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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OCTOBER 16, 2019
FEDERAL AID PROJECT NO.: N/A
STATE PROJECT NO. 155-171

SAFETY AND OPERATIONAL IMPROVEMENTS ON I-84

Town of West Hartford

The State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, Facilities and Incidental Construction, Form 817, 2016, as revised by the Supplemental Specifications dated January 2019 (otherwise referred to collectively as "ConnDOT Form 817") is hereby made part of this contract, as modified by the Special Provisions contained herein. Form 817 is available at the following DOT website link http://www.ct.gov/dot/cwp/view.asp?a=3609&q=430362. The current edition of the State of Connecticut Department of Transportation's "Construction Contract Bidding and Award Manual" ("Manual"), is hereby made part of this contract. If the provisions of this Manual conflict with provisions of other Department documents (not including statutes or regulations), the provisions of the Manual will govern. The Manual is available at the following DOT website link http://www.ct.gov/dot/cwp/view.asp?a=2288&q=259258. The Special Provisions relate in particular to the SAFETY AND OPERATIONAL IMPROVEMENTS ON I-84 in the Town of West Hartford.

CONTRACT TIME AND LIQUIDATED DAMAGES

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

There will be three 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 Six Thousand Dollars ($6,000) Dollars per day shall be applied to each calendar day the work runs in excess of the Eight Hundred Twenty-three (823) allowed calendar days for the contract.

2. For this contract, an assessment per day for liquidated damages, at a rate of Two Thousand Dollars ($2,000) per day shall be applied to each calendar day that the CCTV Cameras or Variable Message Signs are not operational. The CCTV Camera Sites and Variable Message Sign included in this Contract are the following:

•(Existing) CCTV Camera Site No. 84E-038
•(Existing) CCTV Camera Site No. 84W-037
•(Existing) CCTV Camera Site No. 84E-036
•(Existing) VMS Site No. 84W-020

The contractor shall refer to the "Notice to Contractor – Installation Qualifications" for terms and conditions.

3. For this contract, an assessment per hour for liquidated damages shall be applied to each hour, or any portion thereof, in which the Contractor interferes with normal traffic operations during the restricted hours given in Article 1.08.04 of the Special Provisions. The liquidated damages shall be as shown in the following tables entitled "Liquidated Damages Per Hour" for each hour, or any portion thereof, in which the Contractor interferes with normal traffic operations during the restricted hours.

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

A. Any portion of the travel lanes or shoulders is occupied by any personnel, equipment, materials, or supplies including signs.

B. The transition between the planes of pavement surfaces is at a rate of one inch in less than fifteen feet longitudinally.

MILESTONE INCENTIVE AND MILESTONE LIQUIDATED DAMAGES PROVISIONS

In order to minimize the hazard, obstruction, inconvenience, and cost to the public, pollution of the environment, and detriment to area businesses, 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.

STAGE 1A:

A maximum of 155 consecutive days is permitted for the closure of the on-ramp (Ramp G) from Ridgewood Road to I-84 Westbound beginning on or after May 4, 2020, and ending on or before the Milestone Completion Date of October 5, 2020. A corresponding approximate 2.7 mile detour will service the traffic as detailed within the Contract. The reopening of the noted ramp is defined below.

As detailed below, the Contractor will receive an Incentive Payment by completing the required listed tasks between the Incentive Completion Date and one day prior to the Milestone Completion Date. After the Milestone Completion Date, Milestone Liquidated Damages shall be deducted from any money due the Contractor as specified in Article 1.08.09 – "Failure to Complete Work on Time" of the Standard Specifications.

The tasks are:

- The **closure time frame begins** with the implementation of the Detour Plan
- Perform the following work per Stage 1A plan sheets and Section 1.08 Prosecution and Progress:
  - construct full-depth pavement
  - reconstruct I-84 median
  - partially demo concrete deck, Bridge #01743B
  - remove existing girders and approach slab
  - excavate behind abutments 1 and 2 and around pier
  - partially demo concrete abutments 1 and 2
  - remove pier cap pedestals
  - reconstruct abutments 1& 2
  - extend stage 1 pier footing
  - reconstruct pier
  - erect girders
  - install deck forms and rebar
  - pour concrete deck and parapets
  - install bridge overlay and approach pavement
  - install Stage 1B pavement markings and shift traffic for I-84 WB stage 1B
  - remove all signs pertaining to the closure of the on-ramp, as shown on the Detour Plan and open Ramp G

MILESTONE: The **closure timeframe ends** with the completion of all above tasks and ancillary work thereto and with the reopening of Ramp G to one lane of traffic and shoulders as shown on the Stage 1B MPT Drawing Number 14.

STAGE 2A:

A maximum of 183 consecutive days is permitted for the closure of the on-ramp (Ramp G) from Ridgewood Road to I-84 Westbound beginning on or after April 4, 2022, and ending on or before the Milestone Completion Date of October 3, 2022.

A corresponding approximate 2.7 mile detour will service the traffic as detailed within the Contract. The reopening of the noted ramp is defined below.

As detailed below, the Contractor will receive an Incentive Payment by completing the required listed tasks between the Incentive Completion Date and one day prior to the Milestone Completion Date. After the Milestone Completion Date, Milestone Liquidated Damages shall be deducted from any money due the Contractor as specified in Article 1.08.09 – "Failure to Complete Work on Time" of the Standard Specifications.

The tasks are:

- The **closure time frame begins** with the implementation of the Detour Plan
- Perform following work as per Stage 2A plan sheets and Section 1.08 Prosecution and Progress:
  - Install stage 2A traffic pattern and work on Br. #1743B
  - construct full-depth pavement
  - demo concrete deck, Br. #01743B
  - remove existing girders and approach slab
  - excavate behind abutments 1 and 2 and around pier
  - demo concrete abutments 1 and 2
  - remove pier cap pedestals
  - reconstruct abutments 1 & 2
  - reconstruct pier
  - erect girders
  - install deck forms and rebar
  - pour concrete deck and parapets
  - install bridge overlay and approach pavement
  - remove all signs pertaining to the closure of the on-ramp, as shown on the Detour Plan and open Ramp G

STAGE 1A

Milestone Incentive Payment Terms and Conditions

If the Contractor completes the required listed tasks, as accepted by the Engineer, on or before the Incentive Completion Date of September 7, 2020, he shall receive a Lump Sum payment of $126,000 (One Hundred Twenty Six Thousand Dollars). Thereafter this amount will be reduced

by $4,500 (Four Thousand five Hundred Dollars) per day. There is no Incentive Payment due the Contractor for opening Ramp G on the Milestone Completion Date. The Incentive Payment shall be paid under "Item #0108100A – Lump Sum Incentive Payment (Estimated Cost)".

STAGE 2A

Milestone Incentive Payment Terms and Conditions

If the Contractor completes the required listed tasks, as accepted by the Engineer, on or before the Incentive Completion Date of September 5, 2022, he shall receive a Lump Sum payment of $126,000 (One Hundred Twenty Six Thousand Dollars). Thereafter this amount will be reduced by $4,500 (Four Thousand five Hundred Dollars) per day. There is no Incentive Payment due the Contractor for opening Ramp G on the Milestone Completion Date. The Incentive Payment shall be paid under "Item #0108100A – Lump Sum Incentive Payment (Estimated Cost)".

Stage 1A and 2A Milestone Incentive Payment Terms and Conditions

The Engineer shall determine the amount of any appropriate payment to be made in this regard, subject to the conditions set forth hereinabove. For purposes of calculation and determination of entitlement to an incentive payment, the Incentive Completion Dates have been established for the Contract, and said Dates will not be adjusted thereafter for any reasons, cause or circumstance, regardless of fault on the part of any party, unless delays result from unforeseeable causes beyond the control and without the fault or negligence of the Contractor. Delays due to weather or seasonal conditions shall not be included in such unforeseeable causes (unless extraordinary and catastrophic such as a hurricane or declared state of emergency). Unforeseeable causes include, but are not restricted to, natural catastrophes, acts of State in either its sovereign or contractual capacity, acts of another contractor in the performance of a contract with the State, or delays resulting from utility work by Utility Companies.

Separate from the above unforeseeable causes, the Contractor must anticipate that Project delays may occur and may arise from any one of various kinds of events and circumstances prior to or during the Contract period, including, but not limited to, the deletion of Contract work, the issuing of construction orders, the execution of supplemental agreements, the discovery of differing site conditions, the adding of extra work to the Contract, the emergence of right-of-way conflicts, problems with the obtaining or the terms of permits, action or inaction by persons or entities working on the project or by third parties, delays in the process of reviewing or approving shop drawings, expansion of the physical limits of the Project, the effects of weather conditions on Project activities, the occurrence of weekends or holidays, the suspension of any Project operation, or other events, forces or factors that affect highway construction work. Such events, forces or factors, and the Project delays, disruptions, inefficiencies or any other detrimental effects caused by them, are to be deemed to have been anticipated and contemplated by the parties in entering into this Contract, and **shall not extend or constitute cause for extending any Incentive Completion Dates for the purpose of determining whether or not any incentive payments are due the Contractor.**

Further, any and all costs or detrimental effects incurred by the Contractor in accelerating its work in an attempt to meet the Incentive Completion Date, regardless of the effects of any delay, disruption, inefficiency or other detrimental effect of the kinds of events, forces or factors

referred to above, shall be solely the Contractor's responsibility, and may not be used as the basis for any claim by the Contractor for additional compensation. **The Contractor is responsible for determining the full scope of labor and equipment resources and anticipated accelerated operations needed to complete the milestone tasks by the Incentive Completion Date and shall bid the on-time completion of the work accordingly.**

If a catastrophic event (as defined above), acts of State in either its sovereign or contractual capacity or acts of another contractor in performance of a contract with the State directly and substantially delays or disrupts a portion of the Contract work as described in the bulleted tasks above, and if said effects and their claimed extent are supported by the Contractor's Critical Path Schedule, the Contractor and the Department shall agree on the number of calendar days by which to extend the pertinent Incentive Completion Date, and the adjusted Date will be used in calculating any related incentive payment. If the Contractor and the Department cannot agree on the appropriate adjustment of the pertinent Date, the Department will adjust the Date in accordance with the period of delay that the Department reasonably deems to have been caused solely by the catastrophic event, acts of State in either its sovereign or contractual capacity or acts of another contractor in performance of a contract with the State. The Contractor shall have no right whatsoever to contest such determination, except in the event that the Contractor establishes that the number of calendar days of delay recognized by the Department in this context was arbitrary and without any reasonable basis.

Waiver of Claim

A Waiver of Claim (WOC) executed between the Contractor and the Department will be issued to establish the pertinent Incentive Completion Date. **The WOC will be incorporated into the Contract by Construction Order.**

If the Contractor elects to take advantage of the milestone incentive payment provisions, and if any portion of said provisions conflicts with any other provision of the Contract, the Contract shall be interpreted in accordance with these additional milestone incentive payment provisions:

(1) To take advantage of the milestone incentive payment provisions, the Contractor must actually complete the pertinent work and obtain written verification from the Engineer that the actual milestone described work is accepted and the completion date was on or before the pertinent Incentive Completion Date.

(2) Within 30 days of receiving such verification of its actual completion date, the Contractor must provide written notification to the administrating District Engineer that the Contractor elects to receive payment(s) under these provisions. A copy of the Engineer's verification of the acceptance of the work and the pertinent actual completion date(s) must be enclosed with the notice to the District Engineer. In said written notice the Contractor, in the following language, shall:

> "waive and release the State from any and all claims, causes of action, issues, demands, disputes, matters or controversies of any nature or kind, known or unknown, present or potential, which the Contractor, its employees, agents or successors may have, may have had or ever may have against the Department, its officials, employees, consultants, or its other agents or representatives, in

connection with the Contract or the Project, including, but not limited to, claims regarding Project work performed or deleted, construction orders, supplemental agreements, delays, disruptions, differing site conditions, utility conflicts, design changes or defects, time extensions, extra work, right-of-way issues, permitting issues, actions of suppliers or subcontractors or other contractors or third parties, shop drawing review or rejection, expansion of the physical Project limits, weather conditions, weekend or holiday cessation of Project activities, restrictions of working hours, suspensions of the Contractor's operations, extended or unabsorbed home office or jobsite overhead, lost profits, markups on subcontractor work, acceleration costs, and any other direct or indirect costs, and any other adverse impacts, events, conditions or circumstances or potential damages, relating to or arising out of the Contract or the Project through the date of this letter. This waiver and release and acknowledgement of satisfaction shall be all-inclusive and absolute, except for any routine adjustment by the Department of final quantity estimates."

If the Contractor does not, (1) prior to the pertinent Incentive Completion Date, complete the described Milestone Contract work and obtain written verification from the Engineer of the acceptance and actual completion date of said work, and (2) within thirty (30) days of said written verification, give the required written notice to the District Engineer of its election to receive incentive payment under the Contract, then the Contractor shall have no right to any payment under these milestone incentive payment provisions.

Without regard to any verification by the Engineer that pertinent Contract work has been completed and accepted, and without regard to whether or not any milestone incentive has been elected or earned under these provisions, the Contractor shall remain responsible for all Contract work and the continued maintenance thereof until such date as the Department formally accepts all work under the Contract in accordance with Section 1.08.14 of these Specifications

Milestone Liquidated Damages Terms and Conditions

If the Contractor fails to complete, as accepted by the Engineer, the above-listed tasks by the pertinent Milestone Completion Date, or by an adjusted Milestone Completion Date, if the adjustment was warranted as defined below, the Contractor will be assessed a liquidated damage charge of $8,200 (Eight Thousand Two Hundred Dollars) on the first minute after the pertinent defined timeframe period has expired, and shall be assessed additional liquidated damage charges at the rate of $8,200 (Eight Thousand Two Hundred Dollars) per day thereafter until the tasks and corresponding milestone are complete and accepted by the Engineer. The maximum assessment of Milestone Liquidated Damages shall not be capped and shall be considered separate from any Liquidated Damages assessed to the Contractor for failure to complete the project on time per Section 1.08.09 of the Standard Specifications.

The Milestone Completion Dates have been established for the Contract, and said Dates will not be adjusted thereafter for any reasons, cause or circumstance, regardless of fault on the part of any party, unless delays result from unforeseeable causes beyond the control and without the fault or negligence of the Contractor. Delays due to weather or seasonal conditions shall not be included in such unforeseeable causes (unless extraordinary and catastrophic such as a hurricane or declared state of emergency). Unforeseeable causes include, but are not restricted to, natural

catastrophes, acts of State in either its sovereign or contractual capacity, acts of another contractor in the performance of a contract with the State, or delays resulting from utility work by Utility Companies.

Separate from the above unforeseeable causes, the Contractor must anticipate that Project delays may occur and may arise from any one of various kinds of events and circumstances prior to or during the Contract period, including, but not limited to, the deletion of Contract work, the issuing of construction orders, the execution of supplemental agreements, the discovery of differing site conditions, the adding of extra work to the Contract, the emergence of right-of-way conflicts, problems with the obtaining or the terms of permits, action or inaction by persons or entities working on the project or by third parties, delays in the process of reviewing or approving shop drawings, expansion of the physical limits of the Project, the effects of weather conditions on Project activities, the occurrence of weekends or holidays, the suspension of any Project operation, or other events, forces or factors that affect highway construction work. Such events, forces or factors, and the Project delays, disruptions, inefficiencies or any other detrimental effects caused by them, are to be deemed to have been anticipated and contemplated by the parties in entering into this Contract, and **shall not extend or constitute cause for extending any Milestone Completion Dates for the purpose of determining whether or not any incentive payments are due the Contractor.**

Further, any and all costs or detrimental effects incurred by the Contractor in accelerating its work in an attempt to meet the Milestone Completion Date, regardless of the effects of any delay, disruption, inefficiency or other detrimental effect of the kinds of events, forces or factors referred to above, shall be solely the Contractor's responsibility, and may not be used as the basis for any claim by the Contractor for additional compensation. **The Contractor is responsible for determining the full scope of labor and equipment resources and anticipated accelerated operations needed to complete the milestone tasks by the Milestone Completion Date and shall bid the on-time completion of the work accordingly.**

If a catastrophic event (as defined above), acts of State in either its sovereign or contractual capacity or acts of another contractor in performance of a contract with the State directly and substantially delays or disrupts a portion of the Contract work as described in the bulleted tasks above, and if said effects and their claimed extent are supported by the Contractor's Critical Path Schedule, the Contractor and the Department shall agree on the number of calendar days by which to extend the pertinent Milestone Completion Date, and the adjusted Date will be used in calculating any related incentive payment. If the Contractor and the Department cannot agree on the appropriate adjustment of the pertinent Date, the Department will adjust the Date in accordance with the period of delay that the Department reasonably deems to have been caused solely by the catastrophic event, acts of State in either its sovereign or contractual capacity or acts of another contractor in performance of a contract with the State. The Contractor shall have no right whatsoever to contest such determination, except in the event that the Contractor establishes that the number of calendar days of delay recognized by the Department in this context was arbitrary and without any reasonable basis.

In addition to the above requirements herein, the Contractor is directed to follow the procedures of Section 1.08.08 of the Form 817 Standard Specifications for any request presented to the Engineer for an adjustment of the Incentive Completion Date and/or the Milestone

Completion Date for any unforeseeable causes as noted herein that have resulted in the need for an adjusted date.

LIQUIDATED DAMAGES PER HOUR

Project No. 155-171

I-84 Eastbound From M.P. 56.34 to M.P. 57.59 3 Lane Section		
If Working Periods Extends Into	A.M. 1 Lane Closure	A.M. 2 Lane Closure
1st Hour of Restrictive Period	$ 5,000	$ 60,000
2nd Hour of Restrictive Period	$ 70,000	$ 100,000
3rd Hour or any Subsequent Hour of Restrictive Period	$ 90,000	$ 100,000

I-84 Westbound From M.P. 55.99 to M.P. 57.86 3 Lane Section		
If Working Periods Extends Into	A.M. 1 Lane Closure	A.M. 2 Lane Closure
1st Hour of Restrictive Period	$ 500	$ 10,000
2nd Hour of Restrictive Period	$ 500	$ 50,000
3rd Hour or any Subsequent Hour of Restrictive Period	$ 3,000	$ 100,000

The above liquidated damages apply to those hours shown on the Limitation of Operations charts designated with a “3” 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 or turning roadways during the non-allowable hours.

NOTICE TO CONTRACTOR - PROJECT LABOR AGREEMENT

The Contractor is hereby notified that a Project Labor Agreement (PLA) is required as part of this Contract.

A copy of the PLA, signed by the Hartford/New Britain Building and Construction Trades Council and each individual Union, is included in the Contract Documents.

The Contractor will be required to sign the PLA prior to the Award of this Contract. At Award, the Contractor will be required to sign the "Acceptance of Agreement" form, acknowledging that the Contractor has received a fully executed copy of the PLA, and accepts and agrees to be bound by the PLA for Project No. 155-171.

CT DOT'S SAFETY AND OPERATIONS IMPROVEMENTS PROJECT I-84

State Project No. 155-171

PROJECT LABOR AGREEMENT

BETWEEN

_____

Prime Contractor

AND

HARTFORD-NEW BRITAIN BUILDING AND CONSTRUCTION TRADES COUNCIL

AND

SIGNATORY UNIONS

_____, 2019

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PROJECT LABOR AGREEMENT
PREAMBLE

This Project Labor Agreement (hereinafter referred to as the "Agreement") is entered into this _____ day of _____, 2019, by and between the _____ as Prime Contractor (hereinafter referred to as the "Prime Contractor") and the Hartford-New Britain Building and Construction Trades Council (hereinafter referred to as the "Council") and each of the nine (9) affiliated Local Unions signatory hereto (hereinafter individually and collectively referred to as "Union" or "Unions" or "Local Unions"), with respect to the site preparation, demolition and construction of I-84 Eastbound and Westbound in the town of West Hartford, Hartford County, Connecticut, State Project No. 155-171 (hereinafter referred to as the "Project").

It is understood by the parties to this Agreement (collectively "Parties"; individually "Party") that this Agreement is in accordance with section 31-56b of the Connecticut General Statutes and it is the intention of the Project owner, the Connecticut Department of Transportation (the "Owner"), that work within the scope of the Agreement shall be performed by Contractors (hereinafter referred to as "Contractors" and as more particularly described in the next paragraph) who agree to execute and be bound by the terms of this Agreement. Therefore, the Unions agree that Contractors may execute an Acceptance of Agreement in the form attached to this Agreement as Exhibit A, which Exhibit is incorporated herein, for the purpose of performing work on the Project. The Prime Contractor for the Owner shall monitor and enforce compliance with this Agreement by the Unions and by all Contractors who, through their execution of the Acceptance of Agreement, together with their subcontractors, have become bound hereto.

The term "Contractors" shall include the Prime Contractor, all subcontractors and sub-subcontractors of whatever tier engaged in on-site construction work or dedicated off-site construction work within the scope of this Agreement. The Unions, the Prime Contractor and all the Contractors agree to abide by the terms and conditions contained in this Agreement with respect to the administration of the Agreement by the Prime Contractor and the performance of all Contractors on the Project. All Contractors shall become parties to this Agreement whether or not they operate their businesses as union or non-union companies on work not covered by this Agreement. The Unions, the Prime Contractor and all other Contractors agree that this Agreement applies only to this Project and nothing in this Agreement requires either the Owner or any Contractor to become party to or to be required to sign any collective bargaining agreement as a

condition of performing work within the scope of this Agreement. This Agreement and the local collective bargaining agreements attached as Schedule A represent the complete understanding of the Parties.

ARTICLE I
PURPOSE

The timely and successful completion of the Project is of paramount importance to the Owner. Therefore, it is essential that the Project work be done in an efficient and economical manner in order to secure optimum productivity and to eliminate any delays in the work. In recognition of the needs of this Project and to maintain a spirit of harmony, labor-management peace, and stability during the term of this Agreement, the Parties agree to binding methods for the settlement of all misunderstandings, disputes or grievances which may arise as set forth in Articles VII and VIII of this Agreement. This Agreement will foster the achievement of these goals by: (1) prohibiting strikes, sympathy strikes, slowdowns, walkouts, lockouts, picketing and other interruptions or disruptions and delays arising from work disputes, and promoting labor harmony and peace for the duration of the Project; (2) standardizing and stabilizing certain basic terms and conditions governing the employment of hourly craft employees on the Project, and thereby promoting labor harmony and peace for the duration of the Project; (3) permitting flexibility in scheduling work and shift hours and times to enhance coordination of work among the various crafts on the Project and to promote efficiency and economy of operations; (4) adjusting work rules and staffing requirements from those which otherwise might pertain to enhanced coordination of the work among the various crafts on the Project, and to promote efficiency and economy of operations; (5) providing comprehensive and standardized mechanisms for the settlement of disputes that can be implemented without delay, including those relating to grievances, job disputes and trade jurisdiction; (6) ensuring a reliable source of skilled and experienced labor, whether unionized or non-unionized; (7) encouraging the use of local residents by Contractors; (8) establishing goals for and encouraging the use of apprentices by all Contractors, whenever and wherever possible and feasible; (9) expediting the Project work and otherwise minimizing potential disruptions for the duration of the Project; (10) inviting all Contractors to bid on the Project without regard to whether the employees are members of a labor organization as defined in section 31-101 of the Connecticut General Statutes; (11) permitting the selection of the lowest responsible

bidder without regard to labor organization affiliation; (12) not requiring compulsory labor organization membership of employees working on the Project; and (13) binding all Contractors to the terms of the Agreement.

ARTICLE II
SCOPE OF THE AGREEMENT

SECTION 1. This Agreement shall apply and is limited to all site preparation, demolition, construction, and dedicated off-site work as defined in Article III, Section 5 within the scope of the Project under the direction of the Contractors who have contracts awarded for such work by the Prime Contractor or other Contractors on and after the effective date of this Agreement.

SECTION 2. (a) The Prime Contractor has the absolute right to award sub-contracts on this Project without reference to the existence or non-existence of any collective bargaining agreements between such Contractor and any signatory Union to this Agreement; provided that such Contractor is willing, ready and able to execute the attached Acceptance of Agreement and comply with this Agreement.

(b) It is agreed that no Contractor shall be awarded contracts for work covered by this Agreement until such Contractor has duly executed the attached Acceptance of Agreement, thereby becoming bound by the terms and conditions of this Agreement. All Contractors shall promptly provide copies of all executed Acceptance of Agreement forms to the Prime Contractor.

SECTION 3. (a) Incorporated into this Agreement by reference are the local collective bargaining agreements or standard agreements between the Unions and their respective employer associations and any successor local collective bargaining agreements (hereinafter referred to as "Schedule A's").

The provisions of this Agreement (including the Schedule A's) shall apply to the construction of the Project, notwithstanding the provisions of any local, area and/or national bargaining or standard agreements which may conflict or differ from the terms of this Agreement.

Where a subject covered by the provisions of this Agreement is also covered by provisions of one of the Schedule A's, the provisions of this Agreement shall prevail. Where a subject is covered by the provisions of one of the Schedule A's and not covered by this Agreement, the Schedule A's provisions shall apply.

(b) Any dispute as to whether this Agreement or the applicable Schedule A determines the

wages, hours and working conditions of employees on the Project shall be resolved pursuant to Article VIII of this Agreement by an Arbitrator selected by the Parties at the time of signing the PLA in accordance with the procedures of the American Dispute Resolution Center ("ADRC"). A Party invoking such arbitration shall notify the Arbitrator by written notice delivered via hand delivery or UPS overnight delivery with a copy to the other Party or Parties to such dispute delivered via hand delivery or UPS overnight delivery. In the event the Arbitrator is unable to hear any such dispute within ten (10) days of receipt of notice, the Parties to such dispute shall choose an alternative Arbitrator. It is understood that this Agreement, together with the attached Schedule A's, constitutes a self-contained, standalone agreement and that by virtue of having become bound to this Agreement, the Contractor will not be obligated to sign or in any way be bound by any other Local, Area or National Agreement.

SECTION 4. This Agreement shall only be binding on the Parties hereto and shall not apply to the parents, affiliates, subsidiaries, or other ventures of any such Party.

SECTION 5. This Agreement shall be limited to work customarily recognized as construction work including, specifically, the site preparation and related demolition work necessary to prepare the site for construction and dedicated off-site work as is directed by the Prime Contractor. "Dedicated off-site work" shall be defined as work done at a facility or location established exclusively for the Project which work is performed outside of the geographic footprint of the Project. Contractor's yards or fabrication sites which include other operations are excluded from the Project.

SECTION 6. It is understood that the liability of any individual Contractor and the liability of the separate Unions under this Agreement shall be several and not joint. The Unions agree that this Agreement does not have the effect of creating any joint employment status between or among the Owner, the Prime Contractor, and/or any other Contractor.

SECTION 7. Items specifically excluded from the scope of this Agreement include, but are not limited to, the following:

a) Work of non-manual employees including, but not limited to, superintendents, supervisors, staff engineers, surveyors, (except where expressly covered by a Schedule A to this Agreement), inspectors, quality control personnel, quality assurance personnel, timekeepers, mail carriers, clerks, office workers, including messengers, guards, emergency medical and first aid technicians, and other professional, engineering,

administrative, supervisory and management employees.

b) Equipment and machinery owned or controlled and operated by the Owner.

c) All off-site fabrication, assembly, and handling of materials, equipment or machinery; and all deliveries of those items with the exception of concrete, to and from the Project site.

d) All employees of the Owner or their representative not a party to this agreement, and all employees of the Contractor not performing manual labor.

e) Any work performed on or near, or leading to or into, the Project site by state, county, municipal or other governmental bodies, or their contractors; or by public utilities, or their contractors, and/or by the Owner, or its contractors (for work which is not part of the Project).

f) Off-site maintenance on leased equipment and on-site supervision of such work.

g) Off-site warranty functions and warranty work, on-site supervision of such work.

SECTION 8. None of the provisions of this Agreement shall apply to the Owner and nothing contained herein shall be construed to prohibit or restrict the Owner or its employees or contractors from performing work not covered by the Agreement on the Project site. As areas and systems of the Project are inspected and construction tested by the applicable Contractor and accepted by the Prime Contractor, the Agreement shall not have further force and effect on such items or areas, except when the Contractor is directed by the Prime Contractor to engage in repairs, modifications, check-out, and/or warranty functions required by the contract(s) with the Owner.

ARTICLE III
UNION RECOGNITION AND EMPLOYMENT

SECTION 1. The Prime Contractor and other Contractors recognize the Unions as the sole and exclusive bargaining representative for all craft employees within their respective jurisdictions working within the scope of this Agreement.

SECTION 2. Applicants for various job classifications covered by the Agreement required by the Contractors on the Project shall be referred to the Contractors by the Local Union. Each Contractor shall have the right to determine the competency of its employees, the right to determine the number of employees required, and shall have the sole responsibility for selecting the employees to be laid off consistent with Article IV of this Agreement and the attached Schedule A's. Each Contractor shall also have the right to reject any applicant referred by the Local Union, subject to the

show-up payments required in the applicable Schedule A.

SECTION 3(a). Recognizing that this is a publicly financed and supported Project for the benefit of the residents of the State of Connecticut, the Parties agree that any special conditions required of the Contractors by the Owner will be observed and accepted for the performance of Project work, including but not limited to:

i. Payment of wages and benefits at least equal to those established by the applicable prevailing wage statute and regulations;

ii. The encouragement of employment of minorities, women, veterans, and residents of the labor market within which the Project is located;

iii. The participation in Project work of certified Small Business Enterprises (SBE); and

iv. The encouragement of the utilization of properly trained and qualified apprentices.

Nothing in this Section 3 shall require Contractors to hire workers that such Contractors believe are not qualified for the available work.

(b) The Prime Contractor and the Council acknowledge that this Project is subject to the State of Connecticut SBE Program and the Prime Contractor will make good faith efforts to meet or exceed the Project goals for SBE participation contained in the bid requirements.

SECTION 4. For a Local Union having a job referral system in its Schedule A, for the purpose of initial employment only, the Contractor agrees to make use of such system. There shall be no discrimination against any employee or applicant for employment because of his or her membership or non-membership in the Union. Such job referral system must be operated in a non-discriminatory manner and in full compliance with federal, state and local laws and regulations which require equal employment opportunities and non-discrimination, and referrals shall not be affected in any way by the rules, regulations, by-laws, constitutional provisions or any other aspects or obligations of union membership, policies or requirements and shall be subject to such other conditions as established in this Article.

SECTION 5. All Union employees now in the employ of any Contractor shall remain members in good standing in the Union during the term of this Agreement to the extent permitted by law. All other employees hereinafter employed by a Contractor shall either elect to become members of the Union, or if they do not desire to become members, they shall not be required to join a Union but shall pay the hourly agency fee and shall not be required to pay monthly Union

dues. Each Union shall ensure that the union security requirement in this Article shall be in compliance with all applicable federal and state laws, and each Union shall remain solely responsible for any non-compliance therewith.

SECTION 6. In the event that any Union is unable to fill any requisition for employees within a forty-eight (48) hour period after such requisition is made by the Contractor (Saturdays, Sundays and Holidays excepted), the Contractor may employ applicants from any other available source.

