green by the manufacturer. The color shall be No. 14056, Federal Standard No. 595.

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.

At intersections at Merritt Parkway interchanges, all brackets and hardware shall be painted dark green by the manufacturer. The color shall be No. 14056, 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.

D. 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.

E. Vibrotactile Arrow Pushbutton

- Pushbutton contained in a circular assembly which fits inside the housing and is attached to the housing with 4 screws.
- 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

F. 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.

G. 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.
- Wire entrance through the rear.
- Stainless steel mounting hardware.
- Color: The color shall be yellow No. 13538, Federal Standard No. 595. At intersections at Merritt Parkway interchanges, all brackets and hardware shall be painted dark green by the manufacturer. The color shall be No. 14056, 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 ASP&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 ASP&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, 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)	EA.

ITEM #1108115A - FULL ACTUATED CONTROLLER 8 PHASE

Article 11.08.01 - Description: Delete the second paragraph and replace with the following:

This item shall consist of furnishing and installing an actuated controller, which shall be a completely digital solid state unit, for controlling the operation of the traffic signals.

The controller shall be completely furnished with the number of phases called for in the item. The cabinet to house the controller shall be completely wired and all sub-bases shall be complete with load switches and flash relays as specified in the **Functional Specifications For Traffic Control Equipment**. The cabinet shall also have all necessary auxiliary equipment required to provide the sequence and timing indicated on the plans. A time switch shall be installed in each cabinet.

Article 11.08.03 – Construction Methods: Delete the entire second paragraph.

Article M.16.09 - Controllers: Add the following sub-articles:

2. Actuated Controllers: The purpose of this sub-article is to set forth minimum design and operating requirements for the materials and components for a digitally timed actuated controller.

UNIFORM CODE FLASH COMMAND PROCEDURE

1. Activate the **MINIMUM RECALL** input to the controller to ensure cycling prior to transferring to flashing operation.
2. Omit all non-actuated and actuated artery advance phases.
3. Omit phases 1 & 5 of all quad sequences.
4. Activate the **STOP TIME** input to the controller, upon entering flash, to prevent cycling.
5. Transfer to flash at the end of the last side street all red condition (at the point the artery **ON** output becomes active).
6. Special technical notes on the intersection plan supercede the above requirements.

TC/TBC INSTALLATION REQUIREMENTS

The following requirements are to be observed when engineering the installation of TC/TBC:

1.
 - a. Circuit 1 shall be designated FLASH and be reserved for night flash command.
 - b. Circuit 2 shall be designated MAX 2 and be reserved for Max 2 command.
 - c. Circuit 3 shall be designated COORD and shall select coordinated operation of the intersection.
 - d. Circuit 4 shall be the yield, and force off command to the controller.
2. All clock outputs shall be active to select the function specified. For example; If the TC/TBC were removed for repair, no inputs would be applied to the controller. The intersection will then operate non-coordinated, in Max 1. Programming the TC/TBC without cycle and offset is not an acceptable method to create a non-coordinated operation. Refer to the typical hookup diagram.
3. All TC/TBC clock installations shall be wired as detailed in figure 1. This method is used for both full and semi actuated operation.
4. Midnight resync shall occur at 12:00 AM.
5. A program card shall be completed indicating all input steps and settings. Four copies shall be provided. One copy left in the cabinet. Three delivered to the engineer along with the cabinet wiring diagrams.

TIME CLOCK / TIME BASE COORDINATION

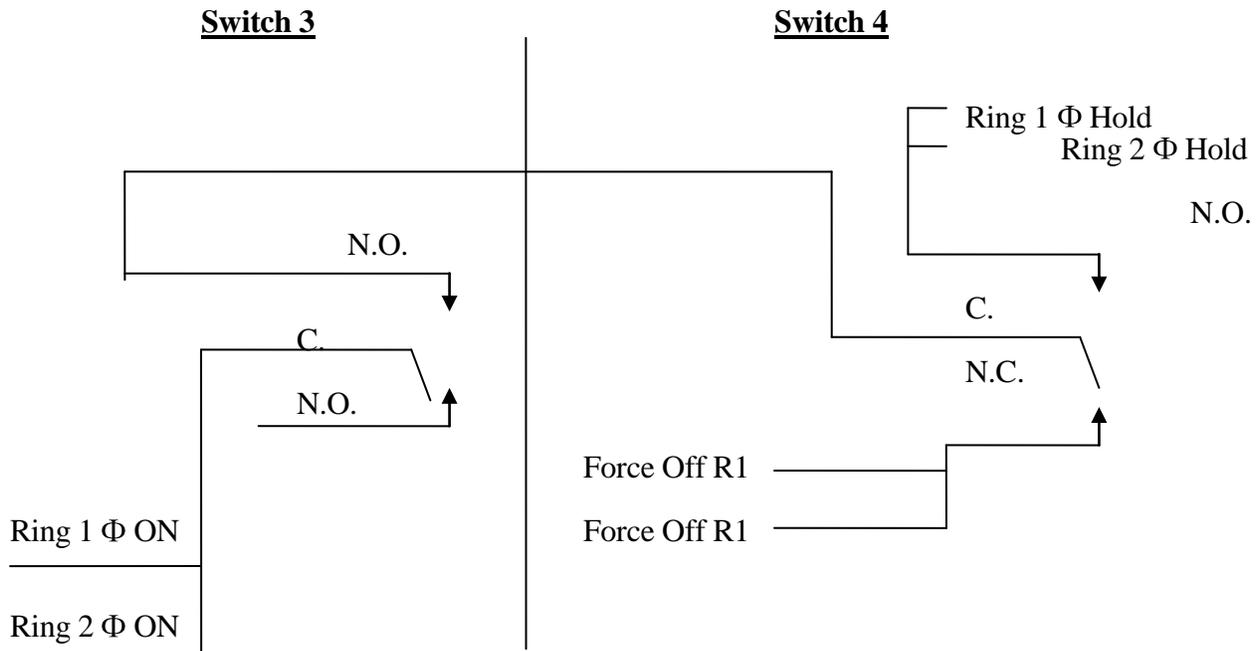


FIG. 1

110 VOLT RELAY

All 110 volt relays shall meet the requirements of one of the following two types. Across the coil of each relay there shall be a molded suppressor rated at .1uf - 47 ohm @ 600V to suppress electrical noise created by the energization / de-energization of the relay.

TYPE F: Midland Ross, Midtex 136-62T3A1 or equivalent

DESCRIPTION:

Relays of this type shall function as flash transfer, power switching and signal drive. Other uses are acceptable, however, type G relays cannot be used for the above applications.

CONTACTS:

The contacts shall be in the D.P.D.T. form and consist of 10mm(3/8") diameter silver cadmium oxide, rated at 20 Amps @ 117 VAC resistive.

COIL:

The coil shall operate on 110 VAC. No semi-conductors will be allowed in the coil circuit of this relay.

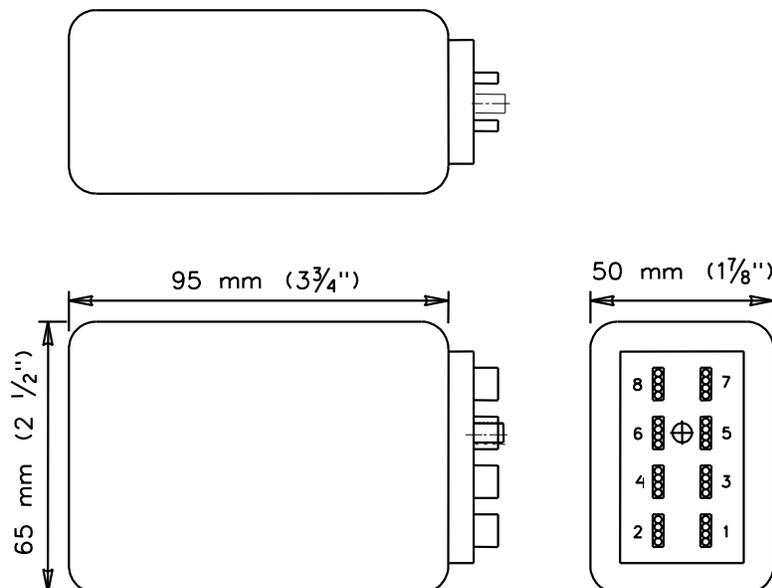
SIZE:

The relay shall be enclosed in a clear plastic dust cover. The overall dimensions shall be no larger than 63mm(2 1/2") x 94mm(3 3/4") x 47mm(1 7/8") as illustrated below.

BASE:

This relay shall have an eight blade plug-in base, Ventron Beau Plug P-5408 or equivalent with the pin designations as shown below:

1. Coil
2. Coil
3. N.C. 1
4. N.C. 2
5. Comm. 1
6. Comm. 2
7. N.O. 1
8. N.O. 2



SOCKET:

The socket shall be Ventron Beau Plug S-5408 or equivalent, contacts rated at 15 Amps @ 1750 VRMS.

TYPE G: Magnecraft, W 88 ACXP-8 or equivalent

DESCRIPTION:

Relays of this type shall function in low current switching applications such as interconnect interface or pre-emption circuits. A clear polycarbonate plastic enclosure shall cover the relay mechanism.

CONTACTS:

The contacts shall be in the D.P.D.T. form and consist of 5mm (3/16") diameter gold flashed, silver alloy, rated at 10 Amps @ 120 VAC resistive.

COIL:

The coil shall operate on 120 Volts AC and require a nominal 3 VA.

SIZE:

Height, length and width dimensions shall be the same as the 24 volt relay Type A: 35mm (1 3/8") x 60mm (2 3/8") x 35mm (1 3/8").

BASE:

The base shall be an octal plug with the pin designations the same as the 24 volt relay Type A.

SOCKET:

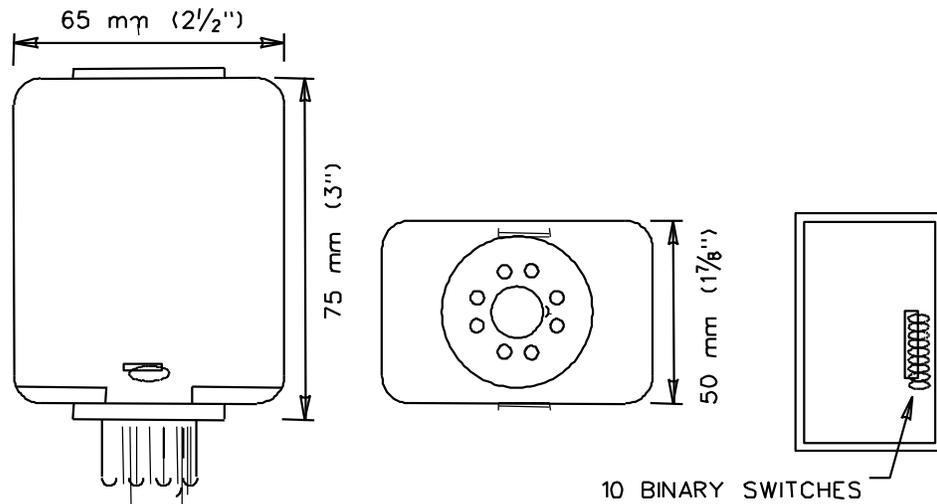
The socket shall be the same as that for the 24 volt relay Type A.

TIME DELAY RELAY

120 VAC SSAC TDM120A or equivalent
24 VDC SSAC TDM24DL or equivalent

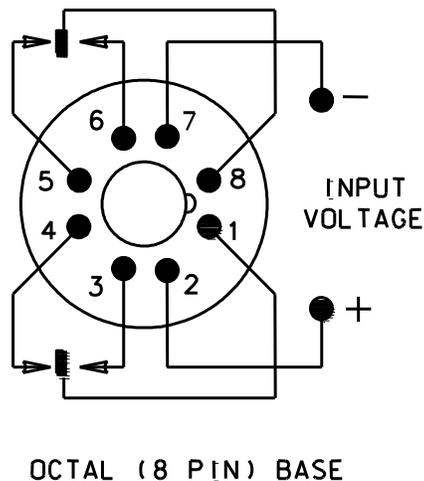
DESCRIPTION:

The time delay relays shall be self enclosed, plug-in, delay on operate type. They shall be digitally timed and adjustable by the use of dip switches located on the top of the case. The timing range shall be 1 to 1023 seconds in 1 second intervals. The time delay relays shall have an internal double pole double throw relay with form "C" contacts rated at 10 amps 120 volts AC. They shall operate accurately in a temperature range of -20 to +65 degrees C. A 120 volt AC input shall initiate timing of the 120 VAC TDR and a 24 VDC input shall initiate timing of the 24 VDC TDR. Removal of the input voltage shall reset the timer. Maximum dimensions of the case shall be as shown below.



SOCKET:

The socket shall be a standard octal base (8 pin) with screw terminal connectors. The pin designation shall be as shown below.

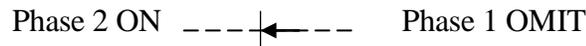


NON-ACTUATED ADVANCE GREEN PHASE

Where the timing and sequence indicates an advance green phase that always precedes the phase in recall (usually phase 2), and that either is fixed timed or is to be extended only, the following guidelines shall be in effect:

1. The parent phase ON output shall be diode connected to the advance phase OMIT input.
2. If the advance phase is to be extendable, it shall be in minimum recall. If the advance phase is fixed timed, it shall be in maximum recall. A different advance time may be selected by switching to maximum 2.

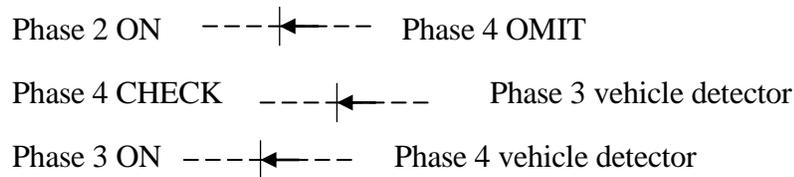
Example: Phase 1 is the advance phase (extendable), in minimum recall.
Phase 2 is the artery, in recall.
Phase 4 is the minor street, in non-lock.



Where the timing and sequence indicates an advance phase that is fixed timed (not extendable), and that always precedes either a phase other than phase 2 or a phase not in recall, the following guidelines shall be in effect:

1. The recall phase (usually Phase 2) ON output shall be diode connected to the advance phase's, parent phase OMIT input.
2. The parent phase CHECK output shall be diode connected to the advance phase vehicle detector input.
3. The advance phase ON output shall be diode connected to the following parent phase vehicle detector input. This is to insure a green indication on the parent phase.
4. The advance phase shall be in the non-lock mode. The advance time shall be selected from the maximum interval.

Example: Phase 2 is the artery, in recall.
Phase 3 is the advance for phase 4, in non-lock mode.
Phase 4 (parent phase) is the minor street, in non-lock mode.

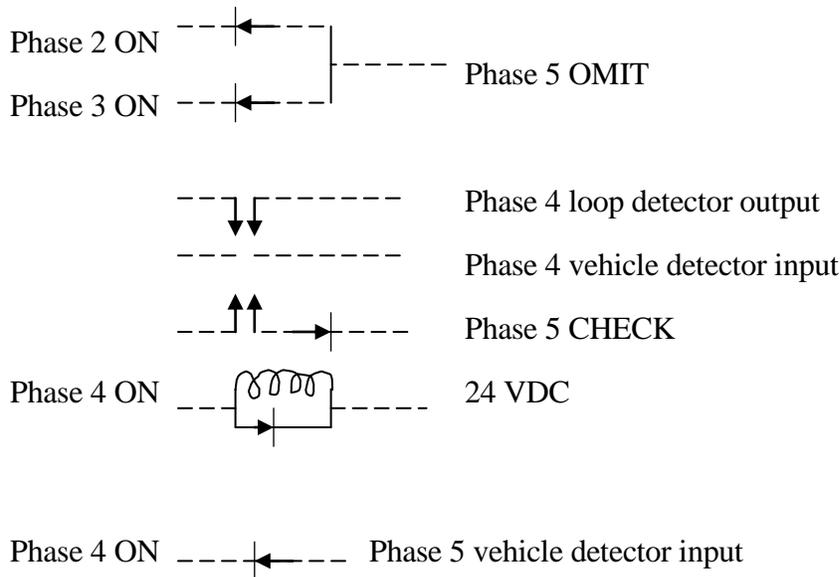


ACTUATED ADVANCE GREEN

Where the timing and sequence indicates an advance green phase that is to be extended only, and is to always precede either a phase other than phase 2 or a phase not in recall, the following guidelines shall be in effect:

1. The phase ON outputs of all phases that could precede the advance phase, shall be diode connected to the parent phase OMIT input.
2. The parent phase CHECK output shall be diode connected, through the normally closed contacts of a relay, to the advance phase vehicle detector input. The advance phase loop detector output shall be connected to the normally open contacts.
3. The relay coil shall be energized by the advance phase ON output, which in turn will switch the vehicle detector input from the parent phase CHECK circuit to the loop detector.
4. The advance phase ON output shall be diode connected to the following parent phase vehicle detector input. This is to insure a green indication from the parent phase.
5. The advance phase shall be in the non-lock mode.

Example: Phase 2 is the artery, in recall.
Phase 3 is the pedestrian phase.
Phase 4 is the advance for phase 5, in non-lock.
Phase 5 (parent phase) is the minor street, in non-lock.