SECTION 7. In the event that the Local Union does not have a job referral system as set forth in Section 2 of this Article, the Local Union shall refer qualified applicants pursuant to a non-discriminatory job referral procedure, subject to the provisions of Section 4 of this Article. The Contractor shall notify the Union of employees hired from any source other than referral by the Union.

SECTION 8. The Local Union shall not knowingly refer to a Contractor under this Agreement employees currently employed by another Contractor working under this Agreement.

SECTION 9. (a) The Unions will exert their utmost efforts to recruit and refer sufficient numbers of skilled craftsmen to fulfill the manpower requirements of the Contractors, including any specific employment conditions to which the Contractor is obligated pursuant to the provisions of the statutes and regulations governing development of the Project. Where employees require Occupational Safety and Health Administration-approved hazardous materials training, the Unions agree to provide such training at no additional cost to the Contractor.

(b) Further, the Parties recognize the level of activity in the construction industry within the area and the State of Connecticut at the time of the execution of this Agreement. Each Contractor shall have the ability to bring a reasonable number of its key employees to work on the Project provided that (i) as a general rule such employee complement does not exceed thirty percent (30%) of its workforce in any given month, and (ii) such employee complement is consistent with State of Connecticut requirements and affirmative action goals contained in the bid specifications. Notwithstanding the above requirements, Small Business Enterprises (SBE) will be allowed to bring up to fifty percent (50%) of their workforce to work on the Project, and their numbers will be included in the 30% goal calculation. The Prime Contractor and the Council will work together to implement procedures and advise the Unions of reasonable means to effectuate the intent of this provision.

SECTION 10. The selection of non-working foremen and/or general foremen and the number of non-working foremen required shall be entirely the responsibility of each Contractor. All employees shall take orders from his or her designated Contractor representative.

SECTION 11. Except as provided in Article IV, Section 3, individual seniority shall be recognized and applied to employees working on the Project as set forth in the attached Schedule A's.

SECTION 12. Helmets to Hardhats.

(a) The Contractors and the Union recognize a desire to facilitate the entry into the building and construction trades of military veterans interested in careers in the building and construction industry. The Contractors and Unions agree to utilize the Connecticut Department of Labor's Jobs Funnel Initiative, the services of the Center for Military Recruitment, Assessment and Veterans Employment ("Center") and the Center's Helmets to Hardhats program to serve as a resource for preliminary orientation, assessment of construction aptitude, referral to apprenticeship programs or hiring halls, counseling and mentoring, support network, employment opportunities and other needs as identified by the Parties.

(b) The Union and Contractors agree to coordinate with the Center to create and maintain an integrated database of veterans interested in working on this Project and of apprenticeship and employment opportunities for this Project. To the extent permitted by law, the Unions will give credit to such veterans for bona fide, provable past experience.

ARTICLE IV
UNION REPRESENTATION

SECTION 1. Authorized representatives of the Union shall have access to the Project, provided they do not interfere with the work of employees and further provided that such representatives comply with safety rules of the Project.

SECTION 2. Stewards.

(a) Each signatory Local Union shall have the right to designate a working journeyman as a steward, and shall notify the Contractor in writing of the identity of the designated steward prior to the assumption of his or her duties as steward. Such designated steward shall not exercise any supervisory functions. Stewards will be allowed to devote a reasonable amount of time to discharge their responsibilities as stewards; however, there will be no non-working stewards.

Stewards will receive the regular rate of pay of their respective crafts.

(b) In addition to his or her work as an employee, the steward shall have the right to receive, but not solicit, complaints or grievances and to discuss and assist in the resolution of the same with the employee's appropriate supervisor. Each steward shall be concerned with the employees of the steward's Contractor and not with the employees of any other Contractor. Contractors will not discriminate against the steward in the proper performance of his/her Union duties.

(c) The stewards shall not have the right to determine when overtime shall be worked or who shall work overtime; provided that this subsection shall not be construed to supersede the provisions of any applicable Schedule A, which contains a procedure for establishing equitable distribution of overtime.

SECTION 3. The Contractor agrees to notify the appropriate Union twenty-four (24) hours prior to the layoff of a steward, except in the case of discipline or discharge for just cause. If a steward is protected against such layoff by the provisions of the applicable Schedule A, such provisions shall be recognized to the extent that the steward possesses the necessary qualifications to perform the work remaining. In any case in which a steward is discharged or disciplined for just cause, the appropriate Union shall be notified immediately by the directly employing Contractor which imposed such discharge or discipline.

ARTICLE V
MANAGEMENT RIGHTS

SECTION 1. The Contractor retains full and exclusive authority for the management of its operation(s). Except as expressly limited by other provisions of this Agreement, the Contractor retains the right to direct the workforce, including the hiring, promotion, transfer, lay-off, discipline or discharge for just cause of its employees; the selection of foremen; the assignment and scheduling of work; the requirement of overtime work, the determination of when it shall be worked, and the number of employees who shall be engaged for such work. No rules, customs, or practices which limit or restrict productivity, efficiency or the individual and/or joint working efforts of employees shall be permitted or observed. The Contractor may utilize any customary, industry-recognized methods or techniques of construction. Nothing herein shall affect the role and responsibility of the Prime Contractor on this Project.

SECTION 2. Except as otherwise expressly stated in this Agreement, there shall be no limitation or restriction upon the Contractor's choice of materials or design or its choice of methodologies for the installation or use of materials, supplies or equipment. The Contractor may install or otherwise use materials, supplies or equipment according to the Schedule A's or as customarily performed in this area. The on-site installation or application of such items shall be performed by the Union trade having jurisdiction over such work.

SECTION 3. The use of new technology, equipment, machinery, tools and/or labor-saving devices and methods of performing work may be initiated by the Contractor from time to time during the Project. The Unions agree that they will not in any way restrict the implementation of such new devices or work methods and there shall be no limit on production by workers or restrictions on the full use of tools and equipment. If there is any disagreement between a Contractor and the Union concerning the manner or implementation of such devices or method of work, the implementation shall proceed as directed by the Contractor, and the Union shall have the right to initiate a dispute as set forth in Article VIII of this Agreement.

ARTICLE VI.
PRE-JOB CONFERENCE

SECTION 1. There shall be a mandatory pre-job conference initiated by the Prime Contractor which shall address all the specific and substantial issues affecting the Project at a time and location to be determined by the Prime Contractor. The Parties agree to use such conference to its fullest to avoid unforeseen conflicts which may affect job assignments, productivity, costs, or the Project schedule. Architects and design professionals may be involved in the pre-job conference to ensure that the Project is fully understood by all Parties involved. A well-planned pre-job conference with labor and management can result in substantial cost savings.

Further, each subcontractor to the Prime Contractor shall conduct a pre-job conference with the appropriate signatory Union(s) prior to commencing work. The Prime Contractor and the Council shall be advised in advance of all such conferences and may participate if they wish.

SECTION 2. A Steering Committee consisting of the President of the Hartford-New Britain Building and Construction Trades Council, the Owner or its designee and the Prime Contractor shall be established to ensure smooth implementation of this Agreement. The Committee shall meet on a designated day on a monthly basis, provided nothing herein shall prevent such

Committee for meeting more often, as may be necessary. The Steering Committee shall have the authority to recommend amendments to this Agreement for consideration by the Union, the Prime Contractor and the Owner.

ARTICLE VII.
WORK STOPPAGES AND LOCKOUTS

SECTION 1. There shall be no strikes, sympathy strikes, walkouts, picketing (including but not limited to economic, area standards, or informational), work stoppages, slowdowns, interruptions or other disruptive activity for any reason by any Union or employees against any Contractor covered under this Agreement or which otherwise disrupts Project work, and there shall be no lockout by any Contractor. Failure of any Union or employee to cross any picket line established by any Union, signatory or non-signatory, or any other organizations, at or in proximity to the Project site is a violation of this Article.

SECTION 2. Any Contractor may discharge any of its employees for violating Section 1 of this Article, and any such employee will not be eligible for employment under this Agreement for a period of ninety (90) working days from the date of his or her discharge. Each Contractor and each Union shall take all steps necessary to obtain compliance with this Article, and neither shall be held liable for conduct for which it is not responsible.

SECTION 3. Any Party may institute the following procedure in lieu of, or in addition to, any other action at law or equity, when a breach of Section 1 of this Article is alleged:

(a) A Party invoking this procedure shall immediately notify the subject Contractor or Union, as applicable. These Parties shall, within two (2) days, agree to a permanent Arbitrator ("Arbitrator") for the subject dispute. Notice to the Arbitrator shall be by telephone and fax and/or e-mail with notices by telephone, fax and/or e-mail, or UPS overnight delivery to the Party alleged to be in violation. The Party invoking this procedure shall also give notice to the Prime Contractor.

(b) Upon receipt of said notice, the Arbitrator selected by the Parties to the contract or his or her alternate shall sit and hold a hearing within twenty-four (24) hours if it is contended that the violations still exist.

(c) The Arbitrator shall notify the subject Parties by telephone and fax and/or e-mail of the reasonable place and time he or she has chosen for this hearing. Said hearing shall be completed in one session which, with appropriate recesses at the Arbitrator's discretion, shall not

exceed twenty-four (24) hours unless otherwise agreed upon by the subject Parties. A failure of any such Party or Parties to attend said hearing shall not delay the hearing of evidence or the issuance of any decision by the Arbitrator. The Arbitrator shall provide all notifications and decisions made pursuant to this subsection to the Prime Contractor at the same time as the same are provide to the Parties to the dispute.

(d) The sole issue at the hearing shall be whether or not a violation of Section 1 of this Article has occurred, and the Arbitrator shall have no authority to consider any matter in justification, explanation or mitigation of such violations or to award damages, which issue is reserved for court proceedings, if any. The Arbitrator's decision shall be issued in writing within three (3) hours after the close of the hearing, and may be issued without an opinion. If any Party to the dispute desires an opinion, one shall be issued within fifteen (15) days, but its issuance shall not delay compliance with, or enforcement of, the Arbitrator's decision. The Arbitrator may order cessation of the violation of Section 1 of this Article and other appropriate relief, and such decision shall be served on all Parties to the dispute and the Prime Contractor by hand or fax and/or e-mail and by certified mail, return receipt requested, upon issuance. No Party may authorize an Arbitrator to consider any matter in justification, explanation or mitigation of such violations or to award damages.

(e) The Arbitrator's decision may be enforced by any Court of competent jurisdiction upon the filing of the Arbitrator's decision and all other relevant documents referred to hereinabove in the following manner. Telephonic and fax and/or e-mail notice of the filing of such enforcement proceeding shall be given to the other Parties to the dispute and the Prime Contractor. In the proceeding to obtain a temporary order enforcing the Arbitrator's decision as issued under subsection (d) of this Article, all Parties to the dispute waive the right to a hearing and agree that such proceedings may be ex parte. Such agreement does not waive any such Party's right to participate in the hearing for a final order of enforcement.

(f) Any rights created by statute or law governing arbitration proceedings inconsistent with the above procedure or which interfere with compliance hereto are, to the extent possible, hereby waived by the Parties to whom they accrue.

(g) The fees and expenses of the Arbitrator shall be borne by the Party or Parties found in violation, or in the event no violation is found, such fees and expenses shall be borne by the Party who invokes the arbitration.

(h) It is the responsibility of each Local Union and Contractor to keep on file with the Owner and the Prime Contractor a current address or operating fax number and/or e-mail address to which notices and notifications under this Article may be sent. Any Local Union or Contractor failing to do so hereby waives its rights to claim that it did not receive proper or timely notice or notification of any action taken by a Party or Arbitrator pursuant to this Article.

(i) If the Arbitrator determines that a violation has occurred in accordance with subsection 3(d) of this Article VII, the violating Party(ies) shall, within eight (8) hours of receipt of the Arbitrator's decision, direct a cessation of such activity held to be in violation. If such violation has not ceased and/or work recommenced consistent with the Arbitrator's decision and this Agreement by the beginning of the next regularly scheduled shift following the expiration of the eight (8) hours, and the violating Union(s) or Contractor(s) has not made all good faith efforts available to comply with the Arbitrator's decision, then the violating Party shall pay the sum of five thousand dollars ($5,000.00) as liquidated damages to the Owner and shall pay, as liquidated damages, an additional five thousand dollars ($5,000.00) per shift for each shift thereafter on which the violation is not ceased and/or work is not recommenced. The liquidated damages contained in this Article are limited solely to the failure of a signatory Union to direct its members to cease engaging in a work stoppage following an Arbitrator's decision. The Arbitrator shall retain jurisdiction to determine compliance with this Section.

SECTION 4. Procedures contained in Article VIII of this Agreement shall not be applicable to any alleged violations of this Article, with the single exception that any employee discharged for violation of Section 1 of this Article VII may resort to the procedures of Article VIII to determine only if he or she was engaged in that violation. Further, disputes alleging a violation of any other provision of this Agreement, including any underlying dispute(s) alleged to be in justification, explanation or mitigation of any violation of Section 1 of this Article VII, shall be resolved under the procedures of Article VIII of this Agreement.

SECTION 5. In the event of any work stoppage, strike, sympathy strikes, slowdowns, picketing, interruptions or any other disruptive activity in violation of Section 1 of this Article, the Prime Contractor may suspend all or any portion of Project work affected by such activity at the Prime Contractor's discretion and without penalty or consequence.

SECTION 6. At its option, the Owner may participate in any proceedings initiated under this Article, and may receive copies of notifications through its Prime Contractor, and no rights or

liabilities shall accrue against the Owner pursuant to this Agreement.

ARTICLE VIII.
GRIEVANCES

SECTION 1. This Agreement is intended to provide close cooperation between management and labor. The Prime Contractor and the Council shall each assign a representative to this Project for the purpose of assisting the Unions, together with the Contractors, to complete the Project economically, efficiently, continuously and without interruption, delays or work stoppages.

SECTION 2. The Contractors and Unions agree to resolve issues of dispute in accordance with the arbitration provisions set forth in this Article, except as otherwise set forth in Article VII of this Agreement. The Unions and Contractors, by signing this Agreement, shall similarly bind employees to such provisions.

SECTION 3. Any question or dispute arising out of and during the term of this Agreement involving its interpretation and application (other than trade jurisdictional disputes or alleged violations of Article VII, Section 1) shall be considered a grievance and subject to resolution under the following procedures:

Step 1. (a) When any employee subject to the provisions of this Agreement feels he or she is aggrieved by a violation of this Agreement, he or she must, to pursue the grievances, shall, through his or her Local Union business representative or job steward, within seven (7) working days after the individual knew or reasonably should have known of the occurrence of the alleged violation, give notice to the work site representative of the involved Contractor and the work site representative and Prime Contractor stating the provision(s) alleged to have been violated. The business representative of the Local Union or the job steward and the work site representative of the involved Contractor shall meet and endeavor to resolve the matter within seven (7) days after timely notice has been given. If those parties fail to resolve the matter within the prescribed period, the grieving party may, within seven (7) days thereafter, pursue Step 2 of this grievance procedure provided the grievance is reduced to writing setting forth the relevant information concerning the alleged grievance, including a short description thereof, the date on which the grievance allegedly occurred, and the provision(s) of the Agreement alleged to have been violated. Grievances settled at Step 1 of this Section shall be non-precedential except as to the parties directly involved unless endorsed by

the Owner through its Prime Contractor within seven (7) days after resolution has been reached and the terms of the resolution are set forth in writing to the subject Union and the subject Contractor.

(b) Should the Local Union(s) or any Contractor have a grievance with the other party and, if after conferring, a settlement is not reached within seven (7) days, the grievance shall be reduced to writing and proceed to Step 2 of this section in the same manner as Step 1(a) above, for the resolution of an employee complaint.

Step 2. The designee of the involved Local Union, together with the International Union representative of that Union, the representative of the involved Contractor, and a representative of the Prime Contractor (or his designee) shall meet within seven (7) days of the referral of the grievance to this second step to attempt to arrive at a satisfactory settlement thereof. If such parties fail to reach an agreement, the grievance may be appealed in writing in accordance with the provisions of Step 3 of this Section within fourteen (14) calendar days after the initial meeting at Step 2.

Step 3. (a) If the grievance shall have been submitted, but not resolved pursuant to Step 2, any party to the grievance may request, in writing, within fourteen (14) calendar days after the initial Step 2 meeting, that the grievance be submitted to an Arbitrator selected by mutual agreement of the parties, but if they are unable to do so within fourteen (14) days after referral to them for arbitration, they shall request the ADRC to provide them with a list of Arbitrators from which the Arbitrator shall be selected. The then- current Labor Arbitration Rules of the American Arbitration Association shall govern the conduct of the arbitration hearing. The decision of the Arbitrator shall be final and binding on all parties to the grievance and the fees and expenses of such arbitrations shall be borne equally by the involved Contractor and the involved Union(s).

(b) Failure of the party raising the grievance to adhere to the time limits established herein shall render the grievance null and void. The time limits established herein may be extended only by written consent of the parties to the grievance involved at the particular step where the extension is agreed upon. The Arbitrator referenced in Step 3 shall have the authority to make decisions only on issues presented to him or her and he or she shall not have the authority to change, amend, add to or subtract or detract from any of the provisions of this Agreement. No Party may authorize an Arbitrator to consider any issue other than an issue raised pursuant to Section 3, Step 1(a) of this Article.

SECTION 4. No adjustment or decision may provide retroactivity exceeding thirty (30) days prior to the date of the filing of a written grievance.

SECTION 5. The Prime Contractor shall be notified by the involved Contractor of all actions at Steps 2 and 3 and shall, upon its request, be permitted to participate in full in all proceedings at these steps.

SECTION 6. To encourage the resolution of disputes and grievances at Steps 1 and 2 of this procedure, the Parties agree that settlements reached at such Steps shall not be precedent setting; and, further, recognizing the unique provisions of this Agreement, any decision issued by an Arbitrator pursuant to Step 3 shall be applicable to work covered by this Agreement only, and may not be used for any purpose regarding works not so covered.

ARTICLE IX.
JURISDICTIONAL DISPUTES

There will be no strikes, work stoppages, slowdowns, or other disruptive activities arising out of any jurisdictional disputes. The procedures set forth in this Article may be invoked prior to the commencement of the work in dispute. If the work in dispute has commenced, it shall continue uninterrupted as assigned by the Contractor until a decision of the Hearing Panel in Step One of this procedure or if appealed, until the issue of a final decision by the Arbitrator in Step Two. If the work in dispute has not commenced, the decision of the Hearing Panel shall be implemented immediately and shall remain in effect during any appeal. When a dispute proceeds to arbitration, the decision of the Arbitrator shall be implemented as soon as it is issued and shall be final and binding on all parties.

To facilitate expeditious processing of jurisdictional disputes, the Construction Manager, Contractors, Subcontractors and the Unions hereby agree to be bound by the following procedure:

STEP ONE

SECTION 1(a). Within 24 hours and upon written notice to the Construction Manager that a dispute exists outlining the work in dispute and the crafts involved, the Construction Manager shall notify the Council of said dispute.

SECTION 1(b). Within 48 hours of such notice, a panel of five members will conduct a hearing and receive evidence regarding the work involved in the dispute. This panel will consist of one (1) representative of the Construction Manager and four (4) regular members and two (2)

alternates elected by the members of the Council at its regular meeting following the execution of this Agreement.

SECTION 1(c). No Council member shall serve on a panel where his union has an interest in the work involved in the dispute. The parties in interest at the hearing will be the Unions involved in the dispute and the involved Contractor. During the hearing, the parties will be permitted to submit any evidence they deem appropriate to assist the panel in rendering its decision.

SECTION 1(d). The decision of the panel must be rendered within 24 hours of the completion of the hearing on the basis of industry practices under the relevant Schedule A's within this geographical area, the efficiency and economy of operation and, where relevant, the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry. Should the panel decision be that an incorrect assignment has been made and the work in dispute has not commenced, the decision shall be implemented immediately. If the work has commenced the original assignment shall remain in place pending any appeal.

SECTION 1(e). Absent an appeal, any decision and award made pursuant to this Article shall be final and binding on the parties in interest on this Project only and may be enforced in any court of competent jurisdiction. Such decision or award shall not establish precedent on other construction work or projects not covered by this Agreement.

STEP TWO
APPEAL PROCEDURE

SECTION 2(a). If any one of the involved Unions or the involved Contractor disagrees with the decision of the Hearing Panel, it may appeal to arbitration within five (5) days after the Panel decision. The arbitration will proceed as follows:

SECTION 2(b). The dispute will be submitted to either Arbitrator Paul Ward, Arbitrator Mike Ricci, or Arbitrator Richard Boulanger. If an arbitrator is not available to hear the dispute within ten (10) days, he shall not be considered. If necessary, the Arbitrator and all parties shall make themselves available for an evening hearing. The hearing will be completed within one (1) day, and the Arbitrator shall issue his decision within forty-eight (48) hours of the close of the hearing. If one of the disputing unions refuses to attend the hearing, the arbitration will proceed with the other union and the Contractor. If requested by either Union or the involved Contractor, a written Opinion and Award shall be issued by the Arbitrator within thirty (30) days. The decision of the Arbitrator shall be on the basis of industry practices under the relevant Schedule A's in the geographical area of the Project and the efficiency and economy of operation (but without

consideration of the comparative wage and benefits paid to the disputing trades). Fees and expenses shall be shared equally and shall be paid one-third by each of the involved Unions and one-third by the involved Contractor.

SECTION 2(c). Any award or resolution made pursuant to this Section shall be final and binding on the disputing Unions and the involved Contractor or an affected subcontractor while performing work on this Project only and may be enforced in any court of competent jurisdiction. Such award or resolution shall not establish a precedent on other construction work not covered by this Agreement.

SECTION 2(d). In making any determinations hereunder, there shall be no authority to assign work to a double crew (that is, to more employees than the minimum required to perform the work involved) nor to assign the work to employees who are not qualified to perform the work involved. This does not prohibit the establishment, with the agreement of the involved Unions, the Construction Manager, and the involved Contractor or subcontractor, or composite crews where more than one (1) employee is needed for the job.

SECTION 2(e). Any award or resolution made by a neutral arbitrator pursuant to this Article shall be confirmed in writing to the involved Parties.

ARTICLE X.
WAGES AND BENEFITS

SECTION 1. All employees covered by this Agreement shall be classified in accordance with work performed and paid the base hourly wage rates for those classifications as specified in the appropriate Schedule A; but in no event will such wage rates be less than those established under the provisions of any prevailing wage statute or regulation applicable to the Project.

SECTION 2. Each Contractor agrees to pay contributions to the established employee benefit funds and industry promotion funds and other funds and programs in the amounts designated in the appropriate Schedule A. Bona fide jointly trusteed fringe benefit plans established or negotiated through collective bargaining during the life of this Agreement may be added only at the time a segment of the Project is put out to bid and will not apply to any segments previously put out to bid.

SECTION 3. Each Contractor shall adopt and agree to be bound by the written terms of the legally-established trust agreements specifying the detailed basis on which payments are to be made

into, the benefits paid out of, such trust funds; provided, however, that any Contractor that has posted payment and performance bonds for the full value of its work shall not be required to post additional payment bonds pursuant to the Trust Agreements. Each Contractor shall authorize the parties to such Trust Agreements to appoint trustees and successor trustees to administer the Trust Funds and hereby ratifies and accepts the trustees so appointed as if made by the Contractor. Employees not previously participants in the Taft-Hartley pension fund shall have the option to divert pension hourly contributions made on their behalf to the appropriate annuity fund. Such election by the employee must be done in writing on a form provided by the Council and shall be effective for the duration of the Project.

SECTION 4. (a) Upon written notice from a Benefit Fund to which Contractors are required to make contributions pursuant to this Agreement (or from the Union co-sponsoring such Benefit Fund), to the Prime Contractor that a Contractor is in arrears on payments of benefit contributions for work performed on this Project, which notice specifies the amount owed by the Contractor for this Project by month, the Prime Contractor will immediately direct the Contractor, in writing, to comply with its contractual obligations. Should the Contractor not provide the Benefit Fund with payment, or a legally enforceable procedure for payment (or enforceable escrow procedure), within five (5) working days after receipt of the written notice from the Prime Contractor, the affected Union(s) may direct employees of such Contractor to engage in work stoppage (provided, however, that such stoppage will not include picketing or otherwise disrupt the work on the Project and provided that any such stoppage will cease upon payment (without violation of Section 1 of Article VII). If the correct payments are not made within thirty (30) days of such notice, the Prime Contractor will withhold moneys owed from its payments to its subject subcontractor sufficient to satisfy the outstanding debt to the Benefit Fund and/or shall issue joint checks payable to the involved subcontractor and the involved Benefit Fund. Upon receipt of any such joint check, the involved Benefit Fund agrees to execute the Prime Contractor's partial lien waiver and release.

ARTICLE XI.
HOURS OF WORK, OVERTIME SHIFTS AND HOLIDAYS

SECTION 1. Work Week and Work Day. The standard work week shall consist of forty (40) hours Monday through Friday. The standard work day shall consist of eight (8) hours of work commencing at 7:00 a.m. and ending at 3:30 p.m., with a one-half ($^1/_2$) hour unpaid lunch period

to commence between the fourth and fifth hours of work. The standard work day may be changed within a two-hour window to accommodate job conditions or the needs of the Project as determined by the Prime Contractor. Starting time shall commence and quitting time shall occur at the employee's designated work area. The Parties affirm their policy of a fair day's work for a fair day's wage, and the Union Parties agree to cooperate in the implementation and application of reasonable work rules intended to enforce this commitment.

SECTION 2. Overtime. Overtime pay at a rate of time and one-half shall be paid for all work performed after ten (10) hours in a shift, forty (40) hours in a work week or any work performed on Saturdays (unless it is a make-up day), Sundays or holidays. There will be no restriction upon the non-discriminatory designation of employees who shall work the overtime. There shall be no pyramiding of overtime pay under any circumstances. Any abuse of this provision will be referred to the dispute/grievance procedure set forth in Article VIII of this Agreement for resolution.

SECTION 3. It shall not be a violation of this Agreement if the Prime Contractor considers it necessary to suspend all or a portion of the job to protect the life and safety of an employee. In such cases, employees will be compensated only for the actual time worked; provided, however, that where the Contractor requests employees to remain at the site and available for work, the employees will be compensated for the standby time at their base hourly rate of pay.

SECTION 4. Shifts. Scheduling of shifts by the Prime Contractor shall remain flexible in order to meet the Project schedules and existing Project conditions including the minimization of interference with traffic. It is not necessary to work a day shift in order to schedule a second or third shift. Shifts must work a minimum of five (5) consecutive work days and must be scheduled with not less than five (5) days' notice to the Unions. There will be no premiums paid for shift work.

SECTION 5 Holidays. Recognized holidays on this Project shall be those set forth below:

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

Holiday pay shall be paid only as set forth in the Schedule A's. Holidays shall be observed on the dates established by the state and federal government.

SECTION 6. Reporting Pay. Reporting pay shall be paid in the manner set forth in the Schedule A's.

SECTION 7. Meal Period. Each Contractor will schedule a meal period of not more than one-half hour's duration at the work location at approximately four (4) hours into the scheduled work shift, consistent with Section 1 of this Article. If an employee is required to work through his or her meal period, he/she shall be compensated.

SECTION 8(a). If the Prime Contractor determines that it would be beneficial to the Project, the Contractor may, with the consent of the Union, implement a four (4) day-ten (10) hours per day work week (as more fully described in this subsection), after providing a five (5) day notice to the affected Union(s). The standard four (4) day-ten (10) hours per day work week shall consist of ten (10) hours of work (plus one-half ($^1/2$) hour unpaid lunch at approximately the mid-point of the shift), between the hours of 6:00 a.m. and 4:30 p.m., Monday through Thursday. The standard ten (10) hour work day may be changed to accommodate conditions on five (5) days' notice from the Prime Contractor or less notice as is mutually agreed upon.

(b) Should a 4 day-10 hour per day work week schedule be implemented, overtime shall be paid after ten (10) hours of work during a work day within the normal work week. Should five (5) or more hours of a normal ten (10) hour day be lost due to weather or other conditions beyond the control of the Contractor, the Contractor may schedule a Friday make-up day, in the same calendar week, with a minimum of eight (8) hours scheduled and straight time to be paid until the schedule of work exceeds the time lost, after which overtime shall be paid.

SECTION 9. If a day during the normal five (5) day work week or two (2) days during a four (4) day ten (10) hour work week is lost as a result of circumstances beyond the control of the Contractor including severe weather, fire, power failure, or natural disaster, a Saturday make- up day at straight time may be scheduled.

ARTICLE XII.
CLEAN UP

All trades will clean up their own work area. The removal of debris from the designated work area will be the work of the laborer.

ARTICLE XIII.
APPRENTICES

SECTION 1. The Contractor is encouraged to utilize apprentices and such other appropriate classifications as are contained in the applicable Schedule A. Apprentices and such other classifications as are appropriate shall be employed by the Unions utilizing a maximum permissible ratio of 1:1 or 1:3, depending upon the craft.

SECTION 2. The Parties recognize the need to maintain continuing support of programs designed to develop adequate numbers of competent workers in the construction industry ("Apprentice Program"). To these ends, each Contractor will employ apprentices in their respective crafts to perform such work as is within their capabilities and which is customarily performed by the craft in which they are indentured.

ARTICLE XIV.
SAFETY, PROTECTION OF PERSON AND PROPERTY

SECTION 1. In accordance with the requirements of the Occupational Safety and Health Act, it shall be the exclusive responsibility of each Contractor on the job site to ensure safe working conditions for its employees and their compliance with any safety rules contained herein or established by the Contractor, and/or Prime Contractor; provided, however, it is understood that the employees have an obligation as set forth in Section 2 of this Article below.

SECTION 2. Employees use diligent care to perform their work in a safe manner and to protect themselves and the property of the Contractor and the Owner. The Contractors and the Unions agree that the failure of employees to do so will be grounds for discipline, including discharge.

SECTION 3. The Contractors and Unions acknowledge that employees covered by the terms of this Agreement shall at all times while in the employ of the Contractor be bound by the reasonable safety, security, and visitor rules as established by the Contractor with the consent of the Union and with applicable state and federal safety and health statutes and regulations. These rules will be published and posted in conspicuous places throughout the Project.

SECTION 4. For the purpose of providing maximum safety for all concerned, the Prime Contractor may establish and implement, after consultation with the Council, reasonable substance abuse testing procedures and regulations, which may include pre-hire and reasonable cause testing, to the extent permitted or otherwise required by federal and state law.

ARTICLE XV.
SECURITY OF MATERIAL, EQUIPMENT AND TOOLS

The inspection of incoming shipments of equipment, apparatus, machinery, and construction materials of every kind shall be performed by individuals selected by the Contractor, at his or her discretion. All employees shall comply with the reasonable security procedures established by the Prime Contractor and/or Contractor.

ARTICLE XVI.
NO DISCRIMINATION

SECTION 1. Each Contractor and Union agrees that they will not discriminate against any employee or applicant for employment because of race, color, religious creed, age, sex, sexual orientation, marital status, national origin, ancestry, gender identity or expression, present or past history of physical or mental or intellectual disability or handicap, or veteran's status in any manner prohibited by law or regulation.

SECTION 2. Any complaints regarding application of the provisions of Section 1 of this Article should be brought to the immediate attention of the involved Contractor for consideration and resolution.