The 24 volt relay shall be Type C as previously described in these specifications.

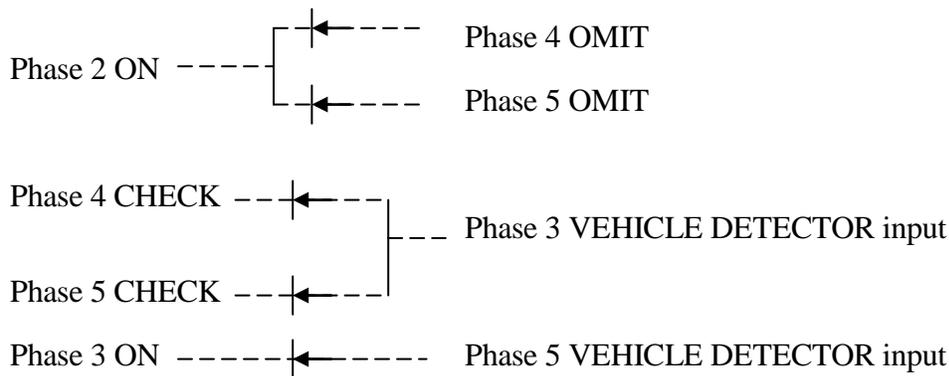
NON-ACTUATED CLEARANCE PHASE

NON-ACTUATED LAG GREEN PHASE

Where the timing and sequence indicates a non-actuated clearance phase or a lagging green phase that always follows the phase in recall, the following guidelines shall be in effect:

1. The parent phase ON output shall be diode connected to all appropriate phase OMIT inputs except the clearance phase.
2. The remaining actuated phases shall have their CHECK outputs diode connected to the clearance phase vehicle detector input.
3. The clearance phase ON output shall be diode connected to the following phases vehicle detector input (if the phase is in non-lock mode). This will prevent the controller from returning to the parent phase from the clearance phase without servicing the minor street.
4. The clearance phase shall be in the non-lock mode.
5. The clearance, or lag green time shall be selected from the maximum interval.

Example: Phase 2 is the artery, in recall.
Phase 3 is the clearance phase, in non-lock.
Phase 4 is the pedestrian phase.
Phase 5 is the minor street, in non-lock.



Where the timing and sequence shows a non-actuated clearance phase or lagging green phase following either a phase other than phase 2 or a phase not in recall, the following guidelines shall be in effect:

1. The parent phase ON output shall be diode connected to the following clearance phase vehicle detector input. This insures the clearance phase will always follow the parent phase.
2. The clearance phase shall be in the non-lock mode.
3. The clearance, or lag green time shall be selected from the minimum green interval.



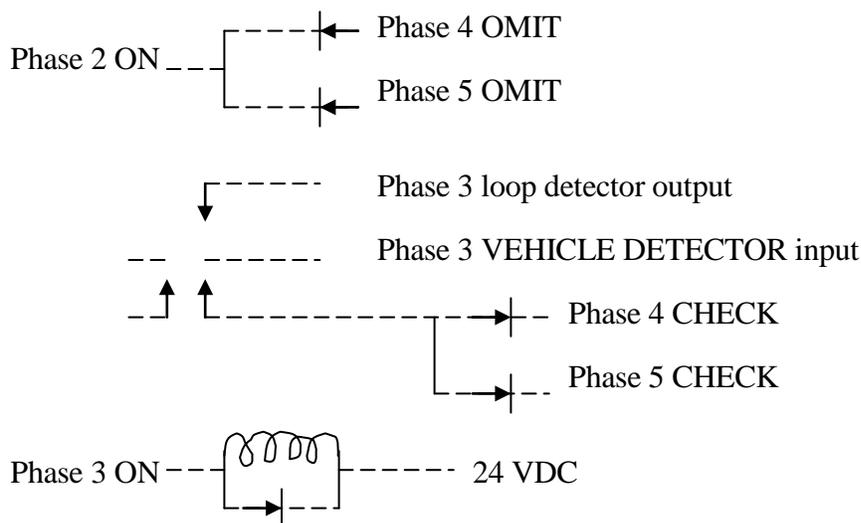
ACTUATED CLEARANCE PHASE

ACTUATED LAG GREEN PHASE

Where the timing and sequence indicates an actuated lagging green phase that is to be extended only, and always follows another phase, the following guidelines shall be in effect:

1. The parent phase (usually phase 2) ON output shall be diode connected to the phase OMIT inputs of all phases that could follow the lag phase.
2. The CHECK outputs of all phases that could follow the lag phase shall be diode connected, through the normally closed contacts of a relay, to the lag phase vehicle detector input. The lag phase loop detector output shall be connected to the normally open contacts.
3. The relay coil shall be energized by the lag phase ON output which in turn will switch the phase detector input from the CHECK circuits to the loop detector.
4. The lag phase shall be in the non-lock mode.

Example: Phase 2 (parent phase) is the artery, in recall.
Phase 3 is the lag phase, in non-lock.
Phase 4 is the pedestrian phase.
Phase 5 is the minor street, in non-lock.



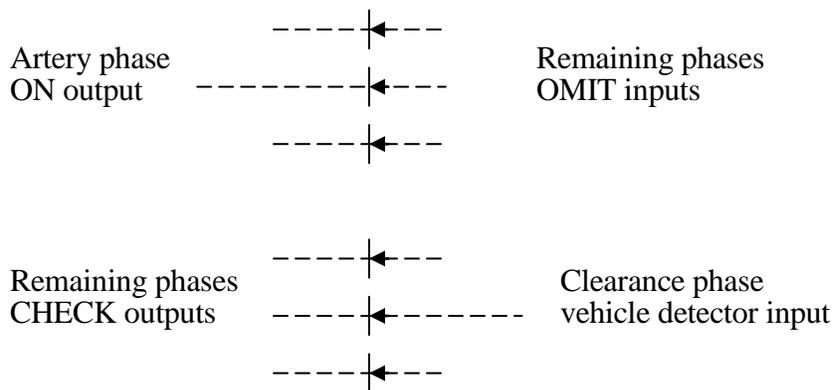
The 24 VDC relay shall be Type C as previously described in these specifications.

FLASHING STOP AHEAD SIGN

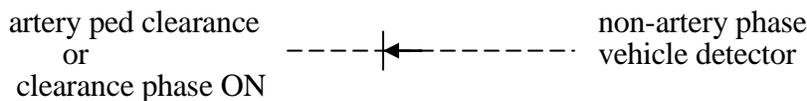
Where the timing and sequence indicates a flashing stop ahead sign, the clearance interval following the phase that the sign is off shall be timed by the following method.

The following phase shall be used for the clearance time. These phases shall be overlapped. The green indication will be maintained by the overlap feature and the following phase green time will be the stop ahead sign clearance.

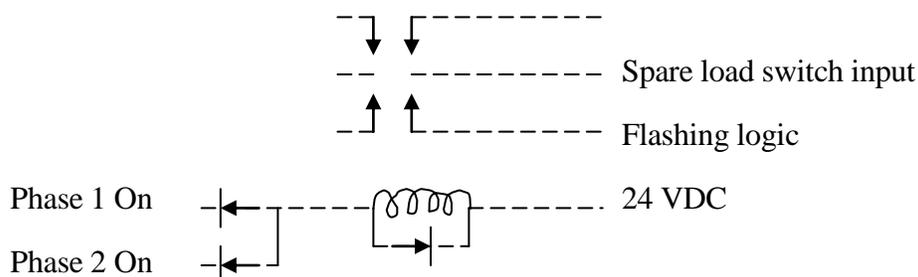
The artery phase ON output shall be diode connected to all other phase OMIT inputs except the clearance phase and the artery phase. The CHECK outputs from the remaining phases (as needed) shall be diode connected to the sign clearance phase vehicle detector input. The clearance phase shall be in the non-lock mode.



If the non-artery phases are in the non-lock mode, a call must be forced to the non-artery phase once the controller leaves the artery Hold interval (either artery walk or artery green). This prevents a false "Stop Ahead" indication if a vehicle turns right on red during the flashing sign clearance interval.



Unless otherwise shown on the plans, the 110 VAC flash power shall be from a spare load switch in the controller cabinet. The load switch input shall be driven with the flashing logic output from the controller. The flashing logic output shall be disconnected from the load switch during the intervals the sign is inactive.