SECTION 3. The Contractors and the Unions agree to provide a workforce that complies with all state guidelines regarding minority hiring. Further, it is recognized that the State of Connecticut has certain policies and commitments for the utilization of business enterprises owned and/or controlled by minorities or women, including a goal of 10% SBE participation. The Parties shall jointly endeavor to assure that these commitments are fully met and that any provisions of this Agreement which may appear to interfere with any minority, women or small business enterprise successfully bidding or subcontracting for work within the scope of this Agreement shall be carefully reviewed, and adjustments made as may be appropriate and agreed upon among the Parties to assure full compliance with the spirit and letter of the policies and commitments of the State of Connecticut and all applicable federal, state and local rules and regulations relating to employment and utilization of such businesses.

SECTION 4. The use of the masculine or feminine gender in this Agreement shall be construed as including both genders.

ARTICLE XVII.
WORKING CONDITIONS

SECTION 1. With the exception of one organized coffee break per day, there will be no rest periods except when necessary for health and safety reasons. Individual coffee containers will be permitted at the employee's work location.

SECTION 2. There shall be no restrictions on the emergency use of any tools or equipment by any qualified employee.

SECTION 3. The Contractor shall provide hard hats, safety glasses, foul weather gear and other required personal protective equipment (PPE). The Unions shall ensure that employees will exercise diligence in the care and custody of such safety gear provided.

SECTION 4. Employees engaging in willful or negligent acts that result in damage to any property or facilities or injury to other employees will be subject to immediate termination.

ARTICLE XVIII.
SAVINGS AND SEPARABILITY

SECTION 1. It is not the intention of the Prime Contractor, any of the other Contractors or the Unions to violate any laws governing the subject matter of this Agreement. The Parties hereto agree that in the event any provisions of the Agreement are finally held or determined to be illegal or void by order of any court of competent jurisdiction as being in contravention of any applicable law, the remainder of the Agreement shall remain in full force and effect to the maximum extent legally possible. Further, the Prime Contractor, all other Contractors and the Unions agree that if and when any and all provisions of this Agreement are finally held or determined to be illegal or void by a court of competent jurisdiction, the Parties will promptly enter into negotiations in which the Owner may participate concerning the substance affected by such decision for the purpose of achieving conformity with the requirements of an applicable law and the intent of the Parties hereto.

SECTION 2. The Parties recognize the right of the Prime Contractor to withdraw, at its absolute discretion, the utilization of this Agreement as part of any bid specification should a court of competent jurisdiction issue any order, or any applicable statute be invoked which contains any self-applying provision, either of which could result, temporarily or permanently, in delay of the bidding, awarding and/or constructing of work on the Project. The Parties further recognize the right of the

Prime Contractor to terminate this Agreement at the direction of the State of Connecticut or the Owner. Notwithstanding such action by the State of Connecticut, the Owner, or such court order or statutory provision, the Parties agree that the Agreement shall remain in full force and effect on the Project, to the maximum extent legally possible.

SECTION 3. The occurrence of events covered by Sections l and 2 of this Article shall not be construed to waive the prohibitions of Article VII.

ARTICLE XIX.
DURATION OF THE AGREEMENT

SECTION 1. This Agreement shall be effective on the date executed by the Parties and shall continue in effect for the duration of the Project site preparation, demolition, dedicated off site work and construction described in Article II hereof. Site preparation, demolition, dedicated off site work and construction of any phase, portion, section or segment of the Project shall be deemed complete when such phase, portion, section or segment has been turned over to the Owner and has received the final acceptance from the appropriate Owner representative as designated by Owner.

SECTION 2. The Schedule A's incorporated into this Agreement shall continue in full force and effect until the Prime Contractor and/or Union Parties to this Agreement and to the Schedule A's notify the Owner of the mutually agreed upon changes in those provisions of such Schedule A's which are applicable to the Project and their effective date(s), which shall become the effective date(s) under this Agreement.

SECTION 3. Notwithstanding Section 2 of this Article, the Parties agree that any provisions negotiated into said collective bargaining agreements will not apply to work on this Project if such provisions are less favorable to the Contractor than those uniformly required of contractors for construction work normally covered by those agreements; nor shall any provision be recognized or applied on this Project if it may be construed to apply exclusively or predominantly to work covered by this Agreement. Any disagreement between the Parties on this issue shall be referred to an Arbitrator as provided in Article VIII, hereof.

SECTION 4. This Agreement may be amended or supplemented only by the mutual consent of the Council, the Prime Contractor and the Unions, reduced to writing and duly signed by each.

SECTION 5. The Union agrees that there will be no strikes, work stoppages, walkouts, sympathy strikes, picketing, slowdowns or other interruptions or disruptive activity affecting the

Project by any Union involved in the negotiation of the subject Schedule A's, nor shall there be any lock-out on this Project affecting the Union during the course of such negotiations. Each Contractor agrees to implement all applicable changes as negotiated in the Schedule A's, except as provided in Section 3 of this Article.

IN WITNESS WHEREOF the parties have caused this Agreement to be executed and effective as of the _____ day of _____, 2019.

PRIME CONTRACTOR

_____
Authorized Representative

HARTFORD-NEW BRITAIN
BUILDING AND CONSTRUCTION
TRADES COUNCIL

By:_____
Joseph Toner, President
Hartford-New Britain Building
and Construction Trades Council

INDIVIDUAL SIGNATORY UNIONS

_____
Operating Engineers, Local 478

_____
Teamsters Local Union No. 671

_____
Connecticut Laborers District Council

_____
New England Regional Council
of Carpenters

_____
Bricklayers' Local 1

_____
Ironworkers Local 15

_____
Electricians Local 35

_____
International Union of Painters and Allied Trades
District Council No. 11

_____
Plumbers and Pipefitters Local 777

CT DOT'S SAFETY AND OPERATIONS IMPROVEMENTS PROJECT I-84

STATE PROJECT NO. 155-171

PROJECT LABOR AGREEMENT

ACCEPTANCE OF AGREEMENT

The undersigned Contractor who has been awarded work for State Project No. 155-171, acknowledges that it has received and hereby accepts and agrees to be bound by the Project Labor Agreement for the CT DOT'S SAFETY AND OPERATIONS IMPROVEMENTS PROJECT I-84, West Hartford, Connecticut, State Project No. 155-171 between _____ in its capacity as the Prime Contractor for the Department of Transportation, the Hartford-New Britain Building & Construction Trades Council, and the individual signatory unions.

NAME OF EMPLOYER _____

ADDRESS _____

CITY, STATE, ZIP CODE _____

_____

Name and Title of Authorized Representative

_____

Signature of Authorized Representative Date

_____

Telephone number _____

Fax Number _____

E-mail _____

NOTICE TO CONTRACTOR - SITE NUMBERS

Site numbers for bridge-related items are as follows:

Bridge No.	Proposed Bridge Description	Site No.
01743B	I-84 WB over Ridgewood Road	1
01744	I-84 EB over Berkshire Road	2
01745	I-84 WB over Berkshire Road	3
01746	I-84 over Rockledge Brook	4
01747	South Main Street over I-84	5

Site numbers for Temporary Signalization items are defined as follows:

Location	Temporary Signalization Item	Site No.
Int. #155-215 – Route 71 (New Britain Avenue) at S.R. 535 (Ridgewood Road)	Temporary Signalization (Site No. 1)	1
Int. #155-234 – S.R. 535 (Ridgewood Road) at Ridgewood Road and I-84 Ramps	Temporary Signalization (Site No. 2)	2

Site numbers for Temporary Detection items are defined as follows:

Location	Temporary Detection Item	Site No.
End of Ramp A	Temporary Detection (Site No. 1)	1
End of Ramp B	Temporary Detection (Site No. 2)	2
End of Ramp C	Temporary Detection (Site No. 3)	3
End of Ramp E	Temporary Detection (Site No. 4)	4

Site numbers for Retaining Wall items are defined as follows:

Location	Retaining Wall Item	Site No.
I-84 EB Sta. 108+50 LT to 118+50 LT (not including Br. #01744 parapet)	Retaining Wall (Site No. 1)	1

NOTICE TO CONTRACTOR - BUY AMERICA NOISE WALL

The Contractor must conform to the Buy America requirements 49 U.S.C. 5323(j) and 49 CFR Part 661 for steel, iron, and manufactured products described in the special provisions for the following items:

ITEM #0916111A - NOISE BARRIER WALL (STRUCTURE)
ITEM #0916126A - NOISE BARRIER WALL
ITEM #0916127A - NOISE BARRIER WALL (EARTH RETAINING PANELS)

Bidders must submit the appropriate certificate, as set forth below with their bid. These certificates are attached to the bid proposal form. Failure to complete and submit one of the referenced certificates will result in rejection of the bid.

Certificate of Compliance with Buy America Requirements

The bidder or offeror hereby certifies that it will comply with the requirements of 49 U.S.C. 5323(j)(1), and the applicable regulations in 49 CFR part 661.

Date _____

Signature _____

Company _____

Name _____

Title _____

The Contractor shall obtain and submit to the State copies of all signed Buy America certifications, including Buy America certifications that may be required of its subcontractors. These complete certifications if applicable, shall be submitted to the Connecticut Department of Transportation.

NOTICE TO CONTRACTOR - DETOUR ROADWAYS

The Contractor is hereby notified that ramp closures with associated detours are required as follows:

- Ramp G (I-84 WB 40 On-Ramp) from S.R. 535 (Ridgewood Road) in Stages 1A and 2A

The length of closures for Ramp G vary as defined in Sec. 1.08 – Prosecution and Progress.

In addition, the Town of West Hartford must be notified at least 14 days in advance any closures and no closure is allowed until after the detour is in place and operational.

NOTICE TO CONTRACTOR - EARLY SUBMITTALS

Post Bid Opening:

Within seven (7) days after the bid opening, the apparent low bid Contractor shall identify and submit a list of items to the Department which will require submittals, shop drawings, working drawings, procurement of materials, and all other submittals to meet the schedule of the closure for the Stage 1A work at Bridge No. 01743B, I-84 WB over Ridgewood Road (Ramp G), in accordance with the contract documents. These items shall include, but not limited to, the following:

- Critical Path Schedule
- Quality Control Program
- Temporary Signalization (Site No. 1)
- Temporary Signalization (Site No. 2)
- Drainage Structures and Pipes
- Removal of Superstructure (Site No. 1)
- Temporary Earth Retaining System
- Structural Steel (Site No. 1)
- Contractor Safety Plan
- Project Coordinator
- Sedimentation and Erosion Control Plan
- Dust Control Plan

Post Award:

Within seven (7) days after the award, the Contractor shall submit all items identified and as described above (Post Bid Opening) and any other submittals required to meet the schedule of the closure for the Stage 1A work at Bridge No. 01743B, I-84 WB over Ridgewood Road (Ramp G).

The Contractor shall submit all items related to the following items in accordance with special provisions of respective Items:

- Readiness Plan - Section 1.08 Prosecution and Progress
- Project Coordinator (Minimum Bid) Item No. 0969030A
- Contractor Quality Control Program Item No. 0969053A
- Smart Work Zone Item Nos. 1131016A thru 1131024A

NOTICE TO CONTRACTOR - PROPRIETARY ITEMS

The Contractor is hereby notified that the following items shall be furnished by the specific manufacturers specified below.

Item No.	Item Description	Manufacturer
1112210A	Camera Assembly	American Dynamics, Inc
1112217A	Camera Lowering Device Assembly – Type B	MG-Squared, Incorporated
1112241A	Fiber Optic Cable Splice Enclosure	Corning, Incorporated
1113604A	Optical Fiber Cable - Single Mode, Loose Buffer Tube Cable, 6 Fiber	Corning Incorporated
1113621A	Optical Fiber Cable - Single Mode, Loose Buffer Tube Cable, 72 Fiber	Corning Incorporated

NOTICE TO CONTRACTOR - PRE-BID QUESTIONS AND ANSWERS

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

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

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

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

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

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

NOTICE TO CONTRACTOR - CONTRACT DURATION

The Contractor is hereby notified that this is not to be considered an ordinary project by any means and that due to the inconvenience to the traveling public that it causes, extra manpower, equipment and workshifts may be required to complete the work in accordance within the specified contract time.

NOTICE TO CONTRACTOR - CONSTRUCTION CONTRACTOR DIGITAL SUBMISSIONS

Upon execution of the Contract, the Contractor acknowledges and agrees that contractual submittals for this Project shall be submitted and handled through a system of paperless electronic means as outlined in the special provision for Section 1.05 herein.

Shop drawings, working drawings, and product data shall be created, digitally signed and delivered by the Contractor in accordance with the Department's Contractor Digital Submission Manual (CDSM). Other deliverables that are required by other special provisions shall be similarly submitted.

Access credentials will be provided to the Contractor by the Department.

The Department will provide the Contractor with a list of email addresses that are to be used for each submittal type.

The Department shall not be held responsible for delays, lack of processing or response to submittals that do not follow the specified guidelines in the CDSM.

NOTICE TO CONTRACTOR - ALL-INCLUSIVE DRAINAGE

ADDED SECTIONS:

2.86 – DRAINAGE TRENCH EXCAVATION

ROCK IN DRAINAGE TRENCH EXCAVATION

5.86 – CATCH BASINS, MANHOLES AND DROP INLETS

6.86 – DRAINAGE PIPES

DRAINAGE PIPE ENDS

This Contract contains the above-noted Special Provisions for all-inclusive drainage, developed to replace the following Sections in their entireties:

- Section 5.07 – *Catch Basins, Manholes and Drop Inlets*
- Section 6.51 – *Culverts*
- Section 6.52 – *Culvert Ends*

The Section 5.86 and 6.86 items include excavation and bedding material in the drainage structure, pipe and pipe end unit prices.

Section 2.05 *Trench Excavation* may be included for miscellaneous trenching, where necessary, but will not be used with all-inclusive drainage items.

Other Standard Specifications, Supplemental Specifications or Special Provisions may contain references to Articles or Subarticles from previous versions of Sections 5.07, 6.51 and 6.52 which are no longer valid.

The following Standard Specifications Sections or Supplements contain references to Articles or Subarticles from Section 2.05 which shall remain in effect:

- Section 2.06 – *Ditch Excavation*
- Section 5.06 – *Retaining Walls, Endwalls and Steps*
- Section 7.51 – *Underdrains and Outlets*
- Section 10.01 – *Trenching and Backfilling*

'Rock in Drainage Trench Excavation' is now defined in Section 2.86. 'Rock in Trench Excavation' will remain in Section 2.05 and may be used with trenching not associated with all-inclusive drainage items.

Any references to Articles beginning with "5.07," "6.51," or "6.52" shall refer to the pertinent topic or materials in the new Special Provisions contained herein.

NOTICE TO CONTRACTOR - MINIMUM CONCRETE COMPRESSIVE STRENGTH

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

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

SECTIONS 6.01 and M.03 MIX CLASSIFICATION EQUIVALENCY

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

Concrete Mix Classification Equivalency Table

New Mix Classification (Class PCCXXXYZ[1])	Former Mix Classification
Class PCC03340	Class "A"
Class PCC03360	Class "C"
Class PCC04460[2]	Class "F"
Class PCC04462[2]	High Performance Concrete
Class PCC04481, PCC05581	Class "S"

Table Notes:

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

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

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

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

NOTICE TO CONTRACTOR - ARCHITECTURAL AND INDUSTRIAL MAINTENANCE COATINGS

This Contract includes the application of materials subject to the Volatile Organic Compounds (VOC) content limits stated in the Regulations of Connecticut State Agencies (RCSA) Sections 22a-174-41 and -41a. All architectural and industrial maintenance (AIM) coatings and applications of such coatings must comply with these regulations.

The Contractor shall submit a Material Safety Data Sheet/Safety Data Sheet or Product Technical Data Sheet developed by the manufacturer of each material that may be subject to the Regulations. The submittal must verify both the type of AIM and its VOC Content. VOC content shall be determined based on the formulation data supplied by the materials manufacturer.

The Contractor may only use AIM coatings that contain VOCs below the respective coating category Phase II limits specified in Table 1 if either:

a) the coating was manufactured on or after May 1, 2018, **or**
b) the coating is being applied after April 30, 2021.

The Contractor may use AIM coatings that contain VOCs exceeding the respective coating category Phase II limits specified in Table 1 only if all of the following four conditions are met:

a) the coating is being applied on or before April 30, 2021,
b) the coating contains VOCs below the applicable Phase I limits specified in Table 1,
c) the coating was manufactured prior to May 1, 2018, **and**
d) the coating container(s) are dated (or date coded) as such.

For any coating that is not categorized within Table 1, the Contractor shall classify the coating as follows and apply corresponding limits in Table 1.

- Registers gloss <15 on an 85-degree meter or <5 on a 60-degree meter) – Flat Coating,
- Registers gloss of ≥15 on an 85-degree meter and ≥5on a 60-degree meter) - Nonflat Coating,
- Registers gloss of ≥70 on a 60-degree meter - Nonflat-High Gloss Coating.

The Contractor must close all containers of coating and solvent when not in use.

Coating container labels must display the date the coating was manufactured, the manufacturer's recommendation regarding thinning with solvent, and the coating's VOC content in grams per liter (g/L) of coating. Certain coating categories as noted in Table 1 have additional labeling requirements.

The Contractor may add additional solvent to a coating only if such addition does not cause the coating to exceed the applicable VOC limit specified Table 1. The Contractor must adhere to type(s) of solvent and maximum amount of solvent recommended by coating manufacturer. VOC content of a thinned coating shall be the VOC content as listed by the manufacturer after thinning in accordance with its recommendation.

TABLE 1		
Coating Category	**Phase I**	**Phase II**
	manufactured prior to May 1, 2018 VOC content limit (g/L)	**manufactured on or after May 1, 2018 VOC content limit (g/L)**
Aluminum roof coating	---[1]	450
Antenna coating	530	---[1]
Antifouling coating	400	---[1]
Basement specialty coating	---[1]	400
Bituminous roof coating	300	270
Bituminous roof primer	350	350
Bond breaker	350	350
Calcimine recoater	475	475
Clear wood coating - Clear brushing lacquer[2]	680	275
Clear wood coating - Lacquer[2,3]	550	275
Clear wood coating - Sanding sealer[2,4]	350	275
Clear wood coating - Varnish[2]	350	275
Concrete curing compound	350	350
Concrete or masonry sealer/ Waterproofing concrete or masonry sealer	400	100
Concrete surface retarder	780	780
Conjugated oil varnish	---[1]	450
Conversion varnish	725	725
Driveway sealer	---[1]	50
Dry fog coating	400	150
Faux finishing coating[2]	350	350
Fire resistive coating	350	350
Fire retardant coating - Clear	650	---[1]
Fire retardant coating - Opaque	350	---[1]
Flat coating	100	50
Floor coating	250	100
Flow coating	420	---[1]
Form-release compound	250	250
Graphic arts coating (sign paint)	500	500
High temperature coating	420	420
Impacted immersion coating	780	780
Industrial maintenance coating[2]	340	250
Industrial maintenance coating	340	250
Low solids coating	120	120
Magnesite cement coating	450	450
Mastic texture coating	300	100
Metallic pigmented coating	500	500

TABLE 1		
Coating Category	**Phase I** manufactured prior to May 1, 2018 VOC content limit (g/L)	**Phase II** manufactured on or after May 1, 2018 VOC content limit (g/L)
Multi-color coating	250	250
Nonflat coating	150	100
Nonflat high gloss coating[2]	250	150
Nuclear coating	450	450
Pre-treatment wash primer	420	420
Primer, sealer and undercoater	200	100
Quick-dry enamel	250	---[1]
Quick-dry primer, sealer and undercoater	200	---[1]
Reactive penetrating carbonate stone sealer[2]	---[1]	500
Reactive penetrating sealer[2]	---[1]	350
Recycled coating	250	250
Roof coating	250	250
Rust preventive coating[2]	400	250
Shellac Clear	730	730
Shellac Opaque	550	550
Specialty primer, sealer and undercoater[2]	350	100
Stain	250	250
Stone consolidant[2]	---[1]	450
Swimming pool coating	340	340
Thermoplastic rubber coating and mastic	550	550
Traffic marking coating	150	100
Traffic marking coating	150	100
Tub and tile refinish	---[1]	420
Waterproofing membrane	---[1]	250
Waterproofing sealer	250	---[1]
Wood coating[2]	---[1]	275
Wood preservative	350	350
Zinc-rich primer[2]	---[1]	340

1 Classify as follows and apply corresponding limits in Table 1.

- Registers gloss <15 on an 85-degree meter or <5 on a 60-degree meter) – Flat Coating,
- Registers gloss of ≥15 on an 85-degree meter and ≥5on a 60-degree meter) – Nonflat Coating
- Registers gloss of ≥70 on a 60-degree meter – Nonflat-High Gloss Coating

2 Container must be appropriately labeled. See RCSA 22a-174-41a

3 "Clear Wood Coating – Lacquer" includes lacquer sanding sealer

4 "Clear Wood Coating - Sanding Sealer" does not include lacquer sanding sealer

-END-

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 must be approved by the Engineer. Any State Police Officers used by the Contractor for its convenience is the responsibility of the Contractor. A separate payment item for State Police Officers is not included in this Contract.

Any costs associated with coordination and scheduling of State Police Officers shall be included in the lump sum bid price for Item No. 0971001A – Maintenance and Protection of Traffic.

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 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.

NOTICE TO CONTRACTOR - COORDINATION WITH EXISTING UTILITIES

Existing utilities shall be maintained during construction. The Contractor shall verify the location of underground and overhead utilities. Construction work within the vicinity of utilities shall be accordance with current safety regulations.

Utility relocation work, by others, is required within the project limits. The Contractor shall schedule their operations in such a manner as to minimize interferences with utility relocation/protection activities. There are utility relocations for aerial utilities. The proposed pole relocations are shown on the utility plan for information purposes only.

The contractor is hereby notified that the utility work schedules will have to be accommodated prior to proceeding. The Contractor shall coordinate with utility companies to accommodate their schedule with all utility company schedules. This includes, but is not limited to, providing access staging, and sequencing prior to proceeding. Any inconvenience or delay that may result from utility company work shall be included in the contract bid for the work. The work to repair or replace any damage to utilities caused by the Contractor's operations will be solely at the Contractor's expense, in accordance with Form 817, Section 1.07.

As required by State Law, the Contractor shall contact "Call Before You Dig." Telephone 1-800-922-4455 for the location of public underground facilities in accordance with Section 16-345 of the Regulations of the Department of Public Utility Control. The underground activities should be clearly delineated within all areas of proposed excavation prior to performing actual excavation. The notification of "Call Before You Dig" must be made at least 48 hours in advance.

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 continued elsewhere in the specifications.

NOTICE TO CONTRACTOR - UTILITY GENERATED SCHEDULE

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

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

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

After award, the Contractor shall conduct a utility coordination meeting or meetings to obtain contemporaneous scheduling information from the utilities prior to submitting its baseline schedule to the Department in accordance with Section 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 Contractor predecessor and successor activities to the utility work in such detail as acceptable to the Engineer.

UTILITY WORK SCHEDULE Rev 08 02 2016	
CTDOT Project Number: 155-171	Town: W. Hartford
Project Description:	
CTDOT Utilities Engineer:	
Phone:	Email:
Utility Company: Comcast Cable	
Prepared By: Gary P. Meek	Date Prepared: 12/4/2016
Phone: 203-721-0727	Email: gary_meek@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 will need to re-locate cable facilities at pole 4338 located at the intersection of Berkshire RD and Mildred RD in the town of W. Hartford CT. Comcast will shift the aerial wires at this pole when the new pole has been set and Eversource has shifted. Comcast should need one working day to complete the aerial tranfer from the old pole to the new pole.

Special Considerations and Constraints

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

UTILITY WORK SCHEDULE Rev 3/2015			
CTDOT Project Number:	155-171		
Utility Company:	Comcast Cable		
Prepared By:	Gary Meek	Total Working Days:	1

Schedule

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

Location (Station to Station)	Description of Utility Work Activity	Predecessor Activity	Duration (working days)
	Shift aerial facilities at pole 4338 located on Berkshire RD at Mildred RD.		1

UTILITY WORK SCHEDULE Rev 3/2015			
CTDOT Project Number:	155-171	Town:	WEST HARTFORD
Project Description:	I-84 AUXILIARY LANES / BERKSHIRE RD BRIDGE		
CTDOT Utilities Engineer:	XIUYUN CAI		
Phone: 860-594-3269		Email	Xiuyun.Cai@ct.gov
Utility Company:	FRONTIER COMMUNICATIONS		
Prepared By:	MARC SWEENEY	Date Prepared:	11/20/018
Phone: 860-521-0692		Email	marc.sweeney@ftr.com

Scope of Work

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

This project will require Frontier Communications to shift cables (2-cables, 1-loop) on P4338, replaced by Eversource.

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..

PLEASE NOTE THAT ANY TIME FRAME GIVEN AS A START TIME OR DURATION OF WORK CAN BE AFFECTED BY MANY FACTORS INCLUDING, BUT NOT LIMITED TO, MAKE READY WORK, OTHER UTILITIES, PERMIT APPLICATIONS, CHANGES IN SCOPE, INCLEMENT WEATHER, HOLIDAYS AND EMERGENCY SITUATIONS.

UTILITY WORK SCHEDULE Rev 3/2015

CTDOT Project Number:	155-171		
Utility Company:	FRONTIER COMMUNICATIONS		
Prepared By:	MARC SWEENEY	Total Working Days:	1

Schedule

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

Location (Station to Station)	Description of Utility Work Activity	Predecessor Activity	Duration (working days)
P4338 Berkshire Rd	SHIFT 2 CABLES, 1 LOOP	ALL OTHER UTILITIES SHFTED	1
C/O Mildred Rd			

UTILITY WORK SCHEDULE Rev 3/2015	
CTDOT Project Number: 155-171	Town: West Hartford
Project Description: Safety Improvements for I-84 at Berkshire Rd	
CTDOT Utilities Engineer: Xiuyun Cai	
Phone: (860) 594-3269	Email: Xiuyun.Cai@ct.gov
Utility Company: Eversource	
Prepared By: John Remkiewicz	Date Prepared: 09/06/2018
Phone: 860-280-2497	Email: john.remkiewicz@eversource.com

Scope of Work

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

Berkshire Rd –

Replace poles 4335 and 4338. Remove poles 4335-S, 4336 and 4337-S.

Install 2 new manholes and 6 – 6" ducts in concrete on Berkshire Rd. Install 650' of 1000 MCM copper in duct to replace the overhead primary crossing over I-84.

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..

Night and / or weekend work may be necessary to accommodate outages due to pole relocations and new cable being installed.

UTILITY WORK SCHEDULE Rev 3/2015

CTDOT Project Number: 155-171

Utility Company: Eversource

Prepared By: John Remkiewicz Total Working Days: 25

Schedule

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

Location (Station to Station)	Description of Utility Work Activity	Predecessor Activity	Duration (working days)
Berkshire Rd	Replace 2 poles and remove 3 poles	State permit and authorization to proceed has been received	5
Berkshire Rd	Install 2 new manholes and new duct line	State permit and authorization to proceed has been received	20

UTILITY WORK SCHEDULE Rev 08 02 2016			
CTDOT Project Number:	155-171	Town:	West Hartford
Project Description:	Safety and Operational Improvements on I-84		
CTDOT Utilities Engineer:	Xiuyun Cai		
Phone:	860-594-3269	Email:	Xiuyun.Cai@ct.gov
Utility Company:	Town of West Hartford		
Prepared By:	J. Brennan	Date Prepared:	11/20/2018
Phone:	860-561-7546	Email:	ames.brennan@westhartfordct.go

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.

Town of West Hartford's work will consist of placing new conduit from an existing utility pole south of the project site to an existing pole north of the project site. One existing aerial cable will be removed between the same poles. Handholes and risers will be installed at each conduit terminus. Innerduct and figure 8 twisted pair to be installed within conduit and will be spliced with existing cable in an aerial splice boot.

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..

Care should be given to minimize the time the pre-empt cable is non-operational. The West Hartford Fire Department should have 24-hour notice of any pre-empt outage.

UTILITY WORK SCHEDULE Rev 3/2015

CTDOT Project Number: 155-171

Utility Company: Town of West Hartford

Prepared By: J. Brennan Total Working Days: 9

Schedule

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

Location (Station to Station)	Description of Utility Work Activity	Predecessor Activity	Duration (working days)
EB 115+55 R 120'	Sawcut; install handholes, risers, trench, conduit, innerdcut;	None	5
to	Pull cable, connect to ex. aerial cable in splice boots; demo ex. aerial cable	Install conduit	2
WB 117+90 L 150'	Trench restoration	Install conduit	2

NOTICE TO CONTRACTOR - PROTECTION OF EXISTING UTILITIES

The Contractor's attention is directed to the need for the protection of the existing utilities during the construction of the proposed rehabilitation work.

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

The Contractor’s means and method of jacking the girders shall be such that it will not cause damage to existing utilities or their support brackets. Damages to utilities associated with the girder jacking operation shall be the Contractor’s responsibility and shall bear the cost to repair or replace damaged elements.

Any damage to any existing utility shall be repaired including all materials, labor, etc., to the Engineer's satisfaction at no cost to the State.

NOTICE TO CONTRACTOR - COORDINATION WITH FIRE DEPARTMENT

The Contractor shall coordinate the date and time of fire suppression standpipe systems testing with the Town of West Hartford Fire Department so that necessary personnel may be present to witness the testing. Testing of fire suppression standpipe systems shall not be performed until the Fire Department is present. The contact for the Fire Department is as follows:

Mr. Gregory Priest
Fire Chief
(860) 561-8300

NOTICE TO CONTRACTOR - MDC WATER TRANSMISSION MAIN

The Contractor shall not use rollers in vibratory mode within 25-feet of the 54-inch diameter Metropolitan District Commission (MDC) water transmission main crossing I-84 west of Bridge No. 01747 (South Main Street over I-84). The water transmission main crosses the interstate at the following approximate locations:

- Ramp D – Station 46+08
- I-84 Westbound – Station 145+64
- I-84 Eastbound – Station 144+93
- Ramp C – Station 44+43

NOTICE TO CONTRACTOR - CNG GAS MAIN AT RIDGEWOOD ROAD

The Contractor shall not place cranes or the outriggers from cranes directly over the 8-inch diameter Connecticut Natural Gas (CNG) gas main that is located within the northbound lane of Ridgewood Road near Bridge No. 01743B (I-84 Westbound over Ridgewood Road). The gas main is offset approximately 8-feet from the eastern curbline. The Contractor shall have the location of the gas main verified using the Call Before You Dig service prior to commencing work at Bridge No. 01743B.

NOTICE TO CONTRACTOR - EXISTING IMS

The Contractor is herein made aware of existing Incident Management System (IMS) conduit and appurtenances located on I-84 in the vicinity of the project area.

The Contractor will be responsible for locating, verifying the location of and protecting all IMS below and above the ground. Prior to the start of construction, the Contractor shall contact "Call Before You Dig" and all utility within the towns along the project corridor. The Contractor shall also contact Robert Kennedy (860-594-3458) of ConnDOT Highway Operations to mark out IMS conduit and appurtenances.