Typical drive circuit for "WHEN FLASHING STOP AHEAD" sign

TIME BASE COORDINATION MAX II ACTUATION BY PEDESTRIAN CALL

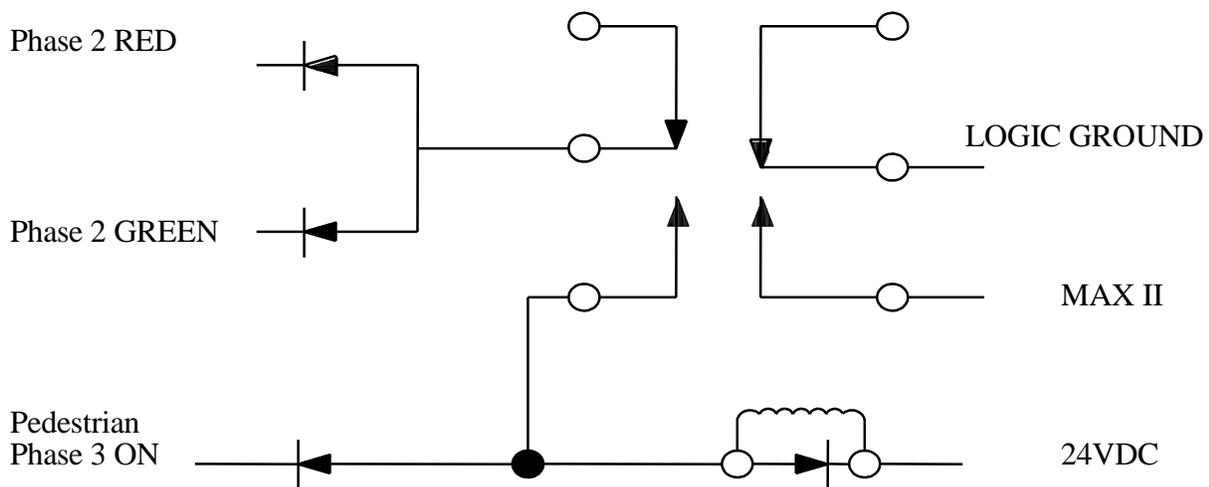
When the sum of the split times, including the walk and don't walk, exceed the background cycle length, the designer may choose to either allow a double cycle of the background timer or reduce the phase timings when the ped phase is called. Reduction of the phase timing by switching to MAX 2 avoids double cycling.

Where indicated on the plans the exclusive pedestrian phase will call MAX II. The minor movement max 2 times are set low so that the total phase times do not exceed the coordination cycle length.

Install a 24 volt relay connected to the inputs and outputs as shown on the following schematic.

Operation: When the controller advances to the exclusive pedestrian phase, the relay is actuated and latched. MAX II timing is selected for one complete cycle, until the relay is unlatched by the artery yellow (absence of red or green).

Example: Phase 2 is the artery. Phase 3 is the exclusive pedestrian phase.



ITEM #1111201A – TEMPORARY DETECTION (SITE NO. 1)

Description:

Provide a Temporary Detection (TD) system at signalized intersections throughout the duration of construction, as noted on the contract plans or directed by the Engineer. TD is intended to provide an efficient traffic-responsive operation which will reduce unused time for motorists travelling through the intersection. A TD system shall consist of all material, such as pedestrian pushbutton, conduit, handholes, cable, messenger, sawcut, loop amplifier, microwave detector, Video Image Detection System (VIDS), Self Powered Vehicle Detector (SPVD), etc. that is needed to achieve an actuated traffic signal operation.

Materials:

Material used for TD is either owned by the Contractor that is in good working condition or existing material that will be removed upon completion of the contract. Approval by the Engineer is needed prior to using existing material that will be incorporated into the permanent installation. New material that will become part of the permanent installation is not included or paid for under TD.

Construction Methods:

This item includes furnishing, installation, relocating, realigning, and maintaining the necessary detection systems as to provide vehicle detection during each phase of construction. If not shown on the plan, program the TD modes (pulse or presence) as the existing detectors or as directed by the Engineer. If the TD method (loops [saw cut or preformed], SPVD, microwave, VIDS, or other) is not shown on the contract plan it may be the Contractor's choice. The method chosen for TD must be indicated on the TD Plan submission.

The traffic signal plan-of-record, if not in the controller cabinet will be provided upon request. Ensure the controller phase mode (recall, lock, non-lock) and phase timing are correct for the TD. Adjust these settings as needed or as directed by the Engineer.

At least 30 days prior to implementation of each phase of construction submit a TD proposal to the Engineer for approval. Submit the TD proposal at the same time as the Temporary Signalization plan. Indicate the following information for each intersection approach:

- Phase Mode
- Temporary Detection Method
- Area of Detection
- Detector Mode

Submit the proposed temporary phase timing settings and the TD installation schedule with the TD proposal. See the example below.

Example Proposed Temporary Detection and Timing

Site 1

Warren, Rt. 45 at Rt. 341, Location #149-201

Approach	Phase	Phase Mode	TD Method	Area of Detection	Det Mode
<i>Rt. 45 NB</i>	<i>2</i>	<i>Min Recall</i>	<i>VIDS</i>	<i>150' from Stop Bar</i>	<i>Pulse</i>
<i>Rt. 45 SB</i>	<i>2</i>	<i>Min Recall</i>	<i>SPVD</i>	<i>150' from Stop Bar</i>	<i>Pulse</i>
<i>Rt. 341</i>	<i>4</i>	<i>Lock</i>	<i>Microwave</i>	<i>30' from Stop Bar</i>	<i>Pulse</i>

Temporary Phase Timing Settings:

Phase	Min	Ped	Ped Clr	Ext	Max 1	Max2	Yel	Red
<i>2</i>	<i>20</i>	<i>0</i>	<i>0</i>	<i>6</i>	<i>45</i>	<i>60</i>	<i>4</i>	<i>1</i>
<i>4</i>	<i>14</i>	<i>7</i>	<i>9</i>	<i>3</i>	<i>27</i>	<i>35</i>	<i>3</i>	<i>1</i>

Scheduled TD: *July 4, 2011*

Site 2

Scotland, Rt. 14 at Rt. 97, Location #123-201

Approach	Phase	Phase Mode	TD Method	Area of Detection	Det Mode
<i>Rt. 15 WB Left Turn</i>	<i>1</i>	<i>Non-Lock</i>	<i>VIDS</i>	<i>5' in front to 10' Behind Stop Bar</i>	<i>Presence</i>
<i>Rt. 14 EB</i>	<i>2</i>	<i>Min Recall</i>	<i>Existing Loop</i>	<i>150' from Stop Bar</i>	<i>Pulse</i>
<i>Rt. 14 WB</i>	<i>6</i>	<i>Min Recall</i>	<i>VIDS</i>	<i>150' from Stop Bar</i>	<i>Pulse</i>
<i>Rt. 97</i>	<i>4</i>	<i>Lock</i>	<i>Loop, Pre- formed</i>	<i>20' from Stop Bar</i>	<i>Pulse</i>

Temporary Phase Timing Settings:

Phase	Min	Ped	Ped Clr	Ext	Max 1	Max2	Yel	Red
<i>1</i>	<i>5</i>	<i>0</i>	<i>0</i>	<i>2</i>	<i>12</i>	<i>18</i>	<i>3</i>	<i>0</i>
<i>2 & 6</i>	<i>24</i>	<i>0</i>	<i>4</i>	<i>4</i>	<i>26</i>	<i>36</i>	<i>4</i>	<i>1</i>
<i>4</i>	<i>14</i>	<i>7</i>	<i>9</i>	<i>3</i>	<i>27</i>	<i>35</i>	<i>3</i>	<i>1</i>

Scheduled TD: *July 4, 2011*

When at any time during construction the existing vehicle detection becomes damaged, removed, or disconnected, install TD to actuate the affected approaches. Install TD sensors and make operational prior to removing existing detection. TD must be operational throughout all construction phases.

Provide to the Engineer a list of telephone numbers of personnel who will be responsible for the TD. If the TD malfunctions or is damaged, notify the Engineer and place the associated phase on max recall. Respond to TD malfunctions by having a qualified representative at the site within three (3) hours. Restore detection to the condition prior to the malfunction within twenty-four (24) hours.

If the Engineer determines that the nature of a malfunction requires immediate attention and the Contractor does not respond within three (3) hours following the initial contact, then an alternative maintenance service will be called to restore TD. Expenses incurred by the State for alternative service will be deducted from monies due to the Contractor with a minimum deduction of \$500.00 for each service call. The alternate maintenance service may be the traffic signal owner or another qualified Contractor.

TD will terminate when the detection is no longer required. This may be either when the temporary signal is taken out of service or when the permanent detectors are in place and fully operational.

Any material and equipment supplied by the Contractor specifically for TD will remain the Contractor's property. Existing material not designated as scrap or salvage will become the property of the Contractor. Return and deliver to the owner all existing equipment used as TD that is removed and designated as salvage.