In areas adjacent to existing incident management system equipment, the Contractor is required to hand excavate. Any damage caused to the IMS conduit/equipment will be the responsibility of the Contractor, and will be replaced by the Contractor at the Contractor's expense, as directed by the Engineer. Mark out of the IMS will not relieve the Contractor of responsibility for repair of damage caused by the Contractor or the Contractor's sub-contractors.

NOTICE TO CONTRACTOR - SMART WORK ZONE ITEMS

The Contractor is hereby notified that the Portable Work Zone Management System (PWZMS) items have been changed to Smart Work Zone (SWZ) items. The Contractor shall read the special provisions carefully as many requirements have been changed including but not limited to item numbers, new item numbers, method of measurement and basis of payment.

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

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

NOTICE TO CONTRACTOR - 30-DAY SYSTEM OPERATIONAL TEST

Upon successful completion of the installation and testing of the CCTV, TFM, Traffic Management System Cabinet, and other items within this contract and as approved by the Engineer, a 30-day system operational test shall commence.

The Contractor shall not be permitted to start the 30-day system operational test until all manufacturers' equipment warranties, spare parts and as-built drawings have been received by the Engineer for all equipment listed in the item numbers below in this special provision.

During the course of this test, each item listed below must function in accordance with the specifications for the duration of the test. Each item listed below must be tested concurrently. The contractor shall refer to each item for additional testing, if required.

If a malfunction occurs within the stated time frame, then the Contractor shall make all necessary repairs to the system and re-establish proper operation. Upon approval of the Engineer, the 30-day system operational test will begin as new. The system must operate a full thirty (30) consecutive days without a malfunction before the system will be accepted by the Engineer. The Contractor shall coordinate the 30-day System Operational Test with other pertinent items in this specification and contract.

The Contractor shall maintain and submit to the Engineer a log of recording each 30-day system operational test until all items have successfully completed the 30-day test. The log shall contain a record of all 30-day system operational test start date, reported and recorded failures and repairs to remedy failures of any of the items, re-start dates, and 30-day system operational test completion dates. The log shall contain a list all of the sites on the plans. The Contractor shall submit to the Engineer a weekly status of the log to the Engineer for approval until all of the sites have successfully completed the test. The Contractor shall report to the Engineer each 30-day system operational test successful completion on the day the test is completed. The Contractor shall maintain the log on a daily basis. The Contractor shall provide a copy of the log at the Engineer's request at any time to clarify or resolve any issues with the 30-day system operational test. The Contractor shall submit to the Engineer a proposed log format prior to start of any 30-day system operational test for review and approval by the Engineer.

The Contractor shall be responsible for coordination of the 30-day system operational test with the Newington Operations Staff. The Contractor shall notify Mr. Robert Kennedy at 860-594-3458, in writing, when each system is to begin a 30-day system operational test. The Contractor shall make available a telephone number to the Engineer and the Newington Operations Staff for reporting failures. The Contractor shall be responsible for notifying Newington Operations when a restart and successful completion of each CCTV or TFM is made.

The Newington Operations Staff will report to the Contractor when the system experiences a failure. The Contractor is responsible for reporting any or all failures to the Engineer.

Upon successful completion of the 30-day System Operational Test and approval by the Engineer, the system shall be supported by Item #1112252A – Equipment Operations (Estimated Cost) until the successful completion of the entire construction project or as directed by the Engineer.

The Contractor shall coordinate the 30-day System Operational Test with other pertinent items in this contract and other ConnDOT contracts (If required). The 30-day System Operational Test will not be accepted until all As-Built drawings for IMS equipment installations have been submitted by the Contractor and accepted by the Engineer.

Item # **Description**

1112210A – Camera Assembly
1113059A – Traffic Flow Monitor

NOTICE TO CONTRACTOR - IMS ELECTRICAL SERVICES

Procedures regarding Incident Management System (IMS) electrical service installations, removals, inspections and inventory documentation:

1. The contractor shall make all arrangements with the utility company, complete the required service requests for all electrical service locations and keep a record of the service request tracking numbers (such as the Work Request No. from ULI) provided by the utility company. All service requests shall include the six digit location number indicated on the plans. Billing for the monthly energy charges shall be to the following:

   State of Connecticut Department of Transportation
   P.O. Box 317546
   Newington, CT 06131-7546

2. The contractor shall collect the applicable service information (service request tracking number, effective billing date, etc.) indicated on the IMS Service Log form contained herein for each IMS electrical service installation, and provide the information to the construction inspector. The construction inspector will forward the information to the Traffic Engineering Electrical Unit so that it will be entered into the IMS inventory log.
3. The construction inspector will contact the Property and Facilities - Code Inspection Services (P&FCIS) unit to schedule a code inspection for each IMS electrical service installation. The construction inspector will provide the P&FCIS unit a one (1) week notice prior to requiring them to perform an inspection. The construction inspector will provide P&FCIS with the service request tracking number for each electrical service in need of inspection.
4. The construction inspector will contact the Highway Operations unit to inform them when a new IMS system installation has been completed and is ready for their inspection.
5. When removing existing IMS systems, the contractor shall be required to notify the construction inspector 21 days in advance of required electrical service removal. The contractor shall provide the construction inspector with the applicable service information (meter number, meter address, service pole number, pole custodian, etc.) indicated on the IMS Service Log form. The construction inspector will forward the service information to the FDEE unit. The FDEE unit will prepare and submit a service removal request to the utility company to have the service de-energized and removed, and the service account terminated. The FDEE unit will inform the Traffic Engineering Electrical unit of the removal of the electrical service to have the IMS inventory log updated.

Office contacts and contact numbers:

Traffic Engineering Electrical unit – Jorge Kuljis (860) 594-2791
Facilities Design Electrical Engineering (FDEE) – Edward Majcherek (860) 594-2795
Property and Facilities Code Inspection Services (P&FCIS) – Michael LeBlanc (860) 594-2238
Highway Operations unit – Robert Kennedy (860) 594-3458

IMS Service Log,

To be filled out by the contractor.

Project No.: _____

Location: _____ Loc No.: _____

Town: _____ Route: _____

Service Request Tracking No.: _____
(provided by the power company)

Effective Billing Date: _____
(date power is connected & energized by the power company)

Removal Date: _____
(date power is disconnected & de-energized by the power company)

Meter No.: _____

Meter Address: _____

Pole No.: _____

Pole Custodian: _____

Date submitted to Construction Inspector: _____

Contractor Initials: _____

NOTICE TO CONTRACTOR - INSTALLATION QUALIFICATIONS

All management, construction, installation, and inspection services shall be performed by individuals who have performed the same job function on at least two previously completed construction and installation communication projects of comparable size and complexity.

Approval of ITS Equipment Installer:

Each Contractor or Subcontractor performing the work involved with the installation of Intelligent Transportation System (ITS) equipment related to the Incident Management System shall provide references and resumes of staff that shall meet the following requirements:

Satisfactory completion of at least three (3) projects in the last five (5) years that includes the installation of each of the ITS equipment identified below.

- 4" (100 mm) Multiduct Conduit
- Pullboxes
- Camera Lowering Devices
- Camera Assemblies
- Traffic Management System Cabinets (TMSC)
- Traffic Flow Monitors (TFM) and TFM Poles
- Variable Message Signs (VMS) and VMS Controller Cabinets

The Contractor shall provide a list of each ITS project which the Contractor has performed, including a description of each project, the location of each project, inclusive dates of when the work was performed on each project, and a contact reference for each project listed.

This document shall be submitted to ConnDOT for review and approval before any Incident Management System project work may proceed.

Approval of Traffic Structure Foundations Installer:

The Contractor or Subcontractors performing the work to install large drilled shaft or spread footing "Traffic Structure Foundations" including Traffic Control Foundation – Span Pole Type "C" and Overhead Cantilever Sign Support Foundation (Type VMS 1) shall provide references and resumes of staff that shall meet the following requirements:

All management, construction, installation of traffic structure foundations shall be performed by individuals who have performed the same job function on at least two previously completed construction and installation projects of comparable size and

complexity. Each previously completed project shall have included the installation of at least four (4) drilled shaft foundations for overhead sign support foundations. The Contractor shall submit a list of available equipment that will be used for the installation of the traffic structure foundations proposed in the project. The resumes of staff shall include, but not be limited to, the equipment operator(s) and supervisor who will be responsible for conducting the work. The resume of staff and list of available equipment shall demonstrate the ability to perform the installation of drilled shaft foundations and rock socket foundations to the depths identified on the plans and as demonstrated by the soil boring information.

Approval of Fiber-Optic Cable Installation, Splicing and Testing:

Each Contractor or Subcontractor performing the work involved with installing, splicing and testing of cable and electronic communication systems and installing detection and video systems, shall provide references and resumes of staff that shall meet the following requirements:

Satisfactory completion of at least three (3) fiber-optic based communication projects in the last three years. Experience shall be in related fiber optic systems for installers involving single-mode cables in excess of 6 miles (9.7 kilometers).

The Contractor shall provide a list of each fiber-optic based communications project and/or intelligent transportation system project which the Contractor has performed, including a description of each project, the location of each project, inclusive dates of when the work was performed on each project, and a contact reference for each project listed. Each of the referenced projects shall include completing a minimum of three (3), multifiber, single-mode, optical fiber cable fusion splices, and installation of at least 25 optical connectors on single-mode optical fibers. As a minimum, the contact reference shall include an individual's name, training certificates (including updated licenses), title, and current telephone number.

<u>This document shall be submitted to ConnDOT for review and approval before any Incident Management System project work may proceed.</u>

Approval of ITS Systems Integrator:

The Prime Contractor or qualified proposed ITS Systems Integrator Subcontractor performing the work described in these Special Provisions which are involved with supplying, installing, configuring and testing of electronic communication systems and video systems for the Incident Management System and newly installed video and data transport system, shall provide a printed document (nine copies) that contains the proposed ITS Systems Integrator's experience in the areas noted below, as well as references and resumes for staff proposed to perform the project work. The document should clearly indicate how the proposed ITS Systems Integrator meets the following requirements:

- Experience involving at least seven (7) ITS system integration projects with overall system responsibility and accountability, each employing at least 8 camera sites used for highway transportation purposes. A minimum of 7 years experience in ITS system integration.

- Design and installation of at least 200 point-to-point optical digital video links used for highway transportation purposes.

- A minimum of two (2) projects using video matrix switchers with a minimum size of 240 inputs and 64 outputs of analog video used for highway transportation purposes.

- Installation of video compression equipment involving at least ten sites, comprising video compression algorithms including but not limited to: H.261, MPEG1, MPEG2, MPEG4, and MJPEG used for highway transportation purposes.

- Experience using various applicable test equipment including: Fiber Optic Spectrum Analyzer, OTDR, BERT, Protocol Analyzer, and Oscilloscope.

- Installation of a minimum of 40 digital video encoder and decoder devices.

- Ability to respond within 2 hours travel by car to Central Office located at ConnDOT, 2800 Berlin Turnpike, Newington CT.

- Provision of 24x7x365 maintenance available with technicians fully trained in ITS related equipment.

- Demonstrate a general working knowledge of specifications RS-170 and RS-250C.

- Demonstrate a general working knowledge of communications protocols utilized in the CCTV industry.

- Demonstrate a general working knowledge of physical communications interfaces such as RS-232, RS-422, RS-485, RS-530, and RS-449.

- Demonstrate extensive working knowledge of Ethernet physical topologies TCP/IP routing schemes, metro ring and link aggregation protocols, VLAN configurations, and Quality of Service configuration and setup.

- Have working experience in configuring Nortel Sonet equipment.

The document for the ITS Equipment Installer, Traffic Structure Foundations Installer, Fiber-Optic Cable Installation, Splicing and Testing Qualifications, and ITS Systems Integrator shall be submitted for approval within ten (10) days of the Contract Award to:

Mr. Robert Kennedy
Connecticut Department of Transportation
Bureau of Engineering and Highway Operations
2800 Berlin Turnpike P.O. Box 317456
Newington, Connecticut 06131-7546
Robert.Kennedy@ct.gov

These requirements shall apply to the following contract item installations:

- Optical Fiber Cable, Single Mode, Loose Buffered Tube Cable, 6-Fiber, 72-Fiber and 144-Fiber
- Fiber Optic Cable Splice Enclosures
- Equipment Operations
- Traffic Management System Cabinets
- Video equipment, including cameras and mountings
- Optical Video/Data Transmitter and Receiver
- 10/100 Base – TX Ethernet Switch
- Terminal Server
- Port Sharing Device
- Ethernet Switch
- Ethernet Media Converter
- Media Converter
- Wireless Router
- MPEG 4 Video Encoder and Decoder
- Traffic Flow Monitor
- Motorist Variable Message Signs

The Contractor shall not start work on the Incident Management System until the Contractor receives approval from the Department.

The Incident Management System shall be maintained in normal working operation at all times.

In the event that the Contractor needs to remove an Incident Management System device from service, the Contractor shall notify Mr. Robert Kennedy at the Newington Operations Center (830) 594-3458 at least ten (10) working days prior to any scheduled work operation. An Incident Management System device shall consist of CCTV cameras, camera cabinets, mini-hub cabinets, Traffic Flow Monitors, Variable Message Signs, Highway Advisory Radio site equipment and fiber optic cable including any associated fiber optic communications plant equipment.

All Project related scheduled work that will require the downtime of the Incident Management System, such as the splicing of the fiber optic trunkline cable, shall be performed on a non-holiday weekend as specified in Section 1.08 Prosecution and Progress - Incident Management System and as approved by Mr. Robert Kennedy, Newington Operations Center. The scheduled work performed on the approved non-holiday weekend shall be completed in a fifteen (15) hour work window. The Contractor shall identify the work that will be performed during this work window as well as a list of the approved staff to be performing work on the Incident Management System. Any deviation in the fifteen (15) hour work window must be approved by the Newington Operations Center staff.

Prior to the scheduled start of work on the Incident Management System, the Contractor shall contact the Bridgeport Operations Center to determine if there are any on-going incidents on the highway system. The Incident Management System will not be removed from service until any on-going incidents on the highway system are cleared and approval is granted by the Bridgeport Operations Center staff.

All Contractor personnel involved in the placing, splice preparation and splicing of fiber optic cable shall meet or exceed the above referenced installation qualifications and shall be approved by the Department. Under no circumstance will unqualified, unapproved Contractor personnel be allowed to work on the Incident Management System.

NOTICE TO CONTRACTOR - ENVIRONMENTAL INVESTIGATIONS

An environmental site investigation has been conducted that involved the sampling and laboratory analysis of soil collected from various locations and depths within the project limits. The results of this investigation indicated the presence of polynuclear aromatic hydrocarbons (PAH) at concentrations exceeding the applicable Connecticut Department of Energy and Environmental Protection (DEEP) Remediation Standard Regulations (RSRs) in the soils within the project limits. In addition, low-level concentrations of extractable total petroleum hydrocarbons (ETPH) and PAHs were detected in soils at concentrations below the applicable DEEP RSR criteria. The testing results in this report indicate levels of various contaminants that the Contractor may encounter during construction. Actual levels found during construction may vary and such variations will not be considered a change in condition provided the material can still be transported to the project Temporary Reuse Stockpile Area (TRSA) as designated within Subset 20 of the plans or as directed by the Engineer.

The DEEP groundwater classification beneath the site is GA. Groundwater was not encountered during the environmental investigation and therefore no groundwater samples were collected and analyzed. Dewatering fluids encountered during construction activities should be managed and discharged in accordance with the construction dewatering permit for the project. However, if contamination is encountered during dewatering activities, controlled management and disposal of contaminated groundwater in accordance with DEEP permits may be required.

Based on these findings, one (1) Area of Environmental Concern (AOEC) for soil has been designated within the proposed project limits.

The remaining soil within the project limits contains detected compounds but at concentrations below the applicable numeric criteria. The presence of 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 outside the limits of the designated AOEC that cannot be reused within the project limits will require handling and transportation to the project TRSA.

The Contractor is hereby notified that controlled materials requiring special management or disposal procedures may be encountered during 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. 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 may be utilized as fill/backfill within its originating AOEC and suitable material excavated from outside the limits of the AOEC 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 such reuse; and (4) such soil is not placed in an area subject to erosion. Excavated material (AOEC and non-AOEC) which cannot be reused within the project limits will require handling and transportation to the project TRSA as directed by the Engineer.

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

- Item No. 0101000A - Environmental Health and Safety

The Contractor is alerted to the fact that the Department's environmental consultant will be on site for excavation activities to collect soil samples (if necessary) and to observe site conditions for the Department. **The TRSA within Subset 20 of the plans is to be used exclusively for stockpiling of excavated materials from within project AOEC and excess material excavated from outside the limits of the AOEC.**

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

· Task 210 – Subsurface Site Investigation. Safety & Operational Improvements on I-84, West Hartford, Connecticut, DTC, Inc. September 2018.

NOTICE TO CONTRACTOR - HAZARDOUS MATERIALS INVESTIGATIONS

A limited hazardous materials site investigation has been conducted for the I-84 Safety & Capacity Improvements (Bridge Nos. 01743A, 01743B, 01744, 01745, 01746, 01747, 03486, 03489 & 03490 and Sign Support Nos. 21579, 21580, 21581, 21682, 21683, 21684 & 21685) in West Hartford, Connecticut. The scope of inspection was limited to the representative components projected for impact.

Results of the survey identified lead paint to be present or presumed on the structural steel/metal bridge/railing components of Bridge Nos. 01743A, 01743B, 01744, 01745, 01747, 03486, 03489 & 03490. No lead painted bridge components are projected to be impacted at Bridge Nos. 01743A, 01747, 03486, 03489 & 03490. Bridge No. 01746 was constructed entirely of unpainted concrete, therefore no lead paint was identified.

Detectable amounts of lead in paint were identified on the supports of Sign Nos. 21579, 21580 & 21581. No lead paint was detected on the supports of Sign No. 21682, 21683 & 21685. Sign Nos. 21684 was galvanized (unpainted), therefore no lead paint was identified.

Results obtained from TCLP waste stream sampling and analysis for leachable lead from the paint on the structural steel/metal bridge components including the railing systems at Bridge Nos. 01743B, 01744 & 01745 characterized the paint waste streams as CTDEEP/RCRA hazardous waste. No projected lead paint waste is expected to be generated at Bridge Nos. 01743A, 01747, 03486, 03489 & 03490. Results obtained from TCLP waste stream sampling and analysis for leachable lead from Sign Nos. Sign Nos. 21579, 21580 & 21581 characterized those paint waste streams as non-hazardous, non-RCRA waste.

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

Light grey brittle caulking around the base supports of the metal railing systems at Bridge Nos. 01743B, 01744 & 01745 and off-white brittle caulking at the base of Sign Support Nos. 21682, 21683 & 21685 were sampled and found to contain asbestos. Also, light grey brittle caulking around the base supports of the metal railing systems at Bridge Nos. 01743A, eight (8) asbestos cement pipes (transite) under Bridge No. 01747 and tar-like pipe penetrations at Bridge No. 01746 (box culvert) were identified and/or presumed to be ACM, however they are not projected to be impacted by the project. Other various caulks and tars at the above mentioned sites were sampled and found to contain no detectable levels of asbestos.

No bird/pigeon guano accumulations were observed in accessible areas of Bridge Nos. 01743A, 01743B, 01744, 01745, 01746, 01747, 03486, 03489 & 03490.

Universal Waste/Connecticut Regulated Waste in the forms of fluorescent/mercury vapor/halogen bulbs with ballasts were observed at 01743A, 01743B, 01744 & 01745, however the bulbs/ballast are not projected to be impacted at Bridge No. 01743A.

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

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

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

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

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

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

- HazMat Inspection Letter, I-84 Safety & Capacity Improvements (Bridge Nos. 01743A, 01743B, 01744, 01745, 01746, 01747, 03486, 03489 & 03490 and Sign Support Nos. 21579, 21580, 21581, 21682, 21683, 21684 & 21685) West Hartford, TRC Environmental Corporation, January 15, 2019.

NOTICE TO CONTRACTOR - ELECTRONIC ENGINEERING DATA (EED)

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

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

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

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

- Native Format
  - Bentley MicroStation CAD files (dgn)
  - Bentley SS2 InRoads Alignment Files (alg)
  - Bentley SS2 InRoads Digital Terrain Models (dtm)
  - Bentley SS2 InRoads Preference File (xin)
- Converted Format (for use in GPS/RTS Site equipment)
  - AutoCAD CAD files (dxf)
  - Alignment files (xml)
  - Surface Models (xml)

For a complete list of EED files, see the EED file manifest (PDF) located in the EED_0155-0171.zip file (0155-0171 is the project number) which is posted with the contract PS&E's on the State Contracting portal.

NOTICE TO CONTRACTOR - 1.05 CONTROL OF THE WORK

1.05.03 - CONFORMITY WITH PLANS AND SPECIFICATIONS (INCLUDING QUALITY CONTROL)

The Contractor is hereby notified that a Quality Management Plan will be required for this Project in conformance with Standard Specifications (Supplemented July 2017) Article 1.05.03 – "Conformity with Plans and Specifications (including Quality Control)."

NOTICE TO CONTRACTOR - QUALITY CONTROL PROGRAM

ITEM #0969053A CONTRACTOR QUALITY CONTROL PROGRAM LEVEL 2

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

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

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

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

SECTION 1.02 - PROPOSAL REQUIREMENTS AND CONDITIONS

1.02.01—Contract Bidding and Award:

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

In accordance with the provisions of the Construction Contract Bidding and Award Manual, bidders must be prequalified for **Group No. 7 - Road Construction and Rehabilitation: Limited Access Highways/Freeways**, to be eligible to bid on this project. Bidders that are not prequalified for this work classification will not be approved to bid on this project.

SECTION 1.02 - 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 shall commence and proceed with the Contract work on the date specified in a written notice to proceed issued by the Engineer to the Contractor. The date specified will be no later than 45 calendar days after the date of the execution of the Contract by the Department".

SECTION 1.05 - CONTROL OF THE WORK

Replace Article 1.05.02 *with the following:*

1.05.02—Contractor Submittals, Working Drawings, Shop Drawings, Product Data, Submittal Preparation and Processing - Review Timeframes, Department's Action:

1. Contractor Submittals: The plans provided by the Department show the details necessary to give a comprehensive idea of the construction contemplated under the Contract. The plans will generally show the location, character, dimensions, and details necessary to complete the Project. If the plans do not show complete details, they will show the necessary dimensions and details, which when used along with the other Contract documents, will enable the Contractor to prepare working drawings, shop drawings or product data necessary to complete the Project.

The Contractor shall prepare submittals as Portable Document Format (PDF) files. The Contractor is also required to acquire, maintain access and use the Department's document management system for delivery of submittals. The format, digital signing requirements, delivery processes and document tracking procedures shall be performed in accordance with this specification and the Contractor's Digital Submission Manual (CDSM).

The submittals shall be sent to the Department's reviewer(s), sufficiently in advance of the work detailed, to allow for their review in accordance with the review periods as specified herein (including any necessary revisions, resubmittal, and final review), and acquisition of materials, without causing a delay of the Project.

2. Working Drawings: When required by the Contract or when ordered to do so by the Engineer, the Contractor shall prepare and submit the working drawings, signed, sealed and dated by a qualified Professional Engineer licensed to practice in the State of Connecticut, for review. The drawings shall be delivered sufficiently in advance of the work detailed, to allow for their review in accordance with the review periods specified herein (including any necessary revisions, resubmittal, and final review).

There will be no direct payment for furnishing any working drawings, procedures or supporting calculations, but the cost thereof shall be considered as included in the general cost of the work.

a. Working Drawings for Permanent Construction: The Contractor shall supply to the Assistant District Engineer a certificate of insurance in accordance with 1.03.07 at the time that the working drawings for the Project are submitted.

The Contractor's designer, who prepares the working drawings, shall secure and maintain at no direct cost to the State a Professional Liability Insurance Policy for errors and omissions in the minimum amount of $2,000,000 per error or omission. The Contractor's designer may elect to obtain a policy containing a maximum $250,000 deductible clause, but if the Contractor's designer should obtain a policy containing such a clause, they shall be liable to the extent of at

least the deductible amount. The Contractor's designer shall obtain the appropriate and proper endorsement of its Professional Liability Policy to cover the indemnification clause in this Contract, as the same relates to negligent acts, errors or omissions in the Project work performed by them. The Contractor's designer shall continue this liability insurance coverage for a period of

(i) 3 years from the date of acceptance of the work by the Engineer, as evidenced by a State of Connecticut, Department of Transportation form entitled "Certificate of Acceptance of Work," issued to the Contractor; or

(ii) 3 years after the termination of the Contract, whichever is earlier, subject to the continued commercial availability of such insurance.

b. Working Drawings for Temporary Construction: The Contractor shall submit drawings, calculations, procedures and other supporting data to the Assistant District Engineer.

3. Shop Drawings: When required by the Contract, or when ordered to do so by the Engineer, the Contractor shall prepare and deliver shop drawings to the Designer for review. Review timeframes and submission locations are as specified herein.

There will be no direct payment for furnishing any shop drawings, but the cost thereof shall be considered as included in the general cost of the work.

4. Product Data: When required by the Contract, or when ordered to do so by the Engineer, the Contractor shall prepare and deliver product data.

The Contractor shall submit the product data in a single submittal for each element or group of elements of construction.

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

There will be no direct payment for furnishing any product data, but the cost thereof shall be considered as included in the general cost of the work.

a. Traffic Signal Items: When required by the Contract or when ordered by the Engineer, the Contractor shall prepare and submit product data sheets, working drawings and/or shop drawings for all traffic signal items, except Steel Span Poles and Mast Arm Assemblies when applicable, to the Division of Traffic Engineering for approval before fabrication. The packaged set of product data sheets, working drawings or shop drawings shall be submitted in an electronic portable document format (PDF).

The PDF packaged set shall be in an individual file with appropriate bookmarks for each item. The electronic files for product data sheets shall be created on ANSI A (8 1/2 inch × 11 inch, letter) sheets. Working drawings and shop drawings shall be created on ANSI B (11 inch × 17 inch, ledger/tabloid) sheets.

The PDF documents for Traffic Signal items shall be sent via email to:

DOT.TrafficElectrical@ct.gov

Illumination Items:

The packaged set of product data sheets, working drawings and/or shop drawings shall be submitted in an electronic portable document format (.pdf). All approvals or disapprovals and comments will be returned in one package.

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 shop drawings shall be created on ANSI A (8 ½" x 11"; 216 mm x 279mm; letter) sheets.

Please send the pdf documents via email to:

mailto:jon.andrews@ct.gov

Incident Management System Items:

When required by the contract documents or when ordered by the Engineer, the Contractor shall prepare and submit product data sheets, working drawings and/or shop drawings for all Incident Management System (IMS) related items to the Bureau of Highway Operations for approval before fabrication. IMS related items include multiduct conduit, pullboxes, fiber optic and communications cables, cabinets, cameras, camera lowering devices, variable message signs (VMS), traffic flow monitors (TFM) and telecommunications related equipment.

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

Please send the PDF documents via email to:

mail to:Robert.Kennedy@ct.gov

Smart Work Zone Items:

When required by the contract documents or when ordered by the Engineer, The Contractor shall prepare and submit product data sheets**,** working drawings and/or shop drawings for all Smart Work Zone items. The packaged set submitted in an electronic portable document format (.pdf) shall be in an individual file with appropriate bookmarks for each item. The electronic files for product data sheets shall be created on ANSI A (8 ½" x 11"; 216 mm x 279mm; letter) sheets. Working drawings and shop drawings shall be printed on ANSI B (11" x 17"; 279 mm x 432 mm; ledger/tabloid) sheets.

Please send the pdf documents via email to:

DOT.ITSEngineering@ct.gov

5. Submittal Preparation and Processing – Review Timeframes: The Contractor shall allow 30 calendar days for submittal review by the Department, from the date receipt is acknowledged by the Department's reviewer. For any submittals marked with "Revise and Resubmit" or "Rejected," the Department is allowed an additional 20 calendar days for review of any resubmissions.

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

The furnishing of shop drawings, working drawings or product data, or any comments or suggestions by the Designer or Engineer concerning shop drawings, working drawings or product data, shall not relieve the Contractor of any of its responsibility for claims by the State or by third parties, as per 1.07.10.

The furnishing of the shop drawings, working drawings and product data shall not serve to relieve the Contractor of any part of its responsibility for the safety or the successful completion of the Project construction.

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

a. If submittals are marked "No Exceptions Noted," the Designer or Engineer has not observed any statement or feature that appears to deviate from the Contract requirements. This disposition is contingent on being able to execute any manufacturer's written warranty in compliance with the Contract provisions.
b. If submittals are marked "Exceptions as Noted" the considerations or changes noted by the Department's Action are necessary for the submittal to comply with Contract requirements. The Contractor shall review the required changes and inform the Designer or Engineer if

they feel the changes violate a provision of the Contract or would lessen the warranty coverage.

c. If submittals are marked “Revise and Resubmit,” the Contractor shall revise the submittals to address the deficiencies or provide additional information as noted by the Designer or Engineer. The Contractor shall allow an additional review period as specified in 1.05.02-5.
d. If submittals are marked “Rejected,” the Contractor shall prepare and submit a new submittal in accordance with the Designer’s or Engineer’s notations. The resubmissions require an additional review and determination by the Designer or Engineer. The Contractor shall allow an additional review period as specified in 1.05.02-5.

SECTION 1.06 - CONTROL OF MATERIALS

Article 1.06.01 - Source of Supply and Quality:

Add the following:

Smart Work Zone Items:

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

Smart Work Zone Queue Trailer/Sensor (SQT)
Smart Work Zone Variable Message Sign/Queue Sensor Trailer (SVMQ)
Smart Work Zone Mobile Video Camera/Queue Sensor Trailer (SVQS)

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

Traffic Signal Items:

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

I. 11114XXA – Loop Detector Amplifier Loop Vehicle Detection, Loop Detector, Loop Sealant, Loop Wire and Loop Lead-in Wire

Illumination Items:

For the following materials the Contractor shall submit a complete description of the item consisting of the latest manufacturer shop drawing(s) which completely illustrates the material presented for formal approval. The submitted shop drawing(s) shall clearly call-out all material

and operational properties for the item specific to the project. Such approval shall not change the requirements for a certified test report and materials certificate as may be called for.

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

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

Incident Management System Items:

For the following items required for the Incident Management System, the Contractor shall submit a complete description of the item, together with either in paper (hard copy) form or in an electronic portable document format (.pdf) one (1) copy of shop drawings, cuts, data sheets and other descriptive literature which completely illustrates such items presented for formal approval. Such approval shall not change the requirements for a certified test report, and materials certificate as may be called for.

Approval of the Shop Drawings and product data sheets shall not change the requirements for a certified test report, materials certificate and certificate of compliance as may be called for.