Method of Measurement:

Temporary Detection is measured as a percentage of the contract Lump Sum price. Fifty percent (50%) shall be paid when Temporary Detection is initially set up, approved, and becomes fully operational. Fifty percent (50%) shall be paid when Temporary Detection terminates and all temporary equipment is removed to the satisfaction of the Engineer.

Basis of Payment:

This work will be paid at the contract Lump Sum price for "Temporary Detection (Site No.)". The price includes furnishing, installing, relocating, realigning, and maintaining the necessary detection systems and all incidental material, labor, tools, and equipment. This price also includes any detector mode setting changes, timing or program modifications to the controller that are associated with TD. All Contractor supplied material that will remain the Contractor's property will be included in the contract Lump Sum price for "Temporary Detection (Site No.)". Any items installed for TD that will become part of the permanent installation will not be paid for under this item but are paid for under the bid item for that work.

<u>Pay Item</u>	<u>Pay Unit</u>
Temporary Detection (Site No.)	L. S.

ITEM #1111401A - LOOP VEHICLE DETECTOR

ITEM #1111451A - LOOP DETECTOR SAWCUT

Replace Section 11.11, LOOP VEHICLE DETECTOR AND SAWCUT, with the following:

11.11.01 – Description:

1. Furnish and install a loop vehicle detector amplifier.
2. Sawcut pavement. Furnish and install loop detector wire in sawcut.

11.11.02 – Materials:

Article M.16.12

M.16.12 - LOOP VEHICLE DETECTOR AND SAWCUT

1. Loop Vehicle Detector:

- Comply with National Electrical Manufacturers Association (NEMA) standards, Section 6.5, Inductive Loop Detectors.
- Comply with the current CT DOT Functional Specifications for Traffic Control Equipment, Section 3 B, Loop Vehicle Detector With Delay/Extend Option.

2. Sawcut:

(a) Wire in sawcut:

- International Municipal Signal Association (IMSA) Specification 51-7, single conductor cross-linked polyethylene insulation inside polyethylene tube.
- # 14 AWG

(b) Sealant:

(1) Polyester Resin Compound

- Two part polyester which to cure, requires a liquid hardener.
- Use of a respirator not necessary when applied in an open air environment.
- Cure time dependent on amount of hardener mixed.
- Flow characteristics to guarantee encapsulation of loop wires.
- Viscosity: 4000 CPS to 7000 CPS at 77 degrees Fahrenheit (25° C).
- Form a tack-free skin within 25 minutes and full-cure within 60 minutes at 77 degrees Fahrenheit (25° C).
- When cured, resist effects of weather, vehicular abrasion, motor oil, gasoline, antifreeze, brake fluid, de-icing chemicals, salt, acid, hydrocarbons, and normal roadway encounters.
- When cured, maintain physical characteristics throughout the ambient temperature ranges experienced within the State of Connecticut.
- When cured, bonds (adheres) to all types of road surfaces.
- Weight per Gallon (3.8 l): 11 lbs ±1 lb (5kg ± .45kg)

- Show no visible signs of shrinkage after curing.
- 12 month shelf life of unopened containers when stored under manufacturers specified conditions.
- Cured testing requirements:
 - Gel time at 77 degrees F (25° C): 15 - 20 minutes, ASTM C881, D-2471
 - Shore D Hardness at 24 hours: 55-78, ASTM D-2240
 - Tensile Strength: > 1000 psi (6895 kPa), ASTM D-638
 - Elongation: 18 - 20 %, ASTM D-638
 - Adhesion to steel: 700 - 900 psi (4826 - 6205 kPa), ASTM D-3163
 - Absorption of water, sodium chloride, oil, and gasoline: < 0.2%, ASTM D-570
- Include in the Certificate of Compliance:
 - Manufacturer's confirmation of the uncured and cured physical properties stated above.
 - Material Safety Data Sheet (MSDS) stating sealant may be applied without a respirator in an open air environment.
- Designed to allow clean-up without the use of solvent that is harmful to the workers and the environment.

(2) 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:

1. Loop Vehicle Detector

- Shelf-mount the detector amplifier in the controller cabinet.
- Terminate the harness conductors with crimped spade connectors. Connect conductors to appropriate terminals, eg, black wire to 110vac, white wire to 110vac neutral.
- Tie loop harness and conductors to controller cabinet wiring harness. Leave enough slack in loop harness so that amplifier may be moved around on cabinet shelf; ± 2 feet (0.6 meter) slack.
- Attach a loop identification tag to the harness. Record pertinent detector information on the tag with indelible ink. See example below.
 - Loop No.: *D4*
 - Phase Call: *Phase 4*
 - Field Location: *Rt. 411(West St.)*
 - *Eastbound, Left Lane*
 - Detector No.: *4*
 - Cabinet Terminals: *234, 235*

2. Loop Detector Sawcut

- Loop size, number of turns, and location is shown on the intersection plan.
- Do not cut through a patched trench, damaged or poor quality pavement without the approval of the Engineer.
- Wet-cut pavement with a power saw using a diamond blade $\frac{3}{8}$ inch (9.5mm) wide. Dry-cut is not allowed.
- Ensure slot depth is between 1 $\frac{3}{4}$ inch to 2.0 inch (45mm to 50mm).
- Overlap corners to ensure full depth of cut.
- To prevent wire kinking and insulation damage, chamfer inside of corners that are ≤ 120 degrees.
- Clean all cutting residue and moisture from slot with oil-free compressed air. Ensure slot is dry before inserting wire and sealing sawcut.
- Cut home-run, from loop to curb or edge-of-road, as shown on the typical installation sheet.
- To prevent cross-talk and minimize electrical interference, twist home-run wires, from edge of road to handhole, with at least 5 turns per foot (16 turns per meter). Tape together twisted home-run wires at 2 foot (0.6 meter) \pm intervals.
- In new or resurfaced pavement, install loops in the wearing course. If the wearing course is not scheduled for immediate placement (within 24 hours) after the base course, provide temporary detection when directed by the Engineer. Temporary detection may be sawcut

loops, preformed loops, microwave sensor, video, or other method approved by the Engineer.

- Splice(s) not allowed anywhere in loop wire either in loop or in home-run.
- Ensure wires are held in place at bottom of slot by inserting at 2 foot (0.6 m) intervals, 1 inch sections of foam backer rod or wedges formed from 1 inch (25mm) sections of the polyethylene tubing. Loop detectors with wires that have floated to the top of the sealant will not be accepted.
- To create a uniform magnetic field in the detection zone, wind adjacent loops in opposite directions.
- Use **polyester compound** as the sealant unless another type is allowed by the Engineer.
- Mix hardening agent into polyester resin with a power mixer or in an application machine designed for this type of sealant in accordance with the manufacturer's instructions.
- Apply the loop sealant in accordance with the manufacturer's instructions and the typical installation sheet. Do not apply sealant when pavement temperature is outside the manufacturers recommended application range.
- Solder splice the loop wires to the lead-in cable and install water resistant connector as shown on the typical installation sheet.
- Test the loop circuit resistance, inductance, and amplifier power-interruption as shown on the typical installation sheet. Document all test results.

3. Damaged, Patched, or Excessively Worn Pavement

- Where the existing pavement is damaged, patched or excessively worn and is found to be not suitable for reliable loop detection, notify the Engineer.
- When directed by the Engineer, remove and replace an area of pavement to allow the proper installation of the loop.
- Remove a minimum of 3 inches (75mm) depth.
- Comply with the applicable construction methods of Section 2.02 Roadway Excavation, Formation Of Embankment and Disposal of Surplus Material, and Section 4.06 Bituminous Concrete, such as:
 - Cut Bituminous Concrete
 - Material for Tack Coat
 - Bituminous Concrete Class 1

4. Re-surface/Overlay Project

- Prior to disconnecting the existing loop confirm that the amplifier is operating properly and is programmed according to plan. Document loop operation. Report any discrepancies and malfunctions to Engineer.
- Remove all abandoned sawcut home-run wire from handhole.
- Sawcut new loop according to plan.
- Solder splice new loop wires to the existing lead-in cable and install new water resistant twist connectors as shown on the typical installation sheet. Do not re-use the removed connectors.
- Test the loop circuit resistance and inductance. Document results.
- Ensure the existing loop amplifier has re-tuned to the new loop and is operating according to plan.

11.11.04 – Method of Measurement:

1. Loop Vehicle Detector is measured by the number of installed, operating, tested, and accepted vehicle detector amplifiers of the type specified.
2. Loop Detector Sawcut is measured by the number of linear feet (meters) of installed, tested, operating, and accepted sawcut only where there is loop wire. Over-cuts at corners that do not contain wire are not measured.

11.11.05 – Basis of Payment:

1. Loop Vehicle Detector is paid at the contract unit price each of the type specified.
2. Loop Detector Sawcut is paid at the contract unit price per linear foot (meter). The price includes sawcut, loop wire, sealant, liquidtight flexible nonmetallic conduit, duct seal, water resistant splice connectors, testing, incidental material, equipment, and labor.