Shop drawings shall be submitted on 8-1/2 inch by 11 inch sheets, 11 inch by 17 inch sheets or on 24 inch by 36 inch standard plan sheets. Shop drawings and data sheets shall be required for, but not limited to the following

Structural supports
Hand holes and covers
Pullboxes and pullbox covers
Fiber Optic Modems
Camera power supply
Traffic Flow Monitors
Cast Iron Handhole Cover
Cast Iron Junction Box
Fiberglass Junction Box
Traffic Management System Cabinets
Traffic Management System Mini-hub Cabinets
Auxiliary Termination Cabinets
Transformers
Steel CCTV Poles
Camera Lowering Device Assembly
Remote Control Flashing Lights
Service Cabinets
Meter Sockets
Conductors
Fiber Optic Cable
Fiber Patch Cords
Fiber Optic Connectors
Fiber Optic Splice Enclosures
Optical Fiber Termination Patch Panels
Optical Video/Data Transmitter
Optical Video/Data Receiver
Network Customer Service Unit
Video encoders and de-coders
Surge Panels

Ethernet switch
Ethernet Port Sharing Device
Cat 6 Cable
CCTV Coax Cable
Coax Cable Connectors
CCTV Twisted Pair cable
CCTV Twisted pair connectors
RJ 45 and RJ 48 Connectors
Surface Mounted Conduit and Appurtenances
Conduit, pulling tape, supports, brackets, hangers, clamps and any hardware involved with the supports and including complete fabrication details.
Field fastener details including chemical and mechanical anchors.
Camera Assembly.
Schematics of the wiring between the camera and the equipment cabinet shall also be provided.
Camera Video Cables, Data Cables, Power Cables and Connectors.
Modify Existing Operations Center Control System including all materials, schematics, diagrams and drawings.
Motorists Aid Variable Message Signs, cabinets, cables, diagrams, schematics etc.

Incident Management System Items:

All vehicles transporting materials on highways and bridges in the State shall comply with all the vehicle regulations of the Connecticut General Statutes and regulations of Connecticut State Agencies as they apply to vehicle length, width, height and weight.

Any vehicle, either loaded or unloaded, will not be allowed to travel across any bridge or on any highway when such vehicle exceeds the legal limits or posted limits of such bridge or highway without a permit. The owner of the vehicle must apply to the Department for a permit for such travel, as provided in the statutes.

The General Statutes include the following limitations:

Vehicle Width (Section 14-262(a)(1)) - The width of a vehicle and combination vehicle and trailer, including its load, is limited to 8.5 ft. (2,590 mm), without a permit.

Vehicle Length (Section 14-262(c)) - The length of the semitrailer portion of a tractor-trailer unit, including its load, is limited to 48 ft. (14,630 mm), without a permit.

Vehicle Height (Section 14-264) - The height of a vehicle, with its load, is limited to 13.5 ft. (4,110 mm), without a permit.

Vehicle Weight (Section 14-267a(b)(7)) - The gross vehicle weight (weight of vehicle including its load) is limited to 80,000 lbs. (36,280 kg) on 5 axles for vehicles with a 51 ft. (15,540 mm) wheelbase, without a permit.

Axle Weights of Vehicles (Section 14-267a) – For the above five axle vehicle, weight on a single axle may not exceed 22,400 lbs. (10,160 kg) or in the case of axles spaced less than 6 ft. (1,828 mm) apart, 18,000 lbs. (8,160 kg).

On Department projects, in accordance with the Commissioner's policy, any member or component, either temporary or permanent, that measures 120 ft. (36,570 mm) or less and weighs no greater than 120,000 lbs. (54,430 kg), is transportable via an authorized permit route established by the Department provided the individual axle weights on the vehicle and trailer transporting the member or component do not exceed 20,000 lbs. (9,070 kg).

Members and components, shown in the contract documents, that exceed the above length and weight limits have been reviewed by the Department's Oversize and Overweight Permits Section and are transportable via an authorized permit route established by the Department provided the individual axle weights on the vehicle and trailer transporting the member or component do not exceed 20,000 lbs. (9,070 kg).

All permits to transport materials are subject to shipping times established by the Department's Oversize and Overweight Permits Section.

Applications for permits, required to transport materials, shall be submitted a minimum of two weeks prior to their required use, to the Department's Oversize and Overweight Permits Sections.

Article 1.06.07 - Certified Test Reports and Materials Certificate.

Add the following:

Illumination Items:

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

Light Standards	Anchor Bolts

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

Light Standards	Luminaires
Conductors	Anchor Bolts
Cable in Duct	

Incident Management System (IMS) Items:

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

Structural Steel (Poles and Sign Supports)	Rigid Metal Conduit
Structural Tubing	Anchor Bolts
Galvanizing (certifying compliance with ASTM)	Conduit hangers, supports, clamps
Zinc Rich Primer	Handholes
Neoprene Gasket	Cast Iron Junction Box
Polyurethane Sealant	Pull Box
Grounding Rods	Pull Box Cover
Copper Wire	Lowering Device Assembly
	Fiber Optic Cable
	Fiber Optic Cable Connectors

2) For the materials in the following Incident Management System items, a Certified Test Report will be required confirming their conformance to the requirements set forth in these plans or specifications or both.

Anchor Bolt and Hardware	Service Cabinet
Structural Steel (Poles and Sign Supports)	Transformer
Structural Tubing	Camera Cables
Welds	Structural Steel (Poles)
Conduit	Fiber Optic Cable
	Fiber Optic Cable Connector

SECTION 1.07 - LEGAL RELATIONS AND RESPONSIBILITIES

Delete Article 1.07.07 in its entirety and replace it with the following:

1.07.07—Safety and Public Convenience: The Contractor shall conduct the Project work at all times in such a manner as to ensure the least possible obstruction to traffic. In a manner acceptable to the Engineer, the Contractor shall provide for the convenience and interests of the general public; the traveling public; parties residing along or adjacent to the highway or Project Site; and parties owning, occupying or using property adjacent to the Project Site, such as commuters, workers, tenants, lessors and operating agencies.

Notwithstanding any other Contract provision, the Contractor shall not close to normal pedestrian or vehicular traffic any section of road, access drive, parking lot, sidewalk, station platform, railroad track, bus stop, runway, taxiway, occupied space within a Site, or occupied space within a building, except with the written permission of the Engineer.

All equipment, materials, equipment or material storage areas, and work areas must be placed, located, and used in ways that do not create a hazard to people or property, especially in areas open to public pedestrian or vehicular traffic. All equipment and materials shall be placed or stored in such a way and in such locations as will not create a hazard to the traveling public or reduce sight lines. In an area unprotected by barriers or other means, equipment and materials must not be stored within 30 feet of any traveled way.

The Contractor must always erect barriers and warning signs between any of its work or storage areas and any area open to public, pedestrian, or vehicular traffic. Such barriers and signs must comply with all laws and regulations, including any applicable codes.

The Contractor must arrange for temporary lighting, snow and ice removal, security against vandalism and theft, and protection against excessive precipitation runoff within its Project work and storage areas, and within other areas specifically designated in the Contract.

In addition to meeting the requirements of Section 9.71, the Contractor shall take all precautions necessary and reasonable for the protection of all persons, including, but not limited to, employees of the Contractor or the Department, and for the protection of property, until the Engineer notifies the Contractor in writing that the Project or the pertinent portion of the Project has been completed to the Engineer's satisfaction.

The Contractor shall comply with the safety provisions of applicable laws, including building and construction codes and the latest edition of the CFR. The Contractor must make available for reference in its field office, throughout the duration of the Project, a copy of the latest edition and all supplements of the CFR pertaining to OSHA.

The Contractor shall make available to the Contractor's employees, subcontractors, the Engineer, and the public, all information pursuant to OSHA 29 CFR Part 1926.59 and The Hazard Communication Standard 29 CFR 1910.1200, and shall also maintain a file on each job site containing all MSDS for products in use at the Project. These MSDS shall be made available to the Engineer upon request.

The Contractor shall observe all rules and regulations of the Federal, State, and local health officials. Attention is directed to Federal, State, and local laws, rules, and regulations concerning construction safety and health standards. The Contractor shall not require any worker to work in surroundings or under conditions that are unsanitary, hazardous, or dangerous to the worker's health or safety.

Safety Plan: Before starting work on the Project, the Contractor shall submit to the Engineer a written Safety and Health Plan (hereinafter referred to as the "Plan"). The Plan shall meet or exceed the minimum requirements of this Subsection and any applicable State or Federal regulations.

The Plan shall apply to any work under the Contract whether such work is performed, by way of example and not limitation, by the Contractor's forces, subcontractors, suppliers, or fabricators.

The Plan shall be prepared by the Contractor and submitted to the Engineer for review before the actual start of work on the Project. Within ten (10) calendar days of receipt, the Engineer will determine whether or not the Plan meets the requirements of this Specification. If the Plan does not meet the requirements of this Specification, it will be returned for revision. Work on the Project may not proceed until the Engineer has accepted the Plan. Nothing herein shall be construed, however, to relieve the Contractor from responsibility for the prosecution of the Project.

The Plan shall conform to the following general format:

1. **General Introduction**.
   a. **Description.** The general introduction of the Plan shall include a statement by the Contractor describing its commitment to maintain a safe work environment for its employees, Department representatives, and the public. Implementation procedures and company policies relative to safety shall be summarized or referenced in the Plan.
      i. The Plan shall include the names, addresses, and telephone numbers of the Contractor's Project Manager, Project superintendent and/or its designee for safety oversight, all competent persons, and the traffic control coordinator. Any changes to the safety management and oversight for the Project shall be promptly communicated to all concerned.
      ii. The Plan shall provide guidelines for protecting all personnel from hazards associated with Project operations and activities.
      iii. The Plan shall establish the policies and procedures that are necessary for the Project to be in compliance with the requirements of OSHA and other State and

Federal regulatory agencies with jurisdiction, rules, regulations, standards, or guidelines in effect at the time the work is in progress.

b. Responsibility, Identification of Personnel, and Certifications. The Contractor is solely responsible for creating, implementing, and monitoring the Plan.

i. The Contractor shall identify and designate on-site supervisory level personnel who shall be responsible for implementing and monitoring the Plan at all times throughout the duration of the Project and shall have authority to take prompt corrective measures to eliminate hazards including the ability to stop work activities.

ii. Documentation of training provided to the on-site supervisory level personnel shall be included as part of the Plan.

iii. For any work activities wherein the Contractor has identified a competent person as defined by OSHA, that person shall be capable of identifying existing and predictable hazards and have the authority to take prompt corrective measures to eliminate the hazards, including the ability to stop work activities.

iv. Documentation of the qualifications of such competent persons identified, including any certifications received, shall be included as part of the Plan.

v. The Contractor shall further identify the qualified safety professional responsible for developing the Plan and shall provide that person's qualifications for developing the Plan which shall include, but not be limited to, education, training, certifications, and experience in developing this type of Plan.

vi. The Plan shall contain a certification executed by the qualified safety professional that developed the Plan, stating that the Plan complies with OSHA and other applicable State and Federal regulatory agencies with jurisdiction, rules, regulations, standards, or guidelines in effect at the time the work is in progress.

2. Elements of the Plan. The Plan shall address, but not be limited to, the following elements:

a. Management Safety Policy and Implementation Statement.

i. The Plan shall describe in detail the means by which the Contractor shall implement and monitor the Plan. Implementation and monitoring shall also mean that the Plan shall be a document with provision for change to update the Plan with new information on a yearly basis at a minimum and shall include new practices or procedures, changing site and environmental conditions, or other situations that could adversely affect site personnel. The Plan shall provide guidelines for protecting all personnel from hazards associated with Project operations and activities.

b. Emergency Telephone Numbers.

c. Personnel Responsibilities.

i. Management responsibilities

ii. Responsibilities of Supervisor(s)

iii. Site safety officer(s) responsibilities

iv. Employee responsibilities

v. Competent person(s) as defined by OSHA responsibilities

d. Training.
- i. Regulatory
- ii. Documentation
- iii. Site hazard assessment -Daily employee awareness of site operations

e. Safety Rules.
- i. General safety rules
- ii. Personal protective equipment
- iii. Housekeeping

f. Safety Checklists.
- i. Project safety-planning checklist
- ii. Emergency plans and procedures checklist
- iii. Documentation checklist
- iv. Protective materials and equipment checklist

g. Traffic Control Coordinator Inspections.
- i. Responsible person
- ii. Frequency
- iii. Documentation of actions taken

h. Record Keeping.
- i. OSHA 200 log

i. Reporting.
- i. Accident(s)
- ii. On site
- iii. Legal notice requirement
- iv. Public liability
- v. Property damage
- vi. Department of Labor
- vii. Hazard Communications

j. Additional Procedures for Project Specific Situations as Applicable.
- i. Compressed gas cylinders
- ii. Confined spaces
- iii. Cranes
- iv. Crystalline silica (stone, masonry, concrete, and brick dust)
- v. Electrical
- vi. Equipment operators
- vii. Fall protection
- viii. Hand and power tools
- ix. Hearing conservation
- x. Highway safety
- xi. Lead health and safety plan
- xii. Lock out/tag out
- xiii. Materials handling, storage, use, and disposal
- xiv. Areas of environmental concern
- xv. Night work
- xvi. Personal protective equipment
- xvii. Project entry and exit

xviii. Respiratory protection
xix. Sanitation
xx. Signs, signals, and barricades
xxi. Subcontractors
xxii. Trenching

3. **Appendix for Environmental Health and Safety Plan (HASP).** If environmental hazards are identified in the Contract, an Environmental HASP shall be included in an appendix to the Plan, or in a separate document. References to any Environmental HASP shall be included within the Plan, where appropriate.

The Plan shall be kept on the site and shall apply and be available to all workers and all other authorized persons entering the work site. Copies of all updates to the Plan shall be promptly supplied to the Engineer.

If at any time during the Project the Engineer determines that the Contractor is not complying with the requirements of this provision or the updated Plan, the Contractor shall correct such deficiencies immediately. Failure to remediate such deficiencies may result in suspension of the Contractor's operations until the deficiencies have been corrected. Suspensions ordered due to safety deficiencies will not be considered compensable or excusable delays.

The Contractor is responsible for implementation of the Plan. Pursuant to Article 1.07.10, the Contractor shall indemnify, and save harmless the State from any and all liability related to the Plan in proportion to the extent that the Contractor is held liable for same by an arbiter of competent jurisdiction.

The Contractor shall allow onto the Project site any inspector of OSHA or other legally responsible agency involved in safety and health administration upon presentation of proper credentials, without delay and without the presentation of an inspection warrant.

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 Services is supplemented as follows:

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

Mr. Augusto Grazuna
District 1 Electrical Supervisor
Department of Transportation
Hartford, Connecticut
(860) 566-3156/3157

Mr. Rich Norris
Metropolitan District Hartford, Connecticut (MDC)
rnorris@themdc.com
(860)278-7850

Mr. Terry Shea
Crowncastle
tshea@lightower.com
(203)649-3905

Ms. Lynee Delucia
Frontier Communications
Lynne.m.anastasio@ftr.com
(203)238-5000

Mr. Gary Meek
Comcast
Gary_meek@cable.comcast.com
(203)721-0727

Mr. John Remkiewicz
Eversource
John.Remkiewicz@Eversource.com
(860)280-2497

Mr. Marc Sweeney
Frontier Communications
Marc.w.sweeney@ftr.com
(860)725-4226

SECTION 1.08 - PROSECUTION AND PROGRESS

Article 1.08.03 – Prosecution of Work - Add the following:

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 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.

READINESS PLAN

Thirty (30) days after the award of the project, the Contractor shall furnish to the Engineer for approval a Readiness Plan consisting of a Critical Path Method (CPM) schedule that details all of the day-to-day operations necessary to complete the required tasks detailed within the "Milestone Incentive and Milestone Liquidated Damages Provisions" during the specified detour timeframes. The schedule shall include:

- activity descriptions, activity durations and interdependence between activities, where applicable. The activities are to be described so that the work is readily identifiable and the progress on each activity can be readily measured and monitored during the noted timeframe.
- the anticipated number of shifts, the hours per shift, and the anticipated number of personnel staffed per shift
- anticipated submittal and approval dates
- anticipated material delivery dates

Accompanying the CPM schedule shall be the following, as applicable.

- description of any special resources, including backup equivalent resources
- Contingency plans for mechanical failure
- M&PT plans

All Department comments regarding the above Readiness Plan and CPM must be addressed in writing by the Contractor a minimum of fourteen (14) calendar days prior to the scheduled closure date, including any outstanding readiness items.

The Contractor must notify the Engineer of the proposed closure date of Ramp G at least four weeks prior to the closure.

STAGE CONSTRUCTION

The Contractor shall stage construct the project in accordance with the Maintenance and Protection of Traffic (MPT) Plans contained within the Contract Documents. The reconstruction of critical roadway elements along I-84 must be completed during the stage in which they appear in this Sequence of Operations unless otherwise directed by the Engineer. The Contractor, however, may

commence other work included in this Contract provided that construction procedures will not violate, conflict with or impair the traffic movements for each stage as described in the Special Provision, "Maintenance and Protection of Traffic", its accompanying traffic control plans, and the construction plans forming part of this Contract Document.

There are two major stages, with each stage divided into two sub stages, reflecting significant changes in mainline traffic. Additional sub stages are required to complete the ramps and local roads. The major construction components of each stage are described in narrative form below.

In the event of an Engineer approved deviation from the sequence of operations, the Contractor shall immediately notify all Utility Companies on this Contract of any such change.

Stage 1A

1. Deploy Smart Work Zone and install all construction advance warning signs and devices.
2. Install sedimentation and erosion control devices at all Stage 1A areas of disturbance.
3. Mill (2” min.) exist. pavement and fill joints and cracks within the following limits and in advance of the Stage 1A I-84 WB traffic shift:
    a. I-84 WB Sta. 81+00 to Bridge No. 01745 (exist. approach slab)
    b. Ramp B Sta. 14+50 to Sta. 21+00 (including gore area)
    c. Ramp G Sta. 6+10 to Sta. 11+70 (including gore area)
4. Reset all exist. drainage structures and MBR as needed within the milling limits noted above.
5. Install 2” PMA overlay and apply wedge course to meet proposed profile and cross-slopes within milling limits noted above.
6. Complete temp. grading.
7. Establish detour and close Ramp G.
8. Shift I-84 WB and Ridgewood Road traffic to the right as shown on Stage 1A MPT plans.
9. Begin Stage 1 construction at Bridge No. 01743B.
10. Perform sacrificial 2” mill and overlay along outside shoulder of I-84 EB from Sta. 84+00 RT to Sta. 93+50 RT and from Sta. 95+50 RT to Sta. 98+00 RT.
    a. Install temp. wedge course at the same locations to correct cross-slopes prior to traffic shift onto existing shoulder.
11. Repeat Items 3 thru 6 above along I-84 EB from Sta. 100+00 to Bridge No. 01744 (exist. approach slab) and in advance of the Stage 1A I-84 EB traffic shift.
12. Install temp. PMA wedge course along outside shoulder of I-84 EB from Sta. 85+00 RT to Bridge No. 01743A approach slab.
13. Shift I-84 EB traffic to the right as shown on the Stage 1A MPT Plans.
14. Perform clearing and grubbing within project limits.
15. Prepare disposal site at I-84 EB off-ramp to Route 9 SB for surplus material generated throughout duration of construction.
16. Begin IMS relocation along outside of I-84 EB and maintain exist. IMS system along I-84 WB (to be completed prior to beginning of Stage 2 construction).

17. Begin installation of new lighting conduit, cables, conductors, handholes, light standards, etc. along outside of I-84 EB.
18. Relocate exist. utilities at Berkshire Rd.
19. Clean all exist. ditches and install outlet protection at all locations as shown on the Drainage Plans.
20. Clean all plugged exist. drainage structures, pipes, and bridge scuppers within project limits.
21. Upon completion of cleaning operation, perform condition survey of all corrugated metal pipes under I-84 mainline and ramps.
22. Construct full-depth pavement along I-84 mainline within the following limits:
    a. I-84 WB Sta. 81+00 RT to 107+50 RT
    b. I-84 EB Sta. 100+00 LT to 107+50 LT
23. Reconstruct I-84 median from Bridge Nos. 03486 and 03485 to Stage 1A limits of I-84 pavement reconstruction.
24. Remove exist. MBR and install temp. end anchorage as shown on Stage 1A MPT Plans.
25. Install PCBC along both sides of the I-84 median reconstruction.
26. Complete final grading within Stage 1A construction limits.
27. Install MBR, end anchorages and bridge attachments within the limits of the I-84 median reconstruction.
28. Install temp. BCPC along I-84 EB adjacent to median.
29. Install all new drainage within limits of Stage 1A construction.
30. Modify concrete end block at Bridge No. 03486.
31. Remove exist. overhead sign and relocate to temp. sign support as shown on Stage 1A MPT Plans.
32. Construct concrete end block wall at Bridge No. 01743A.
33. Construct temp. pavement widening and drainage along I-84 EB from Sta. 113+00 RT to Bridge No. 01744.
34. Construct Temporary Ramp A as shown on Stage 1A MPT Plans.
    a. During off-peak hours, temporarily remove segments of TPCBC along I-84 EB in order to complete full-depth pavement reconstruction and to place temp. PMA wedge course to complete tie-in to Stage 1A I-84 EB pavement.
    b. Replace removed segments of TPCBC.
35. Complete Stage 1 construction at Bridge No. 01743B.

<u>Stage 1B</u>

1. Continue IMS relocation and illumination work along I-84 EB.
2. Maintain surplus material disposal site.
3. Maintain exist. Ramp A traffic.
4. Install temp. PMA wedge course along inside shoulder of I-84 WB from Sta. 84+00 RT to Sta. 102+00 RT.
5. Shift I-84 WB traffic to the left and install/relocate TPCBC as needed to re-open Ramp G.

6. Remove detour and re-open Ramp G by 10/5/2020.
7. Install sedimentation and erosion control devices at all Stage 1B areas of disturbance.
8. Mill (2" min.) exist. pavement and fill joints and cracks within the following limits and in advance of the Stage 1B I-84 mainline traffic shift:
    a. Bridge No. 01745 (exist. approach slab) to I-84 WB Sta. 177+00
    b. Bridge No. 01744 (exist. approach slab) to I-84 EB Sta. 165+00
    c. Ramp C Sta. 33+50 to Sta. 44+70 (including gore area)
    d. Ramp D Sta. 36+00 to Sta. 46+00 (including gore area)
9. Reset all exist. drainage structures and MBR as needed within the milling limits noted above.
10. Install 2" PMA overlay and apply wedge course to meet proposed profile and cross-slopes within milling limits noted above.
    a. Install temp. PMA wedge course along outside shoulder of I-84 WB from Sta. 112+00 LT to Sta. 128+00 LT.
11. Complete temp. grading.
12. Complete IMS relocation and Illumination work along I-84 EB.
13. Shift I-84 mainline traffic to the right and shift Ramp A traffic to Temp. Ramp A (installed in Stage 1A) as shown on Stage 1B MPT Plans.
14. Begin Stage 1 construction at Bridge Nos. 01744 and 01745.
15. Construct full-depth pavement along I-84 mainline within the following limits:
    a. I-84 WB Sta. 107+50 RT to Sta. 177+00 RT
    b. I-84 EB Sta. 107+50 LT to Sta. 165+00 LT
16. Reconstruct remaining portion of I-84 median from I-84 EB & WB Sta. 107+50 to project limits.
17. Install TERS and construct Retaining Wall No. 1 along the inside edge of I-84 EB.
18. Install PCBC along both sides of the I-84 median reconstruction.
19. Install all new drainage within limits of Stage 1B construction.
20. Complete final grading within Stage 1B construction limits.
21. Install all new MBR, end anchorages and bridge attachments within the limits of the I-84 median reconstruction.
22. Remove exist. concrete haunches at Bridge No. 01747.
23. Remove exist. overhead signs and relocate to temp. sign support as shown on Stage 1B MPT Plans.
24. Install new overhead/cantilever sign supports, sign faces, and foundations as shown on Stage 1B MPT Plans.
25. Complete Stage 1 construction of Bridge Nos. 01744 and 01745.

<u>Stage 2A</u>

1. Maintain surplus material disposal site.
2. Maintain IMS Relocation installed in Stages 1A/1B.

3. Remove temp. PMA wedge course installed along outside shoulder of I-84 EB in Stage 1A and install temp. PMA wedge course along inside shoulder of I-84 EB from Sta. 111+00 LT to Sta. 128+00 LT.
4. Re-establish detour and close Ramp G.
5. Shift I-84 mainline and Temp. Ramp A traffic to the left and Ridgewood Rd traffic to the right as shown on Stage 2A MPT plans.
6. Establish MPT pattern along Berkshire Rd and shift traffic as shown on Stage 2A MPT Plans.
7. Install sedimentation and erosion control devices at all Stage 2A areas of disturbance.
8. Begin Stage 2 construction at Bridge Nos. 01743B, 01744 and 01745.
9. Mill (2" min.) exist. pavement and fill joints and cracks within the following limits and in advance of installation of TPCBC:
    a. Ramp E Sta. 45+33 to Sta. 55+33 (including gore area)
    b. Ramp F Sta. 48+50 to Sta. 58+50 (including gore area)
10. Reset all exist. drainage structures as needed within milling limits noted above.
11. Install 2" PMA overlay and apply wedge course to meet proposed profile and cross-slopes within milling limits noted above.
12. Complete temp. grading.
13. Remove exist. noise barrier walls, PCBC and MBR and begin installation of Noise Barrier Wall Nos. 1, 2, and 3.
14. Install concrete noise barrier support walls at Bridge No. 01746 along I-84 EB and WB.
15. Construct I-84 WB full-depth pavement along outside shoulder at the following locations:
    a. I-84 WB Sta. 81+00 LT to Bridge No. 01743B
    b. Bridge No. 01743B to I-84 WB Sta. 97+50 LT
    c. Ramp G gore to I-84 WB Sta. 102+50 LT
    d. Ramp B Sta. 18+09 LT to Bridge No. 01745
    e. Bridge No. 01745 to Ramp D Sta. 39+50 LT
    f. I-84 WB Sta. 159+00 LT to Sta. 177+00 LT
16. Construct I-84 EB full-depth pavement along outside shoulder at the following locations:
    a. Bridge No. 01744 to I-84 EB Sta. 132+00 RT
    b. Ramp C Sta. 34+50 RT to Ramp C Sta. 39+60 RT
    c. Ramp E Sta. 48+65 RT to Ramp E Sta. 55+33 RT
    d. I-84 EB Sta. 155+33 RT to Sta. 165+00 RT.
17. Install all new drainage within limits of Stage 2A construction.
18. Install all new lighting conduit, cables, conductors, handholes, light standards, etc. within limits of Stage 2A construction.
19. Remove all exist. MBR within conflict of Stage 2A construction.
20. Remove exist. overhead and temp. side-mounted signs as shown on Stage 2A MPT Plans.
21. Install new overhead/cantilever sign supports, sign faces, and foundations as shown on Stage 2A MPT Plans.
22. Modify concrete end block at Bridge No. 03490.

23. Complete all work related to Ramp G during the closure period with exception to installation of final pavement overlay.
24. Complete 2" mill and at Ramp B from Sta. 8+65 to Sta. 14+50. The final pavement overlay shall be installed at end of last stage of construction.
25. Complete final grading within Stage 2A construction limits of I-84 mainline and all ramps.
26. Install all new MBR, end anchorages and bridge attachments within Stage 2A construction limits.
27. Reconstruct Ramp A within limits of full-depth pavement reconstruction, including installation of all new drainage and MBR within limits of work area as shown on Stage 2A MPT Plans.
28. Reconstruct exist. bituminous concrete sidewalk and install new BCPC along Ramp E (right side).
29. Complete Stage 2 Construction at Bridge Nos. 01743B, 01744, and 01745.

Stage 2B

1. Remove temp. PMA wedge course installed along inside shoulder of I-84 WB in Stage 1B.
2. Shift I-84 mainline traffic to the right and open Ramp A to live traffic.
3. Permanently remove detour and re-open Ramp G by 10/3/2022.
4. Maintain surplus material disposal site.
5. Maintain IMS Relocation installed in Stages 1A/1B.
6. Install sedimentation and erosion control devices at all Stage 2B areas of disturbance.
7. Construct all remaining segments of full-depth pavement along outside shoulder of I-84 WB at the following locations:
    a. I-84 WB Sta. 102+50 LT to Ramp B gore
    b. I-84 WB Sta. 139+00 LT to Sta. 155+35 LT (Ramp D gore to Ramp F gore)
8. Construct remaining segment of full-depth pavement along outside shoulder of I-84 EB from Sta. 136+50 RT to Sta. 152+32 RT including adjacent gore/inside shoulder along Ramps C and E.
9. Remove Temp. Ramp A and complete full-depth pavement reconstruction of Ramp A gore area and adjacent outside shoulder of I-84 EB.
10. Install all new drainage within limits of Stage 2B construction.
11. Install all new lighting conduit, cables, conductors, handholes, light standards, etc. within limits of Stage 2B construction.
12. Remove exist. MBR along outside shoulder of I-84 EB between Bridge Nos. 03489 and 01743A and install new MBR and bridge attachments.
13. Modify concrete end block at Bridge No. 01743A.
14. Remove all exist. curbing, MBR, and pavement for MBR along inside shoulder of Ramps B, C, C, E, F, and H and install new MBR.
15. Install overhead sign support and foundation as shown on Stage 2B MPT Plans.
16. Install plantings and mulch along I-84 WB and adjacent to Bridge No. 01745.
17. Complete removal of exist. concrete haunches at Bridge No. 01747.

18. Complete final grading within Stage 2B construction limits of I-84 mainline and all ramps.
19. Complete 2” (min.) mill and overlay at the beginning of Ramp D and at the end of Ramp F. The final pavement overlay shall be installed at end of this stage.
20. Prior to placing the final pavement overlay, remove all temp. PMA wedge course installed at beginning of Stage 2A and reset all drainage structures and MBR as needed within the limits of the final overlay.
21. Mill (2” min.) over all bridge decks and transitions.
22. Shift I-84 mainline traffic to final condition.
23. Place the final 5/8” pavement overlay (Ultra-thin bonded PMA) and final pavement markings.
24. Install final BCPC/BCLC at all remaining locations.
25. Install all remaining overhead sign faces and remove sign covers installed in previous stages.
26. Install rumble strips throughout project limits.
27. Complete final grading at surplus material disposal site.
28. Complete site restoration at all areas of disturbance within the project limits.
29. Complete project closeout.

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 which will interfere with the described traffic operations on all project roadways as follows:

ALL ROADWAYS

On the following State observed Legal Holidays:

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

The following restrictions shall 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.

ROUTE I-84

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

During stage construction, existing traffic operations will be considered to be as shown on the Maintenance and Protection of Traffic (MPT) Plans contained in the contract plans.

During All Other Times

With the prior approval of the Engineer, the Contractor **may halt Route I-84 traffic for a period not to exceed ten (10) minutes beginning 12:01 a.m. and ending by 5:00 a.m. on all non-Holiday days** to perform necessary work for the erection and setting of structural steel and for the removal of existing bridge superstructure.

Installation and Removal of Overhead and Cantilever Sign Structures Spanning over I-84 EB - During the installation and removal of overhead and cantilever sign structures over I-84 EB, with the prior approval of the Engineer, the Contractor **may halt traffic for a period not to exceed fifteen (15) minutes beginning 12:01 a.m. and ending by 5:00 a.m. on all non-Holiday days** to perform necessary work for the installation and removal of overhead and cantilever sign structures spanning over the roadway. The Contractor's work plan, subject to approval by the Engineer, shall minimize the need for and the duration of temporary traffic stoppages. When a lane is opened to traffic after a traffic stoppage, the Contractor will not be allowed to halt traffic again until traffic is flowing similar to the pre-stoppage condition.