<u>Pay Item</u>	<u>Pay Unit</u>
Loop Vehicle Detector	ea. (ea.)
Loop Detector Sawcut	l.f. (m)

S:\traffic\1406\SIGNAL SPECS\SPECS\1111451A-LOOP DETECTOR SAWCUT, rev3-08, polyester compound

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.

Salvage Equipment

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)	330-16-7108	\$ 100.00
4 foot, 4 inch (1.3 m)	330-16-7112	\$ 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 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 all City owned salvage material to the City. Delivery time and location shall be coordinated with the local traffic authority:

Mr. Kevin J. Hale
Chief of Police
City of Ansonia
2 Elm Street
Ansonia, CT 06401
Tel: (203) 735-1885
E-Mail: khale@ansoniac.org

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.

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 and all equipment, material, tools and labor incidental thereto. This price shall also include removing and disposing of traffic signal equipment not to be salvaged and all equipment, material, tools and labor incidental thereto.

Payment is at the contract lump sum price for “Removal and/or Relocation of Traffic Signal Equipment” inclusive of all labor, vehicle usage, storage, and incidental material necessary for the complete removal of abandoned equipment/material and/or relocation of existing traffic signal equipment/material. Payment will also include the necessary labor, equipment, and material for the complete restoration of all affected areas.

A credit will be calculated and deducted from monies due the Contractor equal to the listed value of salvage material not returned or that has been damaged and deemed unsalvageable due to the Contractor’s operations.

Pay Item	Pay Unit
Removal and/or Relocation of Traffic Signal Equipment	L.S. (L.S.)

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ITEM #1131002A - REMOTE CONTROLLED CHANGEABLE MESSAGE SIGN

Description: Work under this item shall include furnishing and maintaining a trailer-mounted, “Changeable Message Sign”, “Remote Controlled Changeable Message Sign”, “Changeable Message Sign with Radar”, or “Remote Controlled Changeable Message Sign with Radar” whichever is applicable, at the locations indicated on the plans or as directed by the Engineer.

Materials: The full matrix, internally illuminated variable message sign shall consist of a LED, fiber optic, lamp matrix, or hybrid magnetically operated matrix – LED message board; and a computer operated interface, all mounted on a towable, heavy duty trailer.

The sign shall have a minimum horizontal dimension of 2920 mm and rotate a complete 360 degrees atop the lift mechanism.

In the raised position, the bottom of the sign shall be at least 2.1 m above the roadway. The messages displayed shall be visible from a distance of 800 m and be clearly legible from a distance of 274 m during both the day and night.

The lighting system shall be controlled both manually and by a photocell for automatic sign dimming during nighttime use.

The sign shall be capable of storing a minimum of 100 preprogrammed messages and be able to display any one of those messages upon call from the trailer mounted terminal and/or through the cellular telephone hookup for the remote controlled sign.

The sign shall be a full matrix sign that is able to display messages composed of any combination of alphanumeric text, punctuation symbols, and graphic images (notwithstanding NTCIP limitations). The display shall be capable of producing arrow functions. Full- matrix displays shall allow the use of graphics, traffic safety symbols and various character heights.

Standard messages shall be displayed in a three-line message format with 8 characters per line. The letter height shall not be less than 460 mm.

The sign shall utilize yellow green for the display with a black background. Each matrix shall have a minimum size of 6 x 9 pixels. Each pixel shall utilize a minimum of four high output yellow green LEDs or equivalent light source. The LEDs or light source shall have a minimum 1.4 candela luminance intensity, 22 degrees viewing angle, and wavelength of 590 (+/- 3) nanometers.

For hybrid magnetically operated matrix – LED matrix, each pixel shall have one single shutter faced with yellow green retro-reflective sheeting with a minimum of four high output yellow green LEDs or equivalent light source. The hybrid magnetically operated matrix – LED matrix sign shall be capable of operating in three display modes; shutter only, LED only, and both LED

and shutter. These modes shall be automatically controlled by a photocell for day and night conditions and also capable of being manually controlled through the software.

The sign shall be controlled by an on-board computer. The sign shall automatically change to a preselected default message upon failure. That default message shall remain on display until the problem is corrected.

The sign shall include all necessary controls, including, but not limited to, personal computer, keyboard or alphanumeric hand-held keyboard, and software. The sign shall interface with PCs, cellular phones, and radar speed detection devices as required.

Controls shall be furnished for raising and lowering the message board, aligning the message board and, for solar powered units, a read-out of the battery bank charge.

Power shall be provided by a self-contained solar maintained power source or a diesel engine driven generator. Hardware for connection to a 110-volt power source shall also be provided.

Solar powered signs shall display programmed messages with the solar panel disconnected, in full night conditions, for a minimum of 30 consecutive days.

Remote Controlled Changeable Message Signs shall include one (1) industrial-grade cellular telephone and be equipped with a modem to control the sign and a security system to prevent unauthorized access. The security system shall allow access only through use of a code or password unique to that sign. If the proper code or password is not entered within 60 seconds of initial telephone contact, the call will be terminated. Remote control for the Remote Controlled Changeable Message Sign shall be by cellular telephone and touch tone modem decoder.

The radar equipped signs shall include a high-speed electronic control module (ECM-X), Radar SI transceiver, signal processing board and radar logging software.

The radar software will operate the sign in four modes:

- 1) The sign will display words "YOUR SPEED" followed by the speed (2 digits). The display will repeat the message as long as vehicles are detected. The sign will blank when no vehicles are present.
- 2) The sign will display a series of up to six messages (programmed by the user) when a preset speed (programmed by the user) is exceeded. The sign will blank when no vehicles are present.
- 3) Will perform like mode #2 with the addition of displaying the actual speed with it.
- 4) The sign will work as a standard Changeable Message Sign or Remote Controlled Changeable Message Sign with no radar.

Construction Methods: The Contractor shall furnish, place, operate, maintain and relocate the sign as required. When the sign is no longer required, it shall be removed and become the property of the Contractor. The cellular telephone required for the Remote Controlled Changeable Message Sign shall be provided to the Engineer for his use, and subsequently returned to the Contractor.

When the sign is not in use, it shall either be turned off with a blank display or turned from view.

Any signs that are missing, damaged, defaced or improperly functioning so that they are not effective, 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.

Method of Measurement: This work will be measured for payment for each "Changeable Message Sign", "Remote Controlled Changeable Message Sign", "Changeable Message Sign with Radar", or "Remote Controlled Changeable Message Sign with Radar", whichever applies, furnished and installed, for the number of calendar days that the sign is in place and in operation, measured to the nearest day. When a sign is in operation for less than a day, such a period of time shall be considered to be a full day regardless of actual time in operation.

Basis of Payment: This work will be paid for at the Contract unit price per day for each "Changeable Message Sign", "Remote Controlled Changeable Message Sign", "Changeable Message Sign with Radar", or "Remote Controlled Changeable Message Sign with Radar" which price shall include placing, maintaining, relocating and removing the sign and its appurtenances and all material, labor, tools and equipment incidental thereto. Additionally, for the "Remote Controlled Changeable Message Sign", or "Remote Controlled Changeable Message Sign with Radar", the cellular telephone service and telephone charges shall be included.

<u>Pay Item</u>	<u>Pay Unit</u>
Remote Controlled Changeable Message Sign	Day

ITEM #1203109A – SIDE MOUNTED SIGN FOUNDATION

Description:

Work under this item shall consist of the design, excavation including rock excavation, backfill, when necessary, and the construction of side mounted sign foundations conforming to the requirements of AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals – 2001, including the latest interim specifications. The Breakaway Sign Support Sheets contained within the plan set for this project may be used as a conceptual base for the final design. The Contractor is to submit a final design of the sign supports and their foundations signed and sealed by a Professional Engineer registered in Connecticut.

Materials:

Foundations: Concrete for foundation shall be Class "A" Concrete conforming to the pertinent requirements of Sections 6.01 and M.03.

Reinforcement: Reinforcing steel shall conform to the pertinent requirements of Sections 6.02 and M.06.01.

Shims: 1" horseshoe shims shall be fabricated from 14 or 18 gauge sheet steel.

Breakaway Couplings: Breakaway couplings shall be made from alloy steel conforming to AMS 6378D with exceptions to decarburization and minimum tensile yield strength of 130,000 psi. The coupling shall have a minimum tensile ultimate strength of 40,400 lbs. The Rockwell hardness shall be C32 minimum. Couplings shall be hot dip galvanized in accordance with ASTM A153, cleaned and phosphated per federal specification TT-C-490C, coated, 0.002" – 0.004" thick, using Morton Powder Coatings 20-7037 black polyester powder or equivalent.