Installation and Removal of Overhead and Cantilever Sign Structures Spanning over I-84 WB - During the installation and removal of overhead and cantilever sign structures over I-84 WB, with the prior approval of the Engineer, the Contractor **may halt traffic for a period not to exceed fifteen (15) minutes beginning 12:01 a.m. and ending by 5:00 a.m. on all non-Holiday days** to perform necessary work for the installation and removal of overhead and cantilever sign structures spanning over the roadway. The Contractor's work plan, subject to approval by the Engineer, shall minimize the need for and the duration of temporary traffic stoppages. When a lane is opened to traffic after a traffic stoppage, the Contractor will not be allowed to halt traffic again until traffic is flowing similar to the pre-stoppage condition.

Project No. 155-171
Limitation of Operations Chart
Minimum Number of Lanes to Remain Open

Route: I-84 Eastbound From M.P. 56.34 to M.P. 57.59 Number of Through Lanes: 3							
Hour Beginning	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Mid	1	1	1	1	1	1	1
1 AM	1	1	1	1	1	1	1
2 AM	1	1	1	1	1	1	1
3 AM	1	1	1	1	1	1	1
4 AM	2	2	2	2	2	1	1
5 AM	3	3	3	3	3	1	1
6 AM	E	E	E	E	E	2	1
7 AM	E	E	E	E	E	2	2
8 AM	E	E	E	E	E	3	2
9 AM	3	3	E	E	E	3	3
10 AM	3	3	3	3	E	3	3
11 AM	3	3	3	3	E	3	3
Noon	3	3	3	E	E	3	3
1 PM	3	3	3	E	E	3	3
2 PM	3	3	E	E	E	3	3
3 PM	E	E	E	E	E	3	3
4 PM	E	E	E	E	E	3	3
5 PM	E	E	E	E	E	3	3
6 PM	2	3	3	2	3	3	2
7 PM	2	2	2	2	2	2	2
8 PM	2	2	2	2	2	2	2
9 PM	1	2	2	2	2	2	1
10 PM	1	1	2	2	2	2	1
11 PM	1	1	1	1	1	2	1

Route: I-84 Westbound From M.P. 55.99 to M.P. 57.86 Number of Through Lanes: 3							
Hour Beginning	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Mid	1	1	1	1	1	2	1
1 AM	1	1	1	1	1	1	1
2 AM	1	1	1	1	1	1	1
3 AM	1	1	1	1	1	1	1
4 AM	1	1	1	1	1	1	1
5 AM	3	3	3	3	3	1	1
6 AM	E	E	E	E	E	1	1
7 AM	E	E	E	E	E	2	2
8 AM	E	E	E	E	E	2	2
9 AM	3	3	3	3	3	3	3
10 AM	3	3	3	3	3	3	3
11 AM	3	3	3	3	E	E	3
Noon	E	3	3	E	E	E	E
1 PM	E	3	3	E	E	E	E
2 PM	E	E	E	E	E	E	E
3 PM	E	E	E	E	E	E	E
4 PM	E	E	E	E	E	E	3
5 PM	E	E	E	E	E	3	3
6 PM	3	E	E	E	E	3	3
7 PM	3	3	3	3	3	3	2
8 PM	2	2	2	3	3	2	2
9 PM	2	2	2	2	2	2	2
10 PM	1	2	2	2	2	2	1
11 PM	1	1	1	1	2	2	1

On Holidays and within Holiday Periods, all Hours shall be 'E.'

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

RAMP A (I-84 EB 40 ON-RAMP FROM ROUTE 71 (NEW BRITAIN AVENUE))

The Contractor will not be allowed to perform any work that will interfere with the existing number of lanes of traffic, including turning lanes at intersections, on:

Monday through Friday between 6:00 a.m. and 9.00 a.m. and between 3:00 p.m. and 6:00 p.m.
Saturday and Sunday between 10:00 a.m. and 9:00 p.m.

During stage construction, the existing number of lanes will be considered to be the number of lanes as shown on the Maintenance and Protection of Traffic (MPT) Plans contained in the contract plans.

The Contractor will be allowed to temporarily close the ramp during Stage 1B when existing ramp traffic is shifted to Temporary Ramp A (constructed in Stage 1A) following the I-84 EB traffic shift to the right and prior to the start of Stage 1 construction of Bridge No. 01744 (I-84 EB over Berkshire Road).

The Contractor will be allowed to continue the temporary closure of Ramp A for the duration of Stage 2A while maintaining traffic on Temporary Ramp A.

With prior approval of the Engineer, the Contractor will be allowed to halt ramp traffic for a period not to exceed fifteen (15) minutes to perform necessary work for the installation and removal of overhead and cantilever signs and sign supports, and for a period not to exceed ten (10) minutes to perform necessary work for the erection and setting of structural steel and for the removal of existing bridge superstructure, from 12:01 a.m. to 5:00 a.m. on all non-Holiday days.

RAMP B (I-84 WB 40 OFF-RAMP TO S.R. 535 (RIDGEWOOD ROAD))

The Contractor will not be allowed to perform any work that will interfere with the existing number of lanes of traffic, including turning lanes at intersections, on:

Monday through Friday between 6:00 a.m. and 9.00 a.m. and between 3:00 p.m. and 6:00 p.m.
Saturday and Sunday between 10:00 a.m. and 9:00 p.m.

During stage construction, the existing number of lanes will be considered to be the number of lanes as shown on the Maintenance and Protection of Traffic (MPT) Plans contained in the contract plans.

With prior approval of the Engineer, the Contractor will be allowed to halt ramp traffic for a period not to exceed fifteen (15) minutes to perform necessary work for the installation and removal of overhead and cantilever signs and sign supports, and for a period not to exceed ten (10) minutes to perform necessary work for the erection and setting of structural steel and for the removal of existing bridge superstructure, from 12:01 a.m. to 5:00 a.m. on all non-Holiday days.

RAMP C (I-84 EB 41 OFF-RAMP TO ROUTE 173 (SOUTH MAIN STREET))

The Contractor will not be allowed to perform any work that will interfere with the existing number of lanes of traffic, including turning lanes at intersections, on:

Monday through Friday between 6:00 a.m. and 9.00 a.m. and between 3:00 p.m. and 6:00 p.m.
Saturday and Sunday between 10:00 a.m. and 9:00 p.m.

During stage construction, the existing number of lanes will be considered to be the number of lanes as shown on the Maintenance and Protection of Traffic (MPT) Plans contained in the contract plans.

With prior approval of the Engineer, the Contractor will be allowed to halt ramp traffic for a period not to exceed fifteen (15) minutes to perform necessary work for the installation and removal of overhead and cantilever signs and sign supports from 12:01 a.m. to 5:00 a.m. on all non-Holiday days.

RAMP D (I-84 WB 41 ON-RAMP FROM ROUTE 173 (SOUTH MAIN STREET))

The Contractor will not be allowed to perform any work that will interfere with the existing number of lanes of traffic, including turning lanes at intersections, on:

Monday through Friday between 6:00 a.m. and 9.00 a.m. and between 3:00 p.m. and 6:00 p.m.
Saturday and Sunday between 10:00 a.m. and 9:00 p.m.

During stage construction, the existing number of lanes will be considered to be the number of lanes as shown on the Maintenance and Protection of Traffic (MPT) Plans contained in the contract plans.

With prior approval of the Engineer, the Contractor will be allowed to halt ramp traffic for a period not to exceed fifteen (15) minutes to perform necessary work for the installation and removal of overhead and cantilever signs and sign supports from 12:01 a.m. to 5:00 a.m. on all non-Holiday days.

RAMP E (I-84 EB 4I ON-RAMP FROM ROUTE 173 (SOUTH MAIN STREET))

The Contractor will not be allowed to perform any work that will interfere with the existing number of lanes of traffic, including turning lanes at intersections, on:

Monday through Friday between 6:00 a.m. and 9.00 a.m. and between 3:00 p.m. and 6:00 p.m.
Saturday and Sunday between 10:00 a.m. and 9:00 p.m.

During stage construction, the existing number of lanes will be considered to be the number of lanes as shown on the Maintenance and Protection of Traffic (MPT) Plans contained in the contract plans.

With prior approval of the Engineer, the Contractor will be allowed to halt ramp traffic for a period not to exceed fifteen (15) minutes to perform necessary work for the installation and removal of overhead and cantilever signs and sign supports from 12:01 a.m. to 5:00 a.m. on all non-Holiday days.

RAMP F (I-84 WB 4I OFF-RAMP TO ROUTE 173 (SOUTH MAIN STREET))

The Contractor will not be allowed to perform any work that will interfere with the existing number of lanes of traffic, including turning lanes at intersections, on:

Monday through Friday between 6:00 a.m. and 9.00 a.m. and between 3:00 p.m. and 6:00 p.m.
Saturday and Sunday between 10:00 a.m. and 9:00 p.m.

During stage construction, the existing number of lanes will be considered to be the number of lanes as shown on the Maintenance and Protection of Traffic (MPT) Plans contained in the contract plans.

With prior approval of the Engineer, the Contractor will be allowed to halt ramp traffic for a period not to exceed fifteen (15) minutes to perform necessary work for the installation and removal of overhead and cantilever signs and sign supports from 12:01 a.m. to 5:00 a.m. on all non-Holiday days.

RAMP G (I-84 WB 40 ON-RAMP FROM S.R. 535 (RIDGEWOOD ROAD))

The Contractor will not be allowed to perform any work that will interfere with the existing number of lanes of traffic, including turning lanes at intersections, on:

Monday through Friday between 6:00 a.m. and 9.00 a.m. and between 3:00 p.m. and 6:00 p.m.
Saturday and Sunday between 10:00 a.m. and 9:00 p.m.

During stage construction, the existing number of lanes will be considered to be the number of lanes as shown on the Maintenance and Protection of Traffic (MPT) Plans contained in the contract plans.

The Contractor **will be allowed to temporarily close the ramp for the entire duration of Stage 1A** to complete Stage 1 construction of Bridge No. 01743B (I-84 WB over Ridgewood Road) and after the ramp detour is in place and operational. The Contractor **will be required to re-open the ramp no later than October 5, 2020** and maintain ramp traffic for the duration of Stage 1B as shown on the MPT Plans.

The Contractor **will be allowed to temporarily close the ramp for the entire duration of Stage 2A** to complete Stage 2 construction of Bridge No. 01743B (I-84 WB over Ridgewood Road) and after the ramp detour is in place and operational. The Contractor **will be required to re-open the ramp no later than October 3, 2022** and maintain ramp traffic for the remaining duration of stage construction as shown on the MPT Plans.

With prior approval of the Engineer, the Contractor will be allowed to halt ramp traffic for a period not to exceed fifteen (15) minutes to perform necessary work for the installation and removal of overhead and cantilever signs and sign supports, and for a period not to exceed ten (10) minutes to perform necessary work for the erection and setting of structural steel and for the removal of existing bridge superstructure, from 12:01 a.m. to 5:00 a.m. on all non-Holiday days.

RAMP H (I-84 EB 40 OFF-RAMP TO ROUTE 71 (NEW BRITAIN AVENUE))

The Contractor will not be allowed to perform any work that will interfere with the existing number of lanes of traffic, including turning lanes at intersections, on:

Monday through Friday between 6:00 a.m. and 9.00 a.m. and between 3:00 p.m. and 6:00 p.m.
Saturday and Sunday between 10:00 a.m. and 9:00 p.m.

During stage construction, the existing number of lanes will be considered to be the number of lanes as shown on the Maintenance and Protection of Traffic (MPT) Plans contained in the contract plans.

The Contractor will be allowed to halt ramp traffic for a period not to exceed ten (10) minutes to perform necessary work, as approved by the Engineer from 12:01 a.m. to 5:00 a.m. on all non-Holiday days.

RAMP I (I-84 WB 42 OFF-RAMP TO TROUT BROOK DRIVE)

The Contractor will not be allowed to perform any work that will interfere with the existing number of lanes of traffic, including turning lanes at intersections, on:

Monday through Friday between 6:00 a.m. and 9.00 a.m. and between 3:00 p.m. and 6:00 p.m.
Saturday and Sunday between 10:00 a.m. and 9:00 p.m.

During stage construction, the existing number of lanes will be considered to be the number of lanes as shown on the Maintenance and Protection of Traffic (MPT) Plans contained in the contract plans.

With prior approval of the Engineer, the Contractor will be allowed to halt ramp traffic for a period not to exceed fifteen (15) minutes to perform necessary work to complete the IMS relocation, as approved by the Engineer from 12:01 a.m. to 5:00 a.m. on all non-Holiday days.

RAMP J (I-84 WB 39A OFF-RAMP TO ROUTE 9 SB

The Contractor will not be allowed to perform any work that will interfere with the existing number of lanes of traffic, including turning lanes at intersections, on:

Monday through Friday between 6:00 a.m. and 9.00 a.m. and between 3:00 p.m. and 6:00 p.m.
Saturday and Sunday between 10:00 a.m. and 9:00 p.m.

During stage construction, the existing number of lanes will be considered to be the number of lanes as shown on the Maintenance and Protection of Traffic (MPT) Plans contained in the contract plans.

With prior approval of the Engineer, the Contractor will be allowed to halt ramp traffic for a period not to exceed fifteen (15) minutes to perform necessary work for the installation and removal of overhead and cantilever signs and sign supports from 12:01 a.m. to 5:00 a.m. on all non-Holiday days.

ALL OTHER RAMPS AND TURNING ROADWAYS

The Contractor will not be allowed to perform any work that will interfere with the existing number of lanes of traffic, including turning lanes at intersections, on:

Monday through Friday between 6:00 a.m. and 9.00 a.m. and between 3:00 p.m. and 6:00 p.m.
Saturday and Sunday between 10:00 a.m. and 9:00 p.m.

During stage construction, the existing number of lanes will be considered to be the number of lanes as shown on the Maintenance and Protection of Traffic (MPT) Plans contained in the contract plans.

The Contractor will be allowed to halt ramp traffic for a period not to exceed ten (10) minutes to perform necessary work, as approved by the Engineer from 12:01 a.m. to 5:00 a.m. on all non-Holiday days.

ROUTE 71 (NEW BRITAIN AVENUE)

The Contractor will not be allowed to perform any work that will interfere with the existing number of lanes of traffic, including turning lanes at intersections, on:

Monday through Friday between 6:00 a.m. and 9.00 a.m. and between 3:00 p.m. and 6:00 p.m.
Saturday and Sunday between 10:00 a.m. and 9:00 p.m.

During Stages 1A and 2A, the existing number of lanes will be considered to be the number of lanes shown on the Maintenance and Protection of Traffic (MPT) Plans contained in the contract plans.

Access and egress to all adjacent properties shall be maintained at all times.

A dedicated sidewalk shall be maintained and protected to allow for safe passage of pedestrians during all construction phases.

With prior approval of the Engineer, the Contractor will be allowed to halt traffic for a period not to exceed ten (10) minutes to perform necessary work for the erection and setting of structural steel and for the removal of existing bridge superstructure from 12:01 a.m. to 5:00 a.m. on all non-Holiday days.

S.R. 535 (RIDGEWOOD ROAD)

The Contractor will not be allowed to perform any work that will interfere with the existing number of lanes of traffic, including turning lanes at intersections, on:

Monday through Friday between 6:00 a.m. and 9.00 a.m. and 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 not be allowed to perform any work that will interfere with one lane of traffic in each direction and two right turn lanes in the southbound direction on:

Monday through Friday between 6:00 a.m. and 9.00 a.m. and between 3:00 p.m. and 6:00 p.m.
Saturday and Sunday between 10:00 a.m. and 9:00 p.m.

During Stages 1A and 2A, the existing number of lanes will be considered to be the number of lanes shown on the Maintenance and Protection of Traffic (MPT) Plans contained in the contract plans.

Access and egress to all adjacent properties shall be maintained at all times.

With prior approval of the Engineer, the Contractor will be allowed to halt traffic for a period not to exceed ten (10) minutes to perform necessary work for the erection and setting of structural steel and for the removal of existing bridge superstructure from 12:01 a.m. to 5:00 a.m. on all non-Holiday days.

BERKSHIRE ROAD

The Contractor will not be allowed to perform any work that will interfere with the existing number of lanes of traffic, including turning lanes at intersections, on:

Monday through Friday between 6:00 a.m. and 9.00 a.m. and 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 not be allowed to perform any work that will interfere with one lane of traffic in each direction on:

Monday through Friday between 6:00 a.m. and 9.00 a.m. and between 3:00 p.m. and 6:00 p.m.
Saturday and Sunday between 10:00 a.m. and 9:00 p.m.

During Stages 1B and 2A, the existing number of lanes will be considered to be the number of lanes shown on the Maintenance and Protection of Traffic (MPT) Plans contained in the contract plans.

Access and egress to all adjacent properties shall be maintained at all times.

A dedicated sidewalk shall be maintained and protected along the east side of roadway to allow for safe passage of pedestrians during all construction phases.

With prior approval of the Engineer, the Contractor will be allowed to halt traffic for a period not to exceed ten (10) minutes to perform necessary work for the erection and setting of structural steel and for the removal of existing bridge superstructure from 12:01 a.m. to 5:00 a.m. on all non-Holiday days.

ALL OTHER ROADWAYS

The Contractor will not be allowed to perform any work that will interfere with the existing number of lanes of traffic, including turning lanes at intersections, on:

Monday through Friday between 6:00 a.m. and 9.00 a.m. and between 3:00 p.m. and 6:00 p.m.
Saturday and Sunday between 10:00 a.m. and 9:00 p.m.

Access and egress to all adjacent properties shall be maintained at all times.

A dedicated sidewalk shall be maintained and protected to allow for the safe passage of pedestrians during all construction phases.

INCIDENT MANAGEMENT SYSTEM

The Contractor will not be allowed to perform any work that will disrupt the normal operation of the Incident Management System (IMS) as follows:

On the following State observed Legal Holidays:

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

On the Saturday, Sunday, and Monday following Thanksgiving Day.

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

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

In order to maintain continuous operation of the Incident Management System, the Contractor shall adhere to the requirements in the special provision "Notice to Contractor – Installation Qualifications".

The Contractor shall perform all work related to the relocation of the existing IMS system between Stages 1A and 1B. This work shall be completed prior to the start of Stage 2A construction.

ADDITIONAL LANE CLOSURE RESTRICTIONS

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

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

The Contractor will not be permitted to close a lane if a Contractor working on an adjacent project has the opposite lane closed unless there is at least a one-mile clear area length where the entire roadway is open to traffic, measured from the end of the first work area to the beginning of the signing pattern for the next work area.

The Contractor will not be allowed to conduct any roadway or ramp closures and implement associated detours until all of the following conditions are satisfied:

1. The Contractor shall confirm closures and associated detours with the Engineer a minimum of 30 days in advance of the closure.
2. The Contractor has all the required materials, equipment, tools and labor needed on the site for the construction that requires closure.
3. The Contractor has coordinated the closures with the Engineer and the Town of West Hartford, including the Town's Emergency services, at least 14 days in advance of the closure.
4. Road closures and associated detours are approved by the Town of West Hartford. The Contractor should not anticipate being able to close roads and implement detours in more than one location simultaneously without prior approval from the Engineer and the Town of West Hartford.
5. All necessary detour signing has been installed and approved by the Engineer.

SPECIAL CONDITIONS

The Contractor is advised the Stage 1A construction of Temporary Ramp A will require a significant amount of suitable embankment fill in order to form the subgrade. This fill material is intended to become available as surplus material is generated from the Bridge No. 01743B structure excavation and earth excavation from roadway work. Therefore, construction of Temporary Ramp A shall not begin until a sufficient amount of surplus material has been generated from on-site construction unless otherwise directed by the Engineer.

PAVEMENT RECONSTRUCTION

The Contractor shall schedule the operations so that pavement milling shall be full width across the roadway/bridge section by the end of the workday (worknight).

Where milling of pavement is called for on the plans, mill the entire roadway, curb to curb, to the depth as required to achieve the final grade. Proceed from the inside to the outside lanes so that no traffic is allowed to travel at any time on the milled surface of the right shoulder.

The Contractor shall schedule the operations so that PMA pavement placement shall be full width across the bridge by the end of a workday (worknight).

Traffic is not to be allowed on less than 6 inches of PMA S1.0 for short durations not to exceed one month. For durations longer than one month or lasting throughout the Winter Shutdown period (as defined elsewhere in the Contract Documents), the Contractor shall place a lift of PMA S0.5

prior to opening any roadway to traffic. Traffic will not be allowed on the PMA S1.0 pavement surface through the winter months.

Longitudinal dropdowns greater than 3" will not be allowed during those periods when the maximum number of lanes of through traffic are required. The Contractor shall temporarily provide a 4:1 traversable slope of suitable material in those areas where a longitudinal dropdown exists. The cost of furnishing, installing, and removing this material shall be included in the contract lump sum for "Maintenance and Protection of Traffic."

All transverse height differentials on all roadway surfaces shall be tapered to negate any "bump" to traffic as specified elsewhere in the contract or as approved by the Engineer. Material for this taper shall be approved by the Engineer.

The Contractor shall perform the milling of the existing pavement, and the installation of the new PMA pavement in accordance with the Special Provisions as contained elsewhere in the Contract Documents.

It is recommended that the Contractor utilize the various lane closures that will be required for the above work to perform other incidental work where possible.

OTHER LIMITATIONS

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

The Contractor will not be permitted to laterally cross any expressway with construction vehicles. Construction vehicles shall merge with the mainline traffic flow and utilize existing interchanges.

The Contractor shall schedule operations so that any expressway lane closure required for expansion joint work will be limited to the area that can be started and fully completed during the allowable period.

The Contractor shall schedule operations so that bridge pavement removal and bridge roadway resurfacing shall be completed full width across a roadway(bridge) section by the end of a workday (worknight).

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

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

OVERHEAD SIGN WORK

During the course of any active construction work on overhead and cantilever signs along I-84 or its ramps, the Contractor shall close the lane(s) directly below the work area for the entire time that the overhead work is being undertaken. At no time shall an overhead sign be left partially removed or partially installed. If applicable, when a sign is removed, it shall be either relocated or replaced by a new sign during the same workday (worknight).

TRAFFIC SIGNALS

Traffic signals disturbed by the Contractor's operations shall be restored and made operational the same workday (worknight). Loop detectors disturbed by the Contractor's operations shall be made operational or temporary detection must be provided within 24 hours of the termination/disruption of the existing loop detectors.

ILLUMINATION REQUIREMENTS

The Contractor shall maintain a lighting system(s) at all times through the use of existing lights, temporary lights, new lighting systems, or a combination of thereof. Lighting systems disturbed by the Contractor's operations shall be made operational or temporary illumination must be provided within 24 hours of the termination/disruption of the lighting system.

NOISE BARRIER REQUIREMENTS

The Contractor shall schedule operations in order to maintain the functionality of the existing noise barrier walls. In those areas where the noise barrier walls are called to be removed and new noise barrier wall installed the Contractor's operations shall minimize, to the fullest extent possible, the time period where no noise barrier walls are in place.

LOCAL ROAD WORK

All construction on local roads affecting existing traffic operations shall be coordinated with the Engineer and the Town of West Hartford including the following persons:

Duane Martin, Town Engineer
John Phillips, Director Department of Public Works
Greg Priest, Chief of Fire Department
Mike Sinsigalli, Assistant Fire Chief
Vernon Riddick, Chief of Police

Additionally, the Contractor shall notify the Town of West Hartford at least 14 days in advance of any local road closures. The Contractor may not close any local roadways that may be described herein without prior Town of West Hartford approval.

SECTION 1.08 - PROSECUTION AND PROGRESS

Article 1.08.07 - Determination of Contract Time:

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

When the contract time is on a calendar day basis, it shall be the number of consecutive calendar days stated in the contract, INCLUDING the time period from December 1, 2019 through March 31, 2020. The contract time will begin on the effective date of the Engineer's order to commence work, and it will be computed on a consecutive day basis, including all Saturdays, Sundays, Holidays, and non-work days. After March 31, 2020, the contract time shall be on a calendar day basis, including all Saturdays, Sundays, Holidays, and non-work days which shall be the number of consecutive calendar days stated in the contract, EXCLUDING the time period from December 1, through March 31.

SECTION 1.10 - ENVIRONMENTAL COMPLIANCE

In Article 1.10.03--Water Pollution Control:
BEST MANAGEMENT PRACTICES

Add the following after Required Best Management Practices Number 13:

14. The Contractor is hereby notified that the location of the Project occurs within a public watershed, well head protection area, aquifer protection area (APA), or sole source aquifer (SSA). The Contractor is hereby notified that the location of CTDOT Project 155-171 occurs within one of these sensitive areas. The protected areas encompass the area of contribution and recharge for the protected resource, as depicted on the graphical map. Please note that the Office of Environmental Planning will provide the graphical map to the District after the Project has been awarded as this information is considered proprietary. As a result of this location, special requirements must be followed for cleaning machinery, storage of materials, and servicing/fueling equipment.

    a. All Contractors and their employees must be informed of the sensitive area that they are working in. No pollutants may be discharged that could have adverse effects on the public drinking water supply. Any fuel or other hazardous chemical spills must be reported immediately to the DEEP Oil and Chemical Spills Unit at (860) 424-3338, the Department of Public Health's Drinking Water Division at 860-509-7333, and Director of Public Works, Newtown Water Department at 1-877-908-3426, **no exceptions**.

        When working within the Pootatuck SSA in *Newtown* or within the Pawcatuck *SSA in North Stonington which also encompasses areas in Sterling, Stonington* and *Voluntown*, Mr. Jeff Butensky from the Environmental Protection Agency (EPA) must be contacted at (617) 918-1665. Mr. Robert Adler from the EPA must also be contacted at (617) 918-1396, if a Project is near the Rhode Island state border.

    b. Contractors must adhere to specialized cleanup procedures while working within the watershed, well head protection area, APA or SSA. No cleaning of any machinery shall be performed within one hundred (100) feet of any water body within the sensitive area.

        i. Specifically, for cleanup associated with pavers, material transfer vehicles (MTV) and concrete mixers, the Contractor must move the equipment off line onto a tarp. The tarp must be in an acceptable condition so as to prevent liquids and solids from passing through to the ground beneath, when the area is used for paving operations. The cleanup area shall have oil absorbent pads placed on the tarp. The equipment shall be cleaned over

the absorbent pads in a manner that will allow the pads to collect any liquids that are used for cleanup.

ii. Specifically, for cleanup associated with dump trucks, a liquid tight five-gallon pail shall be placed at each corner of the dump body below the lower hinges to capture any materials generated during the cleanup.

c. All materials generated during the cleanup procedures shall be removed off-site at the end of each day and disposed of in a manner consistent with all applicable laws and regulations. These materials shall not be buried outside of the roadway limits.

d. Servicing and fueling of equipment shall be conducted outside of a public watershed area, APA, SSA, and/or well head protection area.

i. If equipment cannot be serviced and refueled outside of the watershed area, well head protection area, APA, or SSA then the Contractor shall utilize the proper spoils handling areas that are identified on the plans.

ii. Servicing and fueling of equipment is not permitted within a 500-foot radius of a non-community well and within a 1000-foot radius of a community well.

iii. Any fuel and/or hazardous materials that must be kept within these sensitive areas during working hours shall be stored in an enclosed spill proof container.

iv. Spill containment systems must be utilized during fueling operations, and shall be manufactured by Sentry Lite Berms, Collapse-a-tainer, or approved equal. It shall have a minimum capacity of 80-gallons and shall be made of plastic or vinyl which is inert to all fuel types.

v. Fuel spill remediation kits shall be stored on-site so that spills may be contained and cleaned quickly.

e. Construction staging and laydown areas are prohibited within a watershed area, APA, SSA, and/or well head protection area. The Contractor shall submit to the Engineer the desired location of trailer(s), construction staging/laydown areas, containment systems, and sedimentation control systems for review and approval prior to the start of construction.

f. Millings may be re-used as asphalt material. Disposal of excess millings must be performed off-site in a manner consistent with all applicable laws and regulations. At no time can millings be dumped or buried outside of the roadway limits.

SECTION 2.01 - CLEARING AND GRUBBING

Replace Section 2.01 in its entirety with the following:

2.01.01—Description: This work shall consist of clearing the ground of trees, stumps, brush, rubbish and all objectionable material in accordance with these specifications or as directed by the Engineer. This work shall also include the clearing of the ground necessary for the construction and installation of drainage, structures, ditches, channels, fences and other appurtenances. Included in this work shall be the preservation from injury or defacement of vegetation and objects designated to remain.

2.01.03—Construction Methods: The Contractor shall mark all trees, shrubs and plants to be removed in accordance with the plans and these specifications. The Engineer shall have 7 days to field review the markings and make any adjustments prior to the start of the clearing operation. Within the excavation lines all trees shall be cut off and stumps removed to a depth of not less than 12 inches below the graded surface.

Within the fill lines where an embankment is to be made not more than 5 feet deep, trees, stumps, roots, etc., shall be removed. Where the embankments to be made exceed 5 feet deep, trees, stumps, roots, etc., shall be cut off to within 6 inches of the ground surface.

In areas where clearing is necessary for the construction and installation of various appurtenances, all trees and stumps shall be cut flush with the ground; and all dead or uprooted trees, brush, roots or otherwise objectionable material shall be removed as directed unless otherwise indicated on the plans.

Prior to clearing operations, a meeting must be held. Those attending the meeting should include the Contractor, the Engineer, the designer, local tree warden or equivalent, and the District Environmental Coordinator. All clearing issues shall be resolved to the satisfaction of the Engineer before any trees are cut.

All trees scheduled to be removed outside of the proposed gutter or curb lines shall be visibly marked or flagged by the Contractor at least 7 days prior to cutting of such trees.

The Engineer will inspect the identified trees within 7 days of the marking of the trees and verify the limits of clearing and grubbing prior to the Contractor proceeding with his cutting operation.

All branches of trees extending within the roadway shall be trimmed as directed to provide a 16 foot minimum vertical clearance including selective trimming of such trees as directed.

The Contractor shall dispose of all such trees, stumps, brush, etc., in a satisfactory manner and shall remove all rubbish and refuse from within the highway limits.

All excavations made below subgrade surface by the removal of trees, stumps, etc., shall be filled with suitable material, which shall be compacted thoroughly in accordance with the provisions governing formation of embankments.

All fences, stonewall fences and ornamental and utilitarian domestic accessories, such as, but not limited to garden pools, arbors, stair railings, fireplaces, sheds and incinerators, within the highway limits shall be removed as directed. However, the removal of materials in stonewalls, that are to be removed and not used in a new stonewall fences, will be paid for according to the provisions of Section 2.02.

All road signs, mail boxes, etc., shall be removed and reset as directed.

2.01.04—Method of Measurement: When no price for "Clearing and Grubbing" is asked for on the proposal form, the cost of the work as described above shall be included in the cost of the grading items and no direct payment for "Clearing and Grubbing" will be made.

When a price is asked for on the proposal form on a lump sum basis, this shall include all the work as described above, which may be necessary to properly complete the Project, unless the item is included under another Project pay item.

Should the Project be increased in length or the scope of work increased due to construction changes beyond the requirements hereinabove, any additional work required will be paid for as extra work. Should the Project be decreased in length, a suitable credit, mutually agreed upon and based on the reduction in actual work or scope, will be taken by the State.

The work, material, tools, equipment and labor incidental to the disposal of trees, stumps, etc., will not be measured for payment.

2.01.05—Basis of Payment: Prior to beginning work, the Contractor shall submit a proposed schedule of values for review and concurrence by the Engineer. If the bid price for this item exceeds 4% of the original Contract value, the amount in excess of 4% of the original Contract value will not be paid until 90% of all work in the Contract is complete.

Payment for this work will be at the Contract lump sum for "Clearing and Grubbing," except as noted above, and shall include all equipment, tools and labor incidental to the completion of this item.

All costs incidental to the disposal of trees, stumps, etc., shall be included in the price of "Clearing and Grubbing."

Pay Item	Pay Unit
Clearing and Grubbing	l.s.

SECTION 2.86 - DRAINAGE TRENCH EXCAVATION, ROCK IN DRAINAGE TRENCH EXCAVATION

2.86.01—Description: Drainage trench excavation consists of the excavation necessary for the proper installation of drainage structures, pipes, pipe ends and any other incidental drainage items.

It shall include earth and rock excavation, removal of existing pipes, dewatering, backfill, and disposal of materials; to the trench limits described herein, to the dimensions shown on the plans, or as directed by the Engineer.

Classifications:

(1) Drainage Trench Excavation will include only the excavation necessary for the construction of the drainage items and the removals specified above.

(2) Rock in Drainage Trench Excavation, insofar as it applies to drainage trench excavation, shall be defined as **1/2 cubic yard or more** in volume of the following obstructions removed from the limits of the drainage trench:

(a) rock in definite ledge formation
(b) boulders, or portions of boulders
(c) cement masonry structures
(d) concrete or reinforced concrete structures
(e) reinforced concrete pipe
(f) subsurface concrete pavement or concrete base

The removal shall be as indicated or directed from within the limits defined in 2.86.03 for drainage trench excavation.

2.86.03—Construction Methods:

(1) Drainage Trench Excavation Limits:

Horizontal Limits: Trench widths for pipes, pipe ends, pipe-arches, and drainage structures shall be as follows:

(a) 2 feet greater than the nominal inside diameter of circular pipe or nominal inside span of elliptical pipe or pipe-arch for such diameters or spans of less than 30 inches
(b) 3 feet greater than the nominal inside diameter of circular pipe or the nominal inside span of elliptical pipe or pipe-arch for such diameters or spans that are 30 inches or greater
(c) 4 feet greater than the nominal inside diameter or nominal horizontal inside span for pipe-arches fabricated from structural plates
(d) 2 feet beyond the neat lines of all exterior or foundation walls of drainage structures

Vertical Limits: Trench depths shall extend vertically as follows:

(a) From the bottom of the trench to the bottom of the roadway excavation, or in areas away from roadway excavation, to the top of existing ground surface.

(b) Where drainage pipe is to be laid in a fill area, the embankment shall be placed and compacted to a minimum elevation 12 inches above the top of the proposed pipe, whereupon the drainage trench excavation shall be performed and the pipe installed.

(2) Drainage Trench Excavation: Drainage trench excavation shall be made in conformity with the requirements of the plans, or as directed by the Engineer. The Contractor shall furnish and employ such shores, braces, pumps, or ancillary equipment as needed for the proper protection of property, proper completion of the work, as well as safety of the public and employees of both the Contractor and the Department. All bracing and shoring shall be removed when no longer required for the construction or safety of the work. When required, the Contractor shall provide or have on the Site at all times any OSHA certification for equipment to be used, per 1.07.07. For support of trenches greater than 10 feet in depth, working drawings shall be submitted, in accordance with 1.05.02. The Contractor shall control erosion and sedimentation at trench locations and ensure that pumped water from the drainage excavation is discharged in accordance with the requirements of 1.10.

Where a firm foundation is not encountered at the grades established due to unsuitable material, such as soft, spongy, or unstable soil, the unsuitable material shall be removed and replaced with approved backfill, thoroughly compacted in lifts not to exceed 6 inches, for the full trench width. The Engineer shall be notified prior to removal of the unsuitable material in order to determine the depth of removal necessary.

After the excavation is complete, the Contractor shall notify the Engineer and no drainage structure or material shall be placed in the excavated area until the Engineer has approved the depth of excavation and the character of the foundation material.

(3) Rock in Drainage Trench Excavation:

(a) Rock in Drainage Trench Excavation - Ledge: When rock in definite ledge form is encountered, the Contractor shall excavate a minimum of 12 inches below the bottom of the proposed pipe or drainage structure; and this depth shall be filled with bedding material (as specified in M.08.03-1) below the proposed pipe; or granular fill (as specified in M.02.01) below the proposed drainage structure, which shall be thoroughly compacted in lifts not to exceed 6 inches.

(b) Rock in Drainage Trench Excavation - Boulders: When boulders are encountered, the Contractor shall remove them from the trench and if backfill is required, the void shall be filled with bedding material, surplus excavated material (as specified in 2.02.03-8) or granular fill which shall be thoroughly compacted in lifts not to exceed 6 inches.

(c) Rock in Drainage Trench Excavation –Structures: When cement masonry, concrete or reinforced concrete structures are encountered within the drainage trench limits, the Contractor shall remove the structure in its entirety or as directed by the Engineer, and if backfill is required, the void shall be filled with bedding material, surplus excavated material or granular fill which shall be thoroughly compacted in lifts not to exceed 6 inches.

(4) Backfill: Suitable material excavated from the drainage trench shall be used as backfill material prior to consideration of using any other source of backfill. Backfill 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. Rock fill or stones larger than 5 inches shall not be placed within 1 foot of the drainage structure or pipe. The grading shall be

completed to the lines shown on the plans, or as ordered, by refilling to the required elevation with approved material, placed in layers not to exceed 6 inches in depth after compaction, which shall be thoroughly compacted with equipment approved by the Engineer.

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 surplus excavation in accordance with 2.02.03-8 or from borrow pits, gravel pits, or elsewhere as directed by the Engineer.

2.86.04—Method of Measurement:

Drainage Trench Excavation: Drainage trench excavation will not be measured for payment.

If granular fill or borrow is required to replace unsuitable material it will be measured for payment as directed by the Engineer.

Rock in Drainage Trench Excavation: If any material meeting the definition of Rock in Drainage Trench Excavation is encountered, the Contractor shall strip it of sufficient overlying material to allow for proper measurement and shall then notify the Engineer that the rock surface is ready for measurement. If the Contractor fails to give such notice, the Engineer will presume that the measurements taken at the time the Engineer first saw the material in question will give the true quantity of excavation.

Rock in Drainage Trench Excavation will be measured according to the classification provided in 2.86.01 and within the drainage trench excavation limits provided in 2.86.03.

For the removal of underground obstructions, as classified in 2.86.01-2, the measurement shall be the actual volume of rock removed (1/2 cubic yard or more) as approved by the Engineer.

Rock in Drainage Trench Excavation will not be measured for payment in fills.

Bedding Material or other suitable fill, as specified in 2.86.03(3), used to fill voids after rock is excavated will not be measured for payment.

2.86.05—Basis of Payment:

Drainage Trench Excavation: There will be no direct payment for drainage trench excavation required for the installation of drainage pipes, pipe ends, catch basins, drop inlets, manholes, and other drainage structures, or any other incidental drainage work including materials, tools, equipment and labor necessary to complete the drainage trench excavation in conformity with the plans or as directed by the Engineer.

There will be no direct payment for backfill or disposal of surplus material necessary for the satisfactory completion of this work.

There will be no direct payment made for shoring, bracing, dewatering, or for material or equipment necessary for the satisfactory completion of the work.

Where called for on the plans to install temporary earth retaining systems for the support of existing facilities, pavement, utilities, or for other constraints, payment will be made in accordance with such items in the Contract.

If granular fill or borrow is used to replace unsuitable material, payment will be made at the respective Contract unit prices, or in the absence of such items in the Contract, as Extra Work in accordance with 1.04.05.

Rock in Drainage Trench Excavation: When rock, conforming to the description in 2.86.01 is encountered within the limits of drainage trench excavation, its removal will be classified and

paid for at the Contract unit price per cubic yard for "Rock in Drainage Trench Excavation 0' – 10' Deep," or "Rock in Drainage Trench Excavation 0' – 20' Deep," as the case may be.

Those portions of drainage trench excavation classified and paid for as "Rock in Drainage Trench Excavation" of the various depths will be the actual volumes of rock excavated within the limits for drainage trench excavation, at the applicable bottom depth price.

Where no item or items for "Rock in Drainage Trench Excavation" at the applicable depth appear in the proposal and rock is encountered in drainage trench excavation, its removal will be paid for as Extra Work in accordance with 1.04.05.

When excavation is necessary in fill, no such excavation will be paid for as "Rock in Drainage Trench Excavation."

When excavation is necessary for any purpose other than drainage-related items, no such excavation will be paid under this item.

Bedding material or any other suitable material used to fill voids vacated by excavated rock will not be paid for but shall be included in the unit price per cubic yard for "Rock in Drainage Trench Excavation."

Pay Item	Pay Unit
Rock in Drainage Trench Excavation 0' - 10' Deep	c.y.
Rock in Drainage Trench Excavation 0' - 20' Deep	c.y.

SECTION 4.06 - BITUMINOUS CONCRETE

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

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

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

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

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

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

Density Lot: The total tonnage of all bituminous concrete placed in a single lift which are:

PWL density lots = When the project total estimated quantity per mixture is larger than 3,500 tons

Simple Average density lots = When the project total estimated quantity per mixture is 3,500 tons or less

Disintegration: Erosion or fragmentation of the pavement surface which can be described as

polishing, weathering-oxidizing, scaling, spalling, raveling, or formation of potholes.
Dispute Resolution: A procedure used to resolve conflicts between the Engineer and the Contractor's results that may affect payment.
Hot Mix Asphalt (HMA): A bituminous concrete mixture typically produced at 325°F.
Job Mix Formula (JMF): A recommended aggregate gradation and asphalt binder content to achieve the required mixture properties.
Lift: An application of a bituminous concrete mixture placed and compacted to a specified thickness in a single paver pass.
Percent Within Limits (PWL): The percentage of the lot falling between the Upper Specification Limit (USL) and the Lower Specification Limit (LSL).
Polymer Modified Asphalt (PMA): A bituminous concrete mixture containing a polymer-modified asphalt binder and using a qualified warm mix technology.
Production Lot: The total tonnage of a bituminous concrete mixture from a single source that may receive an adjustment.
Production Sub Lot: Portion of the production lot typically represented by a single sample.
Quality Assurance (QA): All those planned and systematic actions necessary to provide CTDOT the confidence that a Contractor will perform the work as specified in the Contract.
Quality Control (QC): The sum total of activities performed by the vendor (Producer, Manufacturer, and Contractor) to ensure that a product meets contract specification requirements.
Superpave: A bituminous concrete mix design used in mixtures designated as "S*" Where "S" indicates Superpave and * indicates the sieve related to the nominal maximum aggregate size of the mix.
Segregation: A non-uniform distribution of a bituminous concrete mixture in terms of gradation, temperature, or volumetric properties.
Warm Mix Asphalt (WMA) Technology: A qualified additive or technology that may be used to produce a bituminous concrete at reduced temperatures and/or increase workability of the mixture.

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

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

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

4.06.03—Construction Methods

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

a. State of Connecticut printed on ticket.
b. Name of Producer, identification of Plant, and specific storage silo if used.
c. Date and time.
d. Mixture Designation, mix type and level. Curb mixtures for machine-placed curbing must state "curb mix only."

e. If WMA Technology is used, "-W"must be listed following the mixture designation.
f. Net weight of mixture loaded into the vehicle. (When RAP and/or RAS is used, the moisture content shall be excluded from mixture net weight.)
g. Gross weight (equal to the net weight plus the tare weight or the loaded scale weight).
h. Tare weight of vehicle (daily scale weight of the empty vehicle).
i. Project number, purchase order number, name of Contractor (if Contractor other than Producer).
j. Vehicle number - unique means of identification of vehicle.
k. For Batch Plants: individual aggregate, recycled materials, and virgin asphalt max/target/min weights when silos are not used.
l. For every mixture designation: the running daily and project total delivered and sequential load number.

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

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

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

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

Vehicles with loads of bituminous concrete being delivered to State projects must not exceed the statutory or permitted load limits referred to as gross vehicle weight (GVW). The Contractor shall furnish a list and allowable weights of all vehicles transporting mixture. The State reserves the right to check the gross and tare weight of any vehicle. If the gross or tare weight varies from that shown on the delivery ticket by more than 0.4%, the Engineer will recalculate the net weight. The Contractor shall correct the discrepancy to the satisfaction of the Engineer.

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

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

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

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

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

Pavers: Each paver shall have a receiving hopper with 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 (minimum length 20 feet).

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

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

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

TABLE 4.06-1: Minimum Paver lighting

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

TABLE 4.06-2: Minimum Roller Lighting

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

*All fixtures shall be mounted above the roller.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

All temporary transitions shall meet the following length requirements:

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

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

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

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

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

Tack Coat Application: The tack coat shall be applied by a pressurized spray system that results in uniform overlapping coverage at an application rate of 0.03 to 0.05 gal./s.y. for a non-milled surface and an application rate of 0.05 to 0.07 gal./s.y. 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 gal /s.y. The Engineer must approve the equipment and the method of measurement prior to use. The material for tack coat shall be heated to 160°F ± 10°F and shall not be further diluted.

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

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

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

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

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

The mixture temperature will be verified by means of a probe or infrared type of thermometer. The placement temperature range shall be listed in the quality control plan (QCP) for placement and meet the requirements of Table M.04.03-4. Any HMA material that that falls outside the specified temperature range as measured by a probe thermometer may be rejected.

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

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

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

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

TABLE 4.06-3: Thickness Tolerances

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

Where the thickness of the lift of mixture is less than that shown on the plans beyond the

tolerances shown in Table 4.06-3, the Contractor, with the approval of the Engineer, shall take corrective action in accordance with this Section.

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

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

Compaction: The Contractor shall compact the mixture to meet the density requirements as stated in Article 4.06.04 and eliminate all roller marks without displacement, shoving cracking, or aggregate breakage.

When placing a lift with a specified thickness less than 1 1/2 inches, or a wedge course, the Contractor shall provide a minimum rolling pattern as determined by the development of a compaction curve. The procedure to be used shall be documented in the Contractor's QCP for placement and demonstrated on the first day of placement.

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

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

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

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

Surface Requirements:

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

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

7. Longitudinal Joint Construction Methods: The Contractor shall use Method I - Notched Wedge Joint (see Figure 4.06-1) when constructing longitudinal joints where lift thicknesses are 1 ½ inches to 3 inches. S1.0 mixtures shall be excluded from using Method I. Method II - Butt Joint (see Figure 4.06-2) shall be used for lifts less than 1 1/2 inches or greater than 3 inches. Each longitudinal joint shall maintain a consistent offset from the centerline of the roadway along its entire length. The difference in elevation between the two faces of any completed longitudinal joint shall not exceed 1/4 inch at any location.

Method I - Notched Wedge Joint:

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

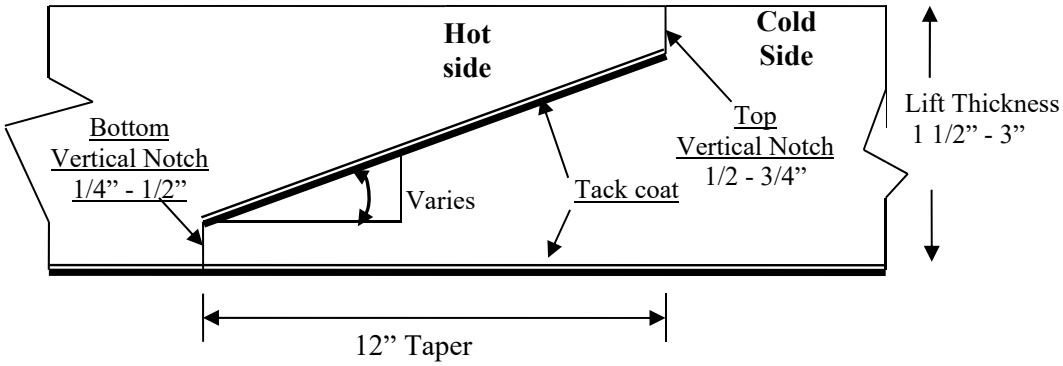
the Engineer.

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

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

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

Figure 4.06-1: Notched Wedge Joint (Not to Scale)



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

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

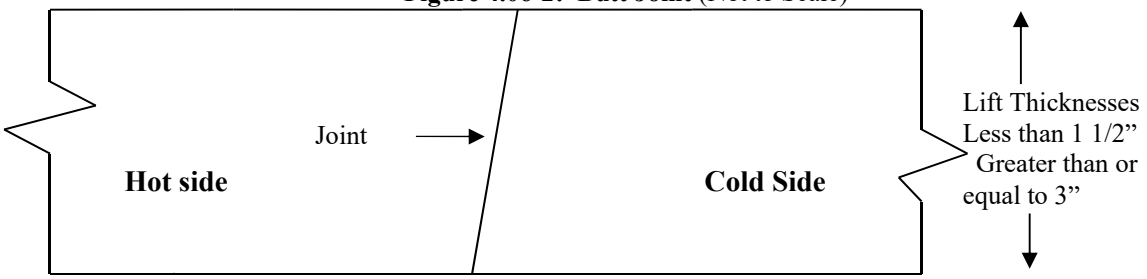
If Method I cannot be used on those lifts which are 1 ½ inches to 3 inches, Method III may be substituted according to the requirements below for "Method III - Butt Joint with Hot Poured Rubberized Asphalt Treatment."

Method II - Butt Joint:

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

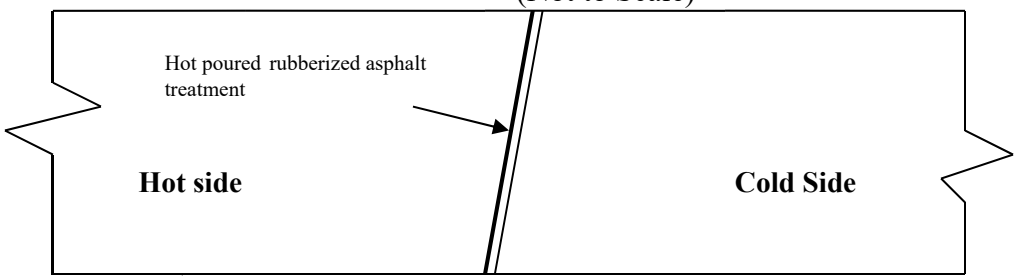
Figure 4.06-2: Butt Joint (Not to Scale)



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

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

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



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

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

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

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

There are 3 components to the QCP for placement: a Standard QCP, a Project Summary Sheet

that details Project-specific information, and, if applicable, a separate Extended Season Paving Plan as required in 4.06.03-9 "Temperature and Seasonal Requirements."

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

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

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

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

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

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

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

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

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

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

The Contractor may obtain 1 mat core and 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's determinations from the acceptance cores. The Contractor shall submit the location of each process control core to the Engineer for approval prior to taking the core. The core holes shall be filled to the same requirements described in Subarticle 4.06.03-10.

9. Temperature and Seasonal Requirements: Paving, including placement of temporary pavements, shall be divided into 2 seasons, "In-Season" and "Extended-Season." In-Season paving occurs from May 1 to October 14, and Extended Season paving occurs from October 15 to April 30. The following requirements shall apply unless otherwise authorized or directed by the Engineer:

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

operations. Paving during Extended Season shall not commence until the Engineer has approved the plan.

10. Field Density The Contractor shall obtain cores for the determination of mat and longitudinal joint density of bituminous concrete pavements. Within five calendar days of placement, mat and joint cores shall be extracted on each lift with a specified thickness of 1 1/2 inches or more. Joint cores shall not be extracted on HMA S1.0 lifts.

The Contractor shall extract cores from random locations determined by the Engineer in accordance with ASTM D3665. Four (4) or six (6) inch diameter cores shall be extracted for S0.25, S0.375 and S0.5 mixtures; 6 inch diameter cores shall be required for S1.0 mixtures. The Contractor shall coordinate with the Engineer to witness the extraction, labeling of cores, and filling of the core holes.

Each lift will be separated into lots as follows:

a. Simple Average Density Lots: For total estimated quantities below 2,000 tons, the lift will be evaluated in one lot which will include the total paved tonnage of the lift and all longitudinal joints between the curb lines.
   For total estimated quantities between 2,000 and 3,500 tons, the lift will be evaluated in two lots in which each lot will include approximately half of the total tonnage placed for the full paving width of a lift including all longitudinal joints between the curb lines.
b. PWL Density Lots: Mat density lots will include each 3,500 tons of mixture placed within 30 calendar days. Joint density lots will include 14,000 linear feet of constructed joints. Bridge density lots will always be analyzed using simple average lot methodology.
c. Partial Density Lot (For PWL only): A mat density lot with less than 3,500 tons or a joint density lot with less than 14,000 linear feet due to:
   - completion of the course; or
   - a lot spanning 30 calendar days.

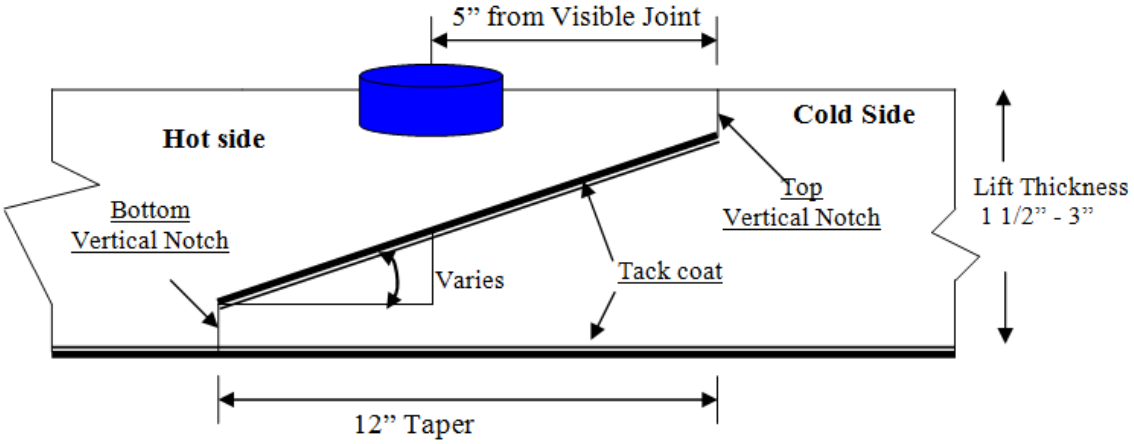
Prior to paving, the type and number of lot(s) will be determined by the Engineer. Noncontiguous areas such as highway ramps may be combined to create one lot.

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

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

Method I, Notched Wedge Joint cores shall be taken so that the center of the core is 5 inches from the visible joint on the hot mat side (Figure 4.06-4).

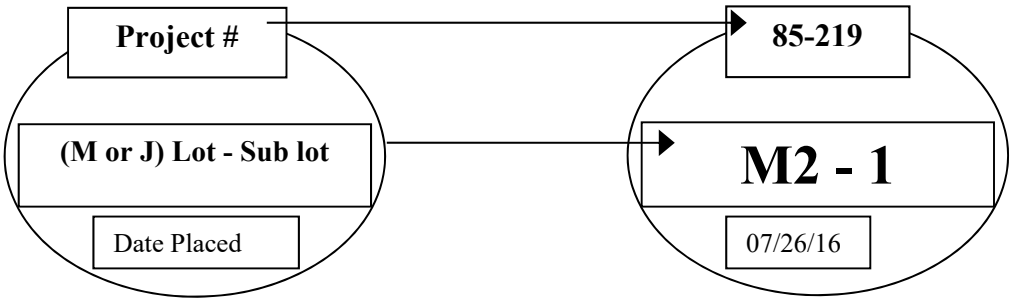
Figure 4.06-4: Notched Wedge Joint Cores (Not to Scale)



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

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

Figure 4.06-5: Labeling of Cores



Each core hole shall be filled within 4 hours upon core extraction. Prior to being filled, the hole shall be prepared by removing any free water and applying tack coat using a brush or other

means to uniformly cover the cut surface. The core hole shall be filled using a bituminous concrete mixture at a minimum temperature of 240°F containing the same or smaller nominal maximum aggregate size and compacted with a hand compactor or other mechanical means to the maximum compaction possible. The bituminous concrete shall be compacted to 1/8 inch above the finished pavement.

Simple Average Density Lots:

A standard simple average density lot is the quantity of material placed within the defined area excluding any bridge decks.

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

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

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

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

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

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

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

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

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

PWL Density Lots:

A PWL mat density lot is 3,500 tons of material placed within the defined area excluding any bridges. One mat core will be obtained per every 500 tons placed.

A PWL joint density lot is 14,000 linear feet of longitudinal joint excluding any joints on bridge decks. One joint core will be obtained per every 2,000 linear feet of joint.

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

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

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

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

12. Density Dispute Resolution Process: The Contractor and Engineer will work in partnership to avoid potential conflicts and to resolve any differences that may arise during quality control or acceptance testing for density. Both parties will review their sampling and testing procedures and results and share their findings. If the Contractor disputes the Engineer's test results, the Contractor must submit in writing a request to initiate the Dispute Resolution Process within five calendar days of the notification of the test results. No request for dispute resolution will be allowed unless the Contractor provides quality control results from samples taken prior to and after finish rolling, and within the timeframe described in 4.06.03-8 supporting its position. No request for dispute resolution will be allowed for a density lot in which any core was not taken within the required 5 calendar days of placement. Should the dispute not be resolved through evaluation of existing testing data or procedures, the Engineer may authorize the Contractor to obtain a new core or set of core samples per disputed lot. The core samples must be extracted no later than seven calendar days from the date of the Engineer's authorization. All such core samples shall be extracted and the core hole filled using the procedure outlined in 4.06.03-10.

a) Simple Average Lots: The Contractor may only dispute any simple average lot that is adjusted at or below 95 percent payment. The number and location (mat, joint, or structure) of the cores taken for dispute resolution must reflect the number and location of the original cores. The location of each core shall be randomly located within the respective original sub lot. The dispute resolution results shall be combined with the original results and averaged for determining the final in-place density value.

b) PWL Lots: The Contractor may dispute any PWL sublot when the PWL falls below 50%

calculated in accordance with section 4.06.04.2.b. An additional random core in the sublot may be taken to validate the accuracy of the core in question. The Department will verify the additional core test result and may average the original test result with the additional core result for purpose of calculating adjustments.

13. Corrective Work Procedure:

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

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

b) Any corrective courses placed as the final wearing surface shall match the specified lift thickness after completion.

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

15. Cut Bituminous Concrete Pavement: Work under this item shall consist of making a straight-line cut in the 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. HMA S* or PMA S*: Bituminous concrete will be measured for payment as the amount of material in tons placed as determined by the net weight on the delivered tickets and adjusted by area, thickness and weight as follows:

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

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

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

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 (inch) of the lift being placed.

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

Quantity Adjusted for Thickness (T_T) = A x t_{adj} x 0.0575 = (-) tons

Where: A = Area = {[L x (Design 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:

Quantity 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

2. Bituminous Concrete Adjustment Cost:

a) Production Lot Adjustment: An adjustment may be applied to each production lot as follows:

i. Non-PWL Production Lot (less than 3,500 tons):
The adjustment values in Tables 4.06-6 and 4.06-7 will be calculated for each sub lot based on the Air Void (AV) and Asphalt Binder Content (PB) test results for that sub lot. The total adjustment for each day's production (lot) will be computed as follows:

Tons Adjusted for Superpave Design (T_{SD}) = [($AdjAV_t$ + $AdjPB_t$) / 100] x Tons

Where: $AdjAV_t$: Percent adjustment for air voids
$AdjPB_t$: Percent adjustment for asphalt binder
Tons: Weight of material (tons) in the lot adjusted by 4.06.4-1

Percent Adjustment for Air Voids = $AdjAV_t$ = [$AdjAV_1$ + $AdjAV_2$ + $AdjAV_i$ + … + $AdjAV_n$)] /n

Where: $AdjAV_t$ = Total percent air void adjustment value for the lot
$AdjAV_i$ = Adjustment value from Table 4.06-6 resulting from each sub lot or the average of the adjustment values resulting from multiple tests within a sub lot, as approved by the Engineer.
n = number of sub lots based on Table M.04.03-2

TABLE 4.06-6: Adjustment Values for Air Voids

Adjustment Value ($AdjAV_i$) (%)	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

Percent Adjustment for Asphalt Binder = $AdjPB_t = [(AdjPB_1 + AdjPB_2 + AdjPB_i + \ldots + AdjPB_n)] /n$

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 4.06-7: Adjustment Values for Binder Content

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

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

For each lot, the adjustment values will be calculated using PWL methodology based on AV, VMA, and PB test results. The results will be considered as being normally distributed and all applicable equations in AASHTO R 9 and AASHTO R 42 Appendix X4 will apply.

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

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

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

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

Where: $AdjAV_t$ = Total percent AV adjustment value for the lot
$AdjPB_t$= Total percent PB adjustment value for the lot
$AdjVMA_t$= Total percent VMA adjustment value for the lot

A lot with PWL less than 50% in any of the 3 individual material quality characteristics will be evaluated under 1.06.04.

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

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

Where Tons: Weight of material (tons) in the lot adjusted by 4.06.4-1

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

Production Lot Adjustment: T_{SD} x Unit Price = Est. (Pi)

Where: Unit Price = Contract unit price per ton per type of mixture
Est. (Pi)= Pay Unit in dollars representing incentive or disincentive per lot

b) Density Lot Adjustment: An adjustment may be applied to each density lot as follows:
i. Simple Average Density Lot (less than 3500 tons) and Bridge Lots:
The final lot quantity shall be the difference between the total payable tons for the Project and the sum of the previous lots. If either the Mat or Joint adjustment value is "remove and replace," the density lot shall be removed and replaced (curb to curb).
No positive adjustment will be applied to a density lot in which any core was not taken within the required 5 calendar days of placement.
Tons Adjusted for Density (T_D) = [{(PA_M x 0.50) + (PA_J x 0.50)} / 100] X Tons
Where: T_D = Total tons adjusted for density for each lot
PA_M = Mat density percent adjustment from Table 4.06-8
PA_J = Joint density percent adjustment from Table 4.06-9
Tons: Weight of material (tons) in the lot adjusted by 4.06.4-1

TABLE 4.06-8: 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)

Notes:
(1) ACRPD = Average Core Result Percent Density
(2) All Percent Adjustments to be rounded to the second decimal place; for example round 1.667 to 1.67.