The breakaway hardware shall be supplied as components of a crash tested system complying with the guidelines of NCHRP Report 350 (recommended procedure for the safety performance evaluation of highway features). The manufacturer shall submit test reports to the FHWA for approval.

Chipped areas of the coated surface shall be repaired. All threaded surfaces, after coating, shall be cleaned to allow them to function properly.

Brackets: Brackets shall be made from aluminum alloy 6061-T6 or an equivalent material. The located concentrating member (Boss) shall be made from stainless steel conforming to ASTM A582, Type 416 with Rockwell Hardness of C33 – C45. Location holes for the breakaway coupling shall be accurately positioned relative to the load concentrating member and brackets shall be permanently labeled with the bracket number to reflect the hole position.

Bolts, Nuts and Washers: All bolts shall conform to the requirements of ASTM A325. Special bolts shall conform to ASTM A449. Nuts shall conform to the requirements of ASTM A563, Grade DH. Lockwashers shall conform to the requirements of ANSI B18-21-1. Bolts, nuts and washers shall be galvanized in accordance with the requirements of ASTM A153. Special bolts may be mechanically galvanized in accordance with the requirements of ASTM B695, Class 50.

Cap Screws: Cap screws attaching brackets to posts shall conform to the requirements of ASTM A307 and shall be hot dip galvanized in accordance with ASTM A153.

Construction Methods:

The design, fabrication and construction of the side mounted sign foundations, including the breakaway sign support coupling system and all appurtenant hardware, shall conform to the requirements of AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and traffic Signals – 2001, including the latest interim specifications. The Breakaway Sign Support Detail Sheets included in the contact plans are to be used for bidding purposes only.

Before fabrication, the Contractor shall submit design drawings for approval, in accordance with Subarticle 1.05.02-3.

Design drawings for the sign support foundation and appurtenances shall be stamped by a Professional Engineer licensed in the State of Connecticut. Each sheet of the design drawings shall be stamped.

No fabrication or foundation construction is to commence until the design drawings are approved by the Engineer. The Contractor shall provide a materials Certificate to certify that the material and components conform to those shown on the plans and specifications.

Design Computations: With the submission of design drawings, the Contractor shall also submit to the Engineer for review four sets of complete design computations for the sign support foundations. These computations shall be stamped by a Professional Engineer licensed in Connecticut.

The Contractor shall also submit a sequence plan outlining reinforcement and concrete placement procedures to the Engineer for review.

Prior to the start of construction of the foundations, the Contractor shall establish and verify the location, dimensions and elevations of the foundations as required on the plans. The Contractor shall submit foundation plan locations for approval prior to construction. The foundation shall be in accordance with design drawings for the steel sign support structure. The Contractor shall be responsible for the final fit of all members.

The concrete foundation shall be placed without forms except where unusual soil conditions prevent the required excavation. The form shall be fastened in place before the placing of any concrete so that the resulting foundation will be monolithic.

The concrete shaft shall not be out of plumb by more than 1% of the total length.

The top of the concrete foundation shall be level within $\pm 1/8$ ".

The anchor bolt locations shall be in accordance with design drawings for the sign support structure. Anchor bolt assemblies shall conform to the requirements of AASHTO.

The installation of the breakaway assembly shall be in accordance with the recommended practices of the supplier.

Method of Measurement:

This work will be measured for payment by the number of units completely installed and accepted.

Basis of Payment:

This work will be paid for at the contract unit price each for "Side Mounted Sign Foundation," which price shall include excavation, including rock excavation, Class "A" Concrete, reinforcing steel, anchor ferrules, furnishing and installing the breakaway coupling system, which consists of, but is not limited to, brackets, breakaway couplings, bolts, nuts, washers, cap screws, shims, forms when necessary, equipment, labor and work incidental thereto.

Pay Item	Pay Unit
Side Mounded Sign Foundation	ea.

ITEM #1206023A - REMOVAL AND RELOCATION OF EXISTING SIGNS

Section 12.06 is supplemented as follows:

Article 12.06.01 – Description is supplemented with the following:

Work under this item shall consist of the removal and/or relocation of designated side-mounted extruded aluminum and sheet aluminum signs, sign posts, sign supports, and foundations where indicated on the plans or as directed by the Engineer. Work under this item shall also include furnishing and installing new sign posts and associated hardware for signs designated for relocation.

Article 12.06.03 – Construction Methods is supplemented with the following:

The Contractor shall take care during the removal and relocation of existing signs, sign posts, and sign supports that are to be relocated so that they are not damaged. Any material that is damaged shall be replaced by the Contractor at no cost to the State.

Foundations and other materials designated for removal shall be removed and disposed of by the Contractor as directed by the Engineer and in accordance with existing standards for Removal of Existing Signing.

Sheet aluminum signs designated for relocation are to be re-installed on new sign posts.

Article 12.06.04 – Method of Measurement is supplemented with the following:

Payment under Removal and Relocation of Existing Signs shall be at the contract lump sum price which shall include all extruded aluminum and sheet aluminum signs, sign posts, and sign supports designated for relocation, all new sign posts and associated hardware for signs designated for relocation, all extruded aluminum signs, sheet aluminum signs, sign posts and sign supports designated for scrap, and foundations and other materials designated for removal and disposal, and all work and equipment required.

Article 12.06.05 – Basis of Payment is supplemented with the following:

This work will be paid for at the contract lump sum price for “Removal and Relocation of Existing Signs” which price shall include relocating designated extruded aluminum and sheet aluminum signs, sign posts, and sign supports, providing new posts and associated hardware for relocated signs, removing and disposing of foundations and other materials, and all equipment, material, tools and labor incidental thereto. This price shall also include removing, loading, transporting, and unloading of extruded aluminum signs, sheet aluminum signs, sign posts, and sign supports designated for scrap and all equipment, material, tools and labor incidental thereto.

<u>Pay Item</u>	<u>Pay Unit</u>
Removal and Relocation of Existing Signs	L.S.

ITEM #1207034A – SIGN FACE - EXTRUDED ALUMINUM (TYPE IV RETROREFLECTIVE SHEETING)

Article 12.07.01 – Description is revised as follows: This item shall consist of furnishing and installing sign face extruded aluminum with Type IV retroreflective sheeting at locations indicated on the plans or as ordered and in conformance with the plans and these specifications.

Sign Face – Extruded Aluminum is supplemented with the sign details that follow.

Article 12.07.02 – Materials is supplemented as follows: For Article M.18.10.02, the heading “2. Type III Reflective Sheeting” shall be replaced with “2. Type IV Retroreflective Sheeting”.

Article 12.07.03 – Construction Methods is supplemented as follows: All overhead sign foundations shall be field staked and the locations approved by an engineer from the Division of Traffic Engineering a minimum of seven days prior to installation.

For all side mounted signs, the edge of the sign closest to the roadway and the sign foundations shall be field staked and approved by an engineer from the Division of Traffic Engineering a minimum of seven days prior to installation.

For side-mounted signs, the offset to the near edge of sign face shall exceed the maximum deflection of the guide rail unless otherwise shown on the plans or otherwise directed by the Engineer.

Pay Item	Pay Unit
Sign Face - Extruded Aluminum (Type IV Retroreflective Sheeting)	S.F. (S.M.)

ITEM # 1210101A – 4” (100 mm) WHITE EPOXY RESIN PAVEMENT MARKINGS

ITEM # 1210102A – 4” (100 mm) YELLOW EPOXY RESIN PAVEMENT MARKINGS

ITEM # 1210103A – 6” (150 mm) WHITE EPOXY RESIN PAVEMENT MARKINGS

ITEM # 1210104A – 8” (200 mm) WHITE 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)

ITEM #1210101A
ITEM #1210102A
ITEM #1210103A
ITEM #1210104A
ITEM #1210105A

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.
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.

ITEM #1210101A
 ITEM #1210102A
 ITEM #1210103A
 ITEM #1210104A
 ITEM #1210105A

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 mcd/ft²/fc (mcd/m²/lux)

Yellow Epoxy: minimum retroreflectivity reading of 325 mcd/ft²/fc (mcd/m²/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 #1210101A
ITEM #1210102A
ITEM #1210103A
ITEM #1210104A
ITEM #1210105A

ITEM #1220013A – CONSTRUCTION SIGNS - BRIGHT FLUORESCENT SHEETING

Article 12.20.01 – 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.

Article 12.20.02 – 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 B₁) 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 $170^{\circ} \pm 5^{\circ}$ 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.

Article 12.20.03 – 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.

Article 12.20.04 – 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.

Article 12.20.05 – 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.

Pay Item

Construction Signs – Bright Fluorescent Sheeting

Pay Unit

S.F.

ITEM #1302048A – RESET VALVE BOX (WATER MAIN)

Description: This work shall consist of removing and resetting, adjustment and re-installation of water main valve boxes as directed by the South Central Connecticut Regional Water Authority (SCCRWA). The SCCRWA shall be notified prior to any work on or around the water facility.

Materials: Contractor shall re-use existing stone from the project site. Mortar material shall conform to the requirements of Article M.11.04. The Contractor shall provide any additional stone material (if required) that resemble as close as possible the existing stone size and shape as approved by the Engineer. The SCCRWA shall furnish valve boxes for installation and adjustment to final grade.

Construction Methods: Water gate boxes and any associated appurtenances shall be carefully removed, re-installed, reset and adjusted to the final grade. The contractor shall have SCCRWA operate all valves to demonstrate the proper operation of any associated water facilities to the satisfaction of the Engineer and the SCCRWA. All gate boxes shall be left free of all debris or matter that may interfere with the proper operation of the associated water facilities. Valve boxes shall be installed vertically, centered over the operating nut, and elevation of the top shall conform to the finished grade of roadway or other surrounding surface.

Method of Measurement: The valve boxes reset and accepted by the Engineer and the SCCRWA will be paid for on a lump sum basis and will not be measured for payment .

Basis of Payment: This work will be paid for at the contract lump sum price for "Reset Valve Box (Water Main)", which price shall include all work, equipment, labor and incidentals required to accomplish the work required under this item.

Pay Item
Reset Valve Box (Water Main)

Pay Unit
l.s.

ITEM #1403501A – RESET MANHOLE (SANITARY SEWER)

Work under this item shall conform to the applicable provisions of Section 5.07 of the Standard Specifications Form 816 amended as follows:

Sub-Article 5.07.05-5:

Add the following “Reset Manhole (Sanitary Sewer)”:

Description: The Contractor shall adjust to final grade the manhole frames and covers of the Sanitary Sewer as shown, specified or directed. Also included is furnishing and installing additional manhole riser sections and brick masonry, where indicated on the plans, or as directed by the Engineer.

Construction Methods: The Contractor shall carefully excavate the manhole frame and cover and add or delete brick masonry, block masonry or manhole risers as necessary to reset frame and cover to final grade.

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

The Contractor may be required to “unstack” the existing cone section so that riser sections can be added or deleted.

Any material damaged by the Contractor shall be repaired or replaced by the Contractor at no cost.

Materials:

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

MORTAR - Shall conform to Section M.11

MANHOLE RISER SECTIONS - Shall conform to ASTM C-478

ALUMINUM MANHOLE RUNGS – Shall be fabricated of 14” wide steel reinforced (1/2” diameter, ASTM A615) copolymer polypropylene, Type II, Grade 16906, ASTM D2146, or equal. Legs shall be tapered and finned.

Method of Measurement: This work will be measured for payment by the number of manholes (sanitary sewer) adjusted to grade and accepted by the Engineer.

ITEM #1403501A

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

All excavation, disposal of surplus material and refill material necessary to adjust the manhole frame and cover will be considered as included in the unit price bid.

Pay Item

Reset Manhole (Sanitary Sewer)

Pay Unit

Ea.

Note: Standards for Ansonia Sewer Manholes includes leakage testing, usually a vacuum test. The application of this requirement, to a “Reset Manhole”, will depend on specific conditions. When a cone section is to be removed, City staff should be contacted to review and decide if testing will be required.

ITEM #1500006A – UTILITY ADJUSTMENT (ESTIMATED COST PLUS)

Description: This item shall consist of payment to United Illuminating Company, by the Contractor, for the installation of a wood utility poles and street lights at the locations listed in the table in the City of Ansonia, as part of this project. The Contractor is responsible to hire and coordinate with United Illuminating Company to furnish and install the wood pole, anchor, bracket, luminaire, aerial cable, and ground rod, make all necessary electrical connections, and provide all labor, materials and equipment incidental thereto as part of the lighting installation.

Location	Station	Offset
Division St. at Rte 8, Exit 18 NB Off-Ramp/Westfield Ave. (Southwest corner)	Sta. 71+81.5	20.4' Left
Division St. at Rte 8, Exit 18 NB Off-Ramp/Westfield Ave. (Northwest corner)	Sta. 10+63.7	30.3' Left
Westfield Ave. South/Rte 8, Exit 18 NB On-Ramp	Sta. 18+48.5	10.9' Left
Westfield Ave. North Cul-De-Sac	Sta. 80+78.1	40.7' Right

Material: All materials shall be provided by United Illuminating Company.

Construction Methods: This work will be performed by the United Illuminating Company, or the utility company's authorized subcontractor. The Contractor shall coordinate all construction work with the work to be performed by the utility company.

This work will consist of the installation of four wood poles with one 150 watt H.P.S. roadway luminaire each and associated bracket and secondary cable

The Contractor shall provide Mr. Thomas Judge of United Illuminating Company (telephone no. (203) 926-4772 (e-mail: Thomas.Judge@uinet.com) 60 days advance notice prior to required utility company work.

All labor, material and equipment supplied by the utility company shall be on a billable basis to the Contractor.

Method of Measurement: This work will be measured for payment as a lump sum at the estimated cost.

The sum of money shown on the estimate and in the itemized proposal as "Estimated Cost" for this work will be considered the price bid even though payment will be made only for actual work performed by the utility company and paid for by the Contractor. Any administrative costs for the Contractor should be considered in the general cost of the work. The estimated cost figure is not to be altered in any manner by the bidder. Should the bidder alter the amount

shown, the altered figure will be disregarded and the original price will be used to determine the total amount bid for the contract.

Basis of Payment: Under this item, the Contractor will be reimbursed his actual costs for work performed by United Illuminating Company, which price shall include all materials and labor as indicated above as part of the complete lighting system. The Contractor shall furnish receipted invoices to the State clearly documenting work performed by the utility company and paid for by the Contractor. No markup for the Contractor will be considered. Any administrative costs for the Contractor should be considered in the general cost of the work.

ITEM #1700001A – SERVICE CONNECTIONS (ESTIMATED COST)

Description: This work shall consist of disconnection, alteration and reconnection of those existing utility services owned by property owners at locations necessary to complete this project and as ordered by the Engineer. This work shall include the coordination with the affected utility companies and customers. Any damage caused by the Contractor or Subcontractors, as determined by the Engineer, shall be corrected by the Contractor in accordance with this specification.

Materials: All materials shall be provided by the Contractor and shall meet the current standards of the affected service.

Construction Methods: The Contractor shall perform all work in coordination with the Utility Company and affected property owner and as directed by the Engineer. Certain work may require use of a licensed and/or certified tradesman when such work is required by local and/or state codes.

Any utility customer's service interruption shall be done in a way that minimizes adverse impacts to the customer and affected utility. Work may occur on holidays, weekends and off peak hours.

Any work and materials supplied by the utility companies shall be on a billable basis to the Contractor.

Method of Measurement: The work and materials shall be measured for payment as provided for under Article 1.04.05 Extra Work.

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

Corrective work required to repair damage caused by the Contractor or its Subcontractors shall not be measured for payment.

Basis of Payment: This work will be paid as Extra Work.

Pay Item
Service Connections (Estimated Cost)

Pay Unit
Estimated Cost

ITEM #0974001A - REMOVAL OF EXISTING MASONRY

Work under this item shall conform to the requirements of Section 9.74 amended as follows:

9.74.01-Description: Add the following:

The removal of existing pedestrian tunnel, stone walls, drainage pipes, unforeseen utilities, within the proposed construction limits as shown on the plans, shall also be included in the cost of the work.

9.74.03 - Construction Methods: Add the following:

The concrete shall be removed to the limits shown on the plans. The Contractor shall take necessary precautions to support, and prevent any collapse outside the limits of removal.

When removing the masonry, concrete and reinforcing steel, the Contractor shall take necessary precautions to prevent any undermining of the route 8 embankment.

All debris shall be disposed of, from the site, by the Contractor at no additional cost to the State.

9.74.05 - Basis of Payment: Delete in its entirety and replace with the following:

This work will be paid for at the contract unit price per cubic yard for "Removal of Existing Masonry", which price shall include all equipment, tools and labor incidental thereto.

Pay Item	<u>Pay Unit</u>
Removal of Existing Masonry	C.Y

PERMITS AND/OR SUPPLEMENTAL TO FORM 816 AND REQUIRED PROVISIONS:

The following Permits and/or Supplemental to Form 816 and Required Provisions follow this page and are hereby made part of this Contract.

- **PERMITS AND/OR PERMIT APPLICATIONS**

Storm Water Discharge Permit

Acquisition occurs during construction

- **SUPPLEMENTAL SPECIFICATIONS TO STANDARD SPECIFICATIONS FORM 816**

- **Construction Contracts - Required Contract Provisions (FHWA Funded Contracts)**