TABLE 4.06-9: 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)

Notes:
(1) ACRPD = Average Core Result Percent Density
(2) All Percent Adjustments to be rounded to the second decimal place; for example round 1.667 to 1.67

Additionally, any sublot with a density result below 87% will be evaluated under 1.06.04.

ii. PWL Density Lot (3,500 tons or more):
For each lot, the adjustment values will be calculated using PWL methodology based on mat and joint density test results. Only one result will be included for each sublot. The results will be considered as being normally distributed and all applicable equations in AASHTO R 9 and AASHTO R 42 Appendix X4 will apply.
The specification limits for the PWL determination are as follows:
Mat Density: 91.5-98%
Joint Density: 90-98%
For mat and joint density, the individual percent adjustment (PA) will be calculated as follows:
For PWL between 50 and 90%: PA ($_M$ or $_J$)= 0.25 * PWL – 22.50
For PWL at and above 90%: PA ($_M$ or $_J$)= 0.125 * PWL – 11.25
Where: PA_M = Total percent mat density adjustment value for the PWL mat density lot
PA_J= Total percent joint density adjustment value for the PWL joint density lot
No positive adjustment will be applied to a density lot in which any core was not taken within the required 5 calendar days of placement.

A lot with PWL less than 50% will be evaluated under 1.06.04.
The total adjustment for each PWL mat density lot will be computed as follows:

Tons Adjusted for Mat Density (T_{MD}) = (PA_M / 100) X Tons

Where: Tons= Weight of material (tons) in the lot adjusted by 4.06.4-1.
The total adjustment for each PWL joint density lot will be computed as follows:

Tons Adjusted for Joint Density (T_{JD}) = (PA_J / 100) X J_Tons

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

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

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

Additionally, any sublot with a density result below 87% will be evaluated under 1.06.04.

iii. Partial Lots:

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

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

Density Lot Adjustment (Simple Average Lots): T_D x Unit Price = Est. (Di)
Density Lot Adjustment (PWL Lots): (T_{MD} or T_{JD}) x Unit Price = Est. (DMi or DJi)

Where: Unit Price = Contract unit price per ton per type of mixture
Est. (Di)= Pay Unit in dollars representing incentive or disincentive per simple average density lot
Est. (DMi)= Pay Unit in dollars representing incentive or disincentive per PWL mat lot
Est. (DJi)= Pay Unit in dollars representing incentive or disincentive per PWL joint lot

Additionally, any sublot with a density result below 87% will be evaluated under 1.06.04.

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

The quantity of material used for the installation of temporary transitions will be measured for payment under the appropriate item used in the formation of the transition. The installation and removal of a bond breaker and the removal and disposal of any temporary transition formed by milling or with 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 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 4.06.03.

a. Container Method – Material furnished in a container will be measured to the nearest 1/2 gallon. The volume will be determined by either measuring the volume in the original container by a method approved by the Engineer or using a separate graduated container

capable of measuring the volume to the nearest 1/2 gallon. The container in which the material is furnished must include the description of material, including lot number or batch number and manufacturer or product source.

b. Vehicle Method
   i. Measured by Weight: The number of gallons furnished will be determined by weighing the material on calibrated scales furnished by the Contractor. To convert weight to gallons, one of the following formulas will be used:
   Tack Coat (gallons at 60°F) = Measured Weight (pounds) / Weight per gallon at 60°F
   Tack Coat (gallons at 60°F) = 0.996 x Measured Weight (pounds) / Weight per gallon at 77°F
   ii. Measured by automated metering system on the delivery vehicle:
   Tack Coat (gallons at 60°F) = 0.976 x Measured Volume (gallons).

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

4.06.05—Basis of Payment:

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

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

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

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

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

Production Lot: Σ Est (Pi) = Est. (P)
Density Lot (Simple Average Lots): Σ Est (Di) = Est. (D)
Density Lot (PWL): Σ Est (DMi) + Σ (DJi) = Est. (D)
Bituminous Concrete Adjustment Cost= Est. (P) + Est. (D)

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

The Bituminous Concrete Adjustment Cost item, if included in the bid proposal or estimate, is not to be altered in any manner by the Bidder. If the Bidder should alter the amount shown, the altered figure will be disregarded and the original estimated cost will be used for the Contract.

3. Transitions for Roadway Surface: The installation of permanent transitions will be paid under the appropriate item used in the formation of the transition. The quantity of material used for the installation of temporary transitions will be paid under the appropriate pay item used in the formation of the transition. The installation and removal of a bond breaker, and the removal and disposal of any temporary transition formed by milling or with 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 2.02.05.

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

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

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

SECTION 5.86 - CATCH BASINS, MANHOLES AND DROP INLETS

5.86.01—Description: The work under this Section shall consist of furnishing, preparing, and installing catch basins, manholes and drop inlets (and also the removal, abandonment, alteration, reconstruction, or conversion of such existing structures) in conformity with the lines, grades, dimensions and details shown on the plans.

This Section shall also include resetting or replacing catch basin tops as well as manhole frames and covers.

5.86.02—Materials: The materials for this work shall meet the following requirements:

Drainage structures shall meet the requirements of M.08.02 and shall utilize concrete with a 28-day minimum compressive strength of 4000 psi.

Galvanizing shall meet the requirements of M.06.03.

Mortar shall meet the requirements of M.11.04.

Butyl rubber joint seal shall meet the requirements of ASTM C990.

Granular fill, if necessary, shall meet the requirements of M.02.01.

Protective compound material shall be a type appearing on the Department's Qualified Products List and be acceptable to the Engineer, as specified in M.03.09.

5.86.03—Construction Methods: Drainage trench excavation, including rock in drainage trench excavation and backfilling, shall be performed in accordance with 2.86.03 and the requirements of the plans.

Where a drainage structure is to be installed below the surface, a drainage trench shall be excavated to the required depth, the bottom of which shall be graded to the elevation of the bottom of the proposed drainage structure or to ensure a uniform foundation for the structure.

Where a firm foundation is not encountered at the grades established due to unsuitable material, such as soft, spongy, or unstable soil, the unsuitable material shall be removed and replaced with approved granular fill, thoroughly compacted in lifts not to exceed 6 inches. The Engineer shall be notified prior to removal of the unsuitable material in order to determine the depth of removal necessary.

When rock, as defined in 2.86.01-2, is encountered, work shall be performed in accordance with 2.86.03 and the requirements of the plans.

When a drainage structure outside of proposed drainage trench limits is to be removed, it shall be completely removed and all pipes shall be removed or plugged with cement masonry.

When a drainage structure is to be abandoned, the structure shall be removed to a depth 2 feet below the subgrade or as directed by the Engineer. The floor of the structure shall be broken and all pipes shall be plugged with cement masonry.

Drainage structures shall be constructed in accordance with the plans and the requirements contained herein for the character of the work involved. The provisions of 6.02.03 pertaining to bar reinforcement shall apply except that shop drawings need not be submitted for approval unless called for in the plans, Contract or directed by the Engineer. Welding shall be performed in accordance with the applicable sections of the AWS Structural Welding Code, D1.1.

When it becomes necessary to increase the horizontal dimensions of manholes, catch basins and drop inlets to sizes greater than those shown on the plans in order to provide for multiple pipe installations, large pipes or for other reasons, the Contractor shall construct such manholes, catch basins and drop inlets to modified dimensions as directed by the Engineer.

The surfaces of the tops of all catch basins, and drop inlets shall be given a coat of protective compound material, at the manufacturer's recommended application rate, immediately upon completion of the concrete curing period.

All masonry units shall be laid in full mortar beds.

Metal fittings for catch basins, manholes or drop inlets shall be set in full mortar beds or otherwise secured as shown on the plans.

All inlet and outlet pipes shall be set flush with the inside face of the wall of the drainage structure as shown on the plans. The pipes shall extend through the walls for a sufficient distance beyond the outside surface to allow for satisfactory connections, and the concrete or masonry shall be constructed around them neatly to prevent leakage along their outer surfaces.

When constructing a new drainage structure within a run of existing pipe, the section of existing pipe disturbed by the construction shall be replaced with new pipe of identical type and size extending from the drainage structure to the nearest joint of the existing pipe in accordance with 6.86.03 or as directed by the Engineer.

Backfilling shall be performed in accordance with 2.86.03.

Frames, covers and tops which are to be reset shall be removed from their present beds, the walls or sides shall be rebuilt to conform to the requirements of the new construction and the frames, covers and tops shall be reset as shown on the plans or as directed by the Engineer.

5.86.04—Method of Measurement:

Drainage Trench Excavation: In accordance with 2.86.04, excavation for drainage trench will not be measured for payment but shall be included in the Contract unit price for the type of structure being installed.

Rock in Drainage Trench Excavation: Rock in Drainage Trench Excavation will be measured in accordance with the drainage trench excavation limits described in 2.86.03.

Manholes, Catch Basins and Drop Inlets will be measured as separate units.

Resetting of Manholes, Catch Basins and Drop Inlets will be measured as separate units.

Replacement of frames, covers, and tops will be measured as a unit for catch basin top or manhole frame and cover.

Conversion of drainage structures as specified on the plans, or as directed by the Engineer, including structure reconstruction will be measured for payment as a unit.

Removal or abandonment of drainage structures outside of drainage trench excavation limits, as defined in 2.86.03, will be measured as separate units.

There will be no measurement or direct payment for the application of the protective compound material, the cost of this work shall be considered as included in the general cost of the work.

Measurement for payment for work and materials involved with installing pipes to connect new drainage structures into a run of existing pipe will be as provided for under the applicable Contract items in accordance with 6.86.04.

There will be no measurement or direct payment for plugging existing pipes with cement masonry, the cost of this work will be considered as included in the general cost of the work.

5.86.05—Basis of Payment:

Drainage Trench Excavation for the installation of proposed structures described herein will be paid for under the respective drainage Contract item(s) for which the excavation is being performed, in accordance with the provisions of 2.86.05.

Rock in Drainage Trench Excavation will be paid for in accordance with the provisions of 2.86.05.

Manholes and Catch Basins will be paid for at the Contract unit price for each "Manhole," or "Catch Basin," of the type specified, at "0' to 10' Deep" or "0' to 20' Deep," complete in place, which price shall include all excavation, backfill, materials, equipment, tools and labor incidental thereto.

Drop Inlets will be paid for at the Contract unit price for each "Drop Inlet," of the type specified, complete in place, which price shall include all excavation, backfill, materials, equipment, tools and labor incidental thereto.

Manholes, Catch Basins and Drop Inlets constructed to modified dimensions as directed by the Engineer, will be paid for as follows:

Where the interior floor area has to be increased to accommodate existing field conditions, as measured horizontally at the top of the base of the completed structure, and does not exceed 125% of the interior floor area as shown on the plans for that structure, then the structure shall be paid for at the Contract unit price for each "Manhole," "Catch Basin," or "Drop Inlet" of the type specified. Where the floor area is greater than 125%, the increase in the unit price for the individual structure shall be in direct proportion to the increase of the completed structure interior floor area as compared to the interior floor area as shown on the plans for that structure. Such increased unit price shall include all excavation, materials, equipment, tools, and labor incidental to the completion of the structure.

Reset Units will be paid for at the Contract unit price each for "Reset Manhole," "Reset Catch Basin," or "Reset Drop Inlet," of the type specified, respectively, complete in place, which price shall include excavation, cutting of pavement, removal and replacement of pavement structure, and all materials, equipment, tools and labor incidental thereto, except when the work requires reconstruction greater than 3 feet, measured vertically, then the entire cost of resetting the unit will be paid for as Extra Work in accordance with the provisions of 1.04.05.

Frames, Covers, and Tops when required in connection with reset units, will be paid for at the Contract unit price each for such "Manhole Frame and Cover" or "(Type) Catch Basin Top," complete in place, including all incidental expense; or when no price exists, the furnishing and placing of such material will be paid for as Extra Work in accordance with the provisions of 1.04.05.

When the catch basin top has a stone or granite curb in its design, the curb or inlet shall be included in the cost of the "(Type) Catch Basin Top."

Conversion of drainage structures will be paid for at the Contract unit price each for "Convert Catch Basin to (Type) Catch Basin," "Convert Catch Basin to (Type) Manhole," or

"Convert Manhole to (Type) Catch Basin," complete in place, which price shall include excavation, cutting of pavement, removal and replacement of pavement, backfill, all alterations to existing structure, all materials including catch basin frame and grate of the type specified, or manhole frame and cover, all equipment, tools and labor incidental thereto.

The maximum change in elevation of frame under these items shall not exceed 3 feet. Greater depth changes, if required, shall be paid for as Extra Work, in accordance with 1.04.05.

Removal or abandonment of drainage structures outside of drainage trench excavation limits as defined in 2.86.03 will be paid for at the Contract unit price each for "Remove Drainage Structure – 0' to 10' Deep," "Remove Drainage Structure – 0' to 20' Deep," or "Abandon Drainage Structure," which price shall include excavation, cutting of pavement, removal and replacement of pavement, backfill, and all equipment, tools and labor incidental thereto.

Pay Item	Pay Unit
(Type) Catch Basin – 0' to 10' Deep	ea.
(Type) Catch Basin – 0' to 20' Deep	ea.
Manhole (Size) – 0' to 10' Deep	ea.
Manhole (Size) – 0' to 20' Deep	ea.
(Type) Drop Inlet	ea.
Reset Catch Basin	ea.
Reset Manhole	ea.
Reset Drop Inlet	ea.
Convert Catch Basin to (Type) Catch Basin	ea.
Convert Catch Basin to (Type) Manhole	ea.
Convert Manhole to (Type) Catch Basin	ea.
Manhole Frame and Cover	ea.
(Type) Catch Basin Top	ea.
Remove Drainage Structure – 0' to 10' Deep	ea.
Remove Drainage Structure – 0' to 20' Deep	ea.
Abandon Drainage Structure	ea.

SECTION 6.01 - CONCRETE FOR STRUCTURES

Replace Section 6.01 in its entirety with the following:

6.01.01—Description
6.01.02—Materials
6.01.03—Construction Methods
6.01.04—Method of Measurement
6.01.05—Basis of Payment

6.01.01—Description: This item shall include concrete for use in new construction, surface repair or structural repair of bridges and culverts, walls, catch basins, drop inlets and other incidental construction. The concrete shall be composed of Portland cement, pozzolans, fine and coarse aggregate, admixtures and water, prepared and constructed in accordance with these specifications, at the locations and of the form dimensions and class shown on the plans, or as directed by the Engineer.

The use of concrete from dry batch or central mixed plants is permitted for all concrete mixtures.

6.01.02—Materials: The materials for this work shall meet the requirements of M.03. Surface or structural repair concrete shall be documented on the delivery ticket, as required in 6.01.03-II-3(a), as having the plastic properties necessary for confined placement to ensure appropriate workability for consolidation within the forms.

6.01.03—Construction Methods:

I. Concrete Quality Control (QC) Requirements: For all bridge deck and bridge parapet construction, the Contractor must demonstrate to the Engineer that the materials and work that will be provided by their field staff, subcontractors, and suppliers meets Contract specification requirements.

This effort shall be documented with a **Concrete Quality Control Plan (CQCP)** and shall address the communication with all parties, on-site inspection, sampling and testing frequency necessary to keep the production, placement and finishing operations in control, to determine when an operation has gone out of control and anticipated procedure to correct the situation in a timely manner.

1. General – provide an overview of the means and methods anticipated to perform the work including any anticipated conditions that may need additional attention (such as seasonal conditions requiring heating or cooling of concrete)

2. Contractor Organization – address authority levels/duties by position and name of persons holding those positions; include those who have decision making authority with regard to quality control, materials, sampling and testing who can be contacted by the Engineer

3. Concrete Mix Design – identify concrete supplier(s); provide copies of all applicable mix designs to field staff; and address submittal timeframe

4. Transportation and Delivery of Concrete – identify the supplier's plant capacity and ability to ensure continuous delivery to the Project to meet the requirements of the mix design and a corrective procedure if it does not meet Project requirements; include a provision for the addition of admixtures and follow up testing

5. Placement and Finishing of Concrete – identify and describe:

(a) placement equipment
(b) placement method(s) to be used (chute, pump, hopper or other)
(c) starting point and direction of placement (logistical sequencing)
(d) slip forming, formwork, stay-in-place forms or other forming method(s)
(e) joint construction method(s)
(f) process and documentation that the elevations, base, forms, reinforcement (including support chairs and ties), utility inserts or any other appurtenance installations have been inspected by the Contractor prior to concrete placement
(g) equipment and method(s) to be used for vibrating and consolidating concrete
(h) procedure for verifying adequate consolidation and how segregation will be addressed
(i) schedule and method(s) to be used for finishing all exposed surfaces

6. Curing of Concrete – describe schedule and method(s) for curing of concrete and how the method(s) will be monitored and maintained

7. Contractor QC testing – identify person(s) or firms responsible for Contractor QC testing and provide copies of their certification(s) (see 6.01.03-5), and testing facility location(s). In addition, describe the process used for communication between the QC testing personnel and the Contractor project staff; describe what measures will be taken when test results are out of compliance; this shall include what increased frequency of testing is to be performed to verify that concrete properties are in compliance; the threshold at which time placement ceases; describe what protective measures will be used in case of unforeseen weather

8. The CQCP shall include the name and qualifications of a Quality Control Manager (QCM) provided by the Contractor. The QCM shall be responsible for the administration of the CQCP, and any modifications that may become necessary. The QCM shall have the ability to direct all Contractor personnel on the Project during concreting operations and must communicate directly with the concrete supplier. At a minimum the QCM shall be certified as a **Concrete Transportation Construction Inspector by the American Concrete Institute (ACI).**

9. The CQCP must include a provision for pre-placement meeting(s) to be held with representatives of the Engineer, the concrete supplier, the QCM and the Contractor's field staff supervising the work.

(a) Timing and number of the meeting(s) will be determined by the complexity of the mix design or placement.
(b) Non-Standard mix designs that require trial placements will be discussed at the Preconstruction Meeting to remind the Contractor of the time needed for testing. Additional meeting(s) should be scheduled at least 90 days prior to first use of non-standard mix designs, to allow suppliers to perform trial batches and testing.
(c) Discussions shall include the configuration and specific application that the concrete will be used for, plastic properties and workability, any mix design challenges, trial placement procedures and subsequent trial results, timing and quantities. Refer to 6.01.03-II-6(e) for additional requirements.

10. The CQCP shall be submitted to the Engineer and concrete supplier for review and comment a minimum of 30 days prior to production or placement. Production and placement shall not occur until all comments of the Engineer and supplier have been addressed by the Contractor. Changes to the CQCP based on data not available at time of submittal may be added via addendum.

11. The Contractor shall provide the Engineer QC test results within 48 hours after testing or inspection in a format acceptable to the Engineer. The Contractor shall also maintain complete records of all QC tests.

Review of the CQCP does not relieve the Contractor of its responsibility to comply with the Project specifications. The Contractor may modify the CQCP as work progresses and must document the changes in writing prior to resuming operations. These changes include but are not limited to changes in quality control procedures or personnel.

II. New Construction:

1. Falsework and Forms: Falsework is considered to be any temporary structure which supports structural elements of concrete, steel, masonry or other material during the construction or erection. Forms are to be considered to be the enclosures or panels which contain the fluid concrete and withstand the forces due to its placement and consolidation. Forms may in turn be supported on falsework.

This work shall consist of the construction and removal of falsework and forms that are designed by the Contractor in the execution of the work, and whose failure to perform properly could adversely affect the character of the Contract work or endanger the safety of adjacent facilities, property, or the public. Forms shall be mortar tight. Forms and falsework shall be of sufficient rigidity and strength to safely support all loads imposed and to produce in the finished structure the lines and grades indicated in the Contract documents. Forms shall also impart the required surface texture and rustication and shall not detract from the uniformity of color of the formed surfaces. Forms shall be made of wood, steel or other material approved by the Engineer.

(a) Design: The design of falsework and formwork shall conform to the *AASHTO Guide Design Specifications for Bridge Temporary Works,* or to other established and generally accepted design codes such as ACI Standard *ACI 347-Recommended Practice for Concrete Formwork* or specific form or falsework manufacturer specifications. When other than new or undamaged materials are used, appropriate reductions in allowable stresses, and decreases in resistance factors or imposed loads shall be used for design.

(b) Loads: The design of the falsework and forms shall be based on load factors specified in the *AASHTO LRFD Bridge Design Specifications* and all applicable load combinations shall be investigated. The design load for falsework shall consist of the sum of appropriate dead and live vertical loads and any horizontal loads.

As a minimum, dead loads shall include the weight of the falsework and all construction material to be supported. The combined unit weight of concrete, reinforcing and pre-stressing steel, and forms that is supported shall be assumed to be not less than:

1. Normal-weight concrete: 0.16 kip/ft^3
2. Lightweight concrete: 0.13 kip/ft^3

Live loads shall consist of the actual weight of any equipment to be supported, applied as concentrated loads at the points of contact and a uniform load of not less than 0.02 kip/ft^2 applied over the area supported, plus 0.075 kip/ft applied at the outside edge of deck overhangs.

The horizontal load used for the design of the falsework bracing system shall be the sum of the horizontal loads due to equipment; construction sequence including unbalanced hydrostatic forces from fluid concrete and traffic control devices; stream flow, when

applicable; and an allowance for wind. However, in no case shall the horizontal load to be resisted in any direction be less than 2% of the total dead load.

For post-tensioned structures, the falsework shall also be designed to support any increase in or redistribution of loads caused by tensioning of the structure. Loads imposed by falsework onto existing, new, or partially completed structures shall not exceed those permitted in 6.01.03-II-12, Application of Loads.

(c) Working Drawings: The working drawings for falsework and formwork shall be prepared in accordance with 1.05.02 whenever the falsework or formwork exceeds 14.0 feet high or whenever vehicular, marine, or pedestrian traffic may travel under or adjacent to the falsework or formwork. Working drawings shall include the sequence, method and rate of placement of the concrete.

Manufacturer catalog cuts or written installation procedures shall be provided for any clips, braces, hangers or other manufactured parts used with the formwork or falsework.

(d) Construction: Forms and falsework shall be built true to lines and grades shall be strong, stable, firm, mortar-tight and adequately braced or tied, or both. They shall be designed and constructed to withstand all loads and pressures including those imposed by plastic concrete, taking full account of the stresses due to the rate of placement, effect of vibration and conditions brought about by construction methods. Forms and falsework shall be constructed to compensate for variations in camber of supporting members and allow for deflections.

Falsework and formwork shall be chamfered at all sharp corners, unless otherwise ordered or permitted, and shall be given a slight bevel or draft in the case of projections to ensure satisfactory removal. Materials for falsework and formwork and their supports, ties and bracing, shall be of the type, quality and strength to achieve the structural requirements. Form material in contact with concrete shall provide the finished concrete surface smoothness as specified in 6.01.03-II-10, Finishing Concrete Surfaces, and shall have a uniform appearance.

Falsework and formwork shall be treated with form oil or other release agent approved by the Engineer before the reinforcing steel is placed or self-releasing forms approved by the Engineer may be used. Release agents which will adhere to or discolor the concrete shall not be used.

Falsework and formwork for concrete surfaces exposed to view shall produce a smooth surface of uniform texture, free of voids, indentations, protrusions and bulges. Panels lining falsework and formwork shall be arranged so that the joint lines form a symmetrical pattern conforming to the general lines of the structure. The same type of form-lining material shall be used throughout each element of a structure. Falsework and formwork shall be sufficiently rigid so that the undulation of the concrete surface shall not exceed 1/4 inch when checked with a 4 foot straightedge or template.

For non-exposed surfaces the falsework and formwork shall be sufficiently rigid so that the undulation of the concrete surface shall not exceed 1/2 inch when checked with a 4 foot straightedge or template.

Metal ties and anchors to hold the falsework and formwork in alignment and location shall be so constructed that the metal work can be removed to a depth of at least 2 inches from the concrete surface without damage to the concrete. All cavities resulting from the removal of metal ties shall be filled after removal of forms with cement mortar of the same

proportions used in the body of the work or other materials approved by the Engineer, and the surface finished smooth and even, and if exposed in the finished work, shall be similar in texture and color of adjacent surfaces. With permission of the Engineer, the Contractor need not remove from the underneath side of bridge decks portions of metal devices used to support reinforcing steel providing such devices are of material, or are adequately coated with material, that will not rust or corrode. When coated reinforcing steel is required, all metal ties, anchorages, or spreaders that remain in the concrete shall be of corrosion-resistant material or coated with a dielectric material.

Forms shall be clean and clear of all debris. For narrow walls and columns where the bottom of the form is inaccessible, an access opening will be allowed in the form and falsework for cleaning out extraneous material.

(e) Vacant

(f) Bridge Decks: After erection of beams and prior to placing falsework and forms, the Contractor shall take elevations along the top of the beam at the points shown on the plans or as directed by the Engineer. The Contractor shall calculate the haunch depths and provide them to the Engineer a minimum of 7 days prior to installing the falsework and forms. The Contractor shall also provide calculations for the setting of the overhang brackets based on the final beam deflection. These calculations shall be based on the final proposed deck grade and parapet elevations.

Falsework or formwork for deck forms on girder bridges shall be supported directly on the girders so that there will be no appreciable differential settlement during placing of the concrete. Girders shall be either braced and tied to resist any forces that would cause rotation or torsion in the girders caused by the placing of concrete for diaphragms or decks, or shown to be adequate for those effects. Unless specifically permitted, welding of falsework support brackets or braces to structural steel members or reinforcing steel shall not be allowed.

(g) Stay-In-Place Metal Forms for Bridge Decks: These forms may be used if shown in the Contract documents or approved by the Engineer. Prior to the use of such forms and before fabricating any material, the Contractor shall submit working drawings to the Engineer for review in accordance with 1.05.02. These drawings shall include the proposed method of form construction, erection plans including placement plans, attachment details, weld procedure(s), material lists, material designation, gage of all materials, and the details of corrugation. Also, copies of the form design computations shall be submitted with the working drawings. Any changes necessary to accommodate stay-in-place forms, if approved, shall be at no cost to the Department.

The metal forms shall be designed on the basis of the dead load of the form, reinforcement and the plastic concrete, including the additional weight of concrete [considered to be equivalent to the weight imposed by an additional concrete thickness equal to 3% of the proposed deck thickness, but not to exceed 0.3 inch] due to the deflection of the metal forms, plus 50 psf for construction loads. The allowable stress in the corrugated form and the accessories shall not be greater than 0.725 times the yield strength of the furnished material and the allowable stress shall not exceed 36,000 psi. The span for design and deflection shall be the clear distance between edges of the beams or girders less 2 inches and shall be measured parallel to the form flutes. The maximum deflection under the weight of plastic concrete, reinforcement, and forms shall not exceed 1/180 of the form

span or 0.5 inches, whichever is less. In no case shall the loading used to estimate this deflection be less than 120 psf. The permissible form camber shall be based on the actual dead load condition. Camber shall not be used to compensate for deflection in excess of the foregoing limits. The form support angles shall be designed as a cantilever and the horizontal leg of the form support angle shall not be greater than 3 inches.

No stay-in-place metal forms shall be placed over or be directly supported by the top flanges of beams or girders. The form supporting steel angles may be supported by or attached to the top flanges.

Stay-in-place metal forms shall not be used in bays where longitudinal slab construction joints are located, under cantilevered slabs such as the overhang outside of fascia members, and bridges where the clearance over a salt-laden body of water is less than 15 feet above mean high water level.

Welding to the top flanges of steel beams and girders is not permitted in the areas where the top flanges are in tension, or as indicated on the plans. Alternate installation procedures shall be submitted addressing this condition.

Drilling of holes in pre-stressed concrete beams or the use of power-actuated tools on the prestressed concrete beams for fastening of the form supports to the pre-stressed concrete beams will not be permitted. Welding of the reinforcing steel to the pre-stressed units is not permitted.

All edges of openings cut for drains, pipes, and similar appurtenances shall be independently supported around the entire periphery of the opening. All fabricated stay-in-place metal forms shall be unloaded, stored at the Project Site at least 4 inches above the ground on platforms, skids or other suitable supports and shall be protected against corrosion and damage and handled in such a manner as to preclude damage to the forms. Damaged material shall be replaced at no additional cost to the State.

Any exposed form or form support metal where the galvanized coating has been damaged, shall be thoroughly cleaned, wire brushed, then coated with 2 coats of Zinc Dust – Zinc Oxide primer, FS No. TT-P-641d, Type II or another product acceptable to the Engineer.

The forms shall be installed from the topside in accordance with the manufacturer's recommended installation procedures. The form supports shall ensure that the forms retain their correct dimensions and positions during use at all times. Form supports shall provide vertical adjustment to maintain design slab thickness at the crest of corrugation, to compensate for variations in camber of beams and girders and to allow for deflections. Stay-in-place metal forms shall have a minimum depth of the form valley equal to 2 inches. The forms shall have closed tapered ends. Lightweight filler material shall be used in the form valleys.

All field cutting shall be done with a steel cutting saw or shears including the cutting of supports, closures and cutouts Flame cutting of forms is not permitted.

All welding shall be performed by Department-certified welders in accordance with the Welding subarticle in 6.03. Welding of forms to supports is not permitted.

The steel form supports shall be placed in direct contact with the flange of stringer or floor beam flanges and attached by bolts, clips, welding where permitted, or other approved means. Form sheets shall not be permitted to rest directly on the top of the stringer or floor beam flanges. The forms shall be securely fastened to form supports with self-drilling fasteners and shall have a minimum bearing length of 1 inch at each end. In the areas

where the form sheets lap, the form sheets shall be securely fastened to one another by fasteners at a maximum spacing of 18 inches. The ends of the form sheets shall be securely attached to the support angles with fasteners at a maximum spacing of 18 inches or 2 corrugation widths, whichever is less.

The depth of the concrete slab shall be as shown on the plans and the corrugated forms shall be placed so that the top of the corrugation will coincide with the bottom of the deck slab. No part of the forms or their supports shall protrude into the slab. All reinforcement in the bottom reinforcement mat shall have a minimum concrete cover of 1 inch unless noted otherwise on the plans.

The completed stay-in-place metal form system shall be sufficiently tight to prevent leakage of mortar. Where forms or their installation are unsatisfactory in the opinion of the Engineer, either before or during placement of the concrete, the Contractor shall correct the defects before proceeding with the work.

(h) Construction Joints: Construction joints other than those shown on the plans will not be permitted without prior approval of the Engineer. In joining fresh concrete to concrete that has already set, the work already in place shall have all loose and foreign material removed, and the surface roughened and thoroughly drenched with water.

All reinforcing steel shall extend continuously through joints. Where unplanned construction joints may be needed, they shall be constructed as directed by the Engineer.

(i) Expansion and Contraction Joints: Expansion and contraction joints shall be constructed at the locations and in accordance with the details specified in the Contract. The forming of joint openings shall be dimensioned in accordance with the joint manufacturer's design requirements. Joints include open joints, filled joints, joints sealed with sealants, joints reinforced with steel armor plates or shapes, paraffin coated joints, and joints with combinations of these features.

Open joints shall be placed at locations designated on the plans and shall be formed by the insertion and subsequent removal of templates of wood, metal or other suitable material. The templates shall be so constructed that their removal may be readily accomplished without damage to the work.

Filled joints shall be made with joint filler, the materials for which shall meet the requirements of the plans and of these specifications.

For mechanical joint systems, the concrete shall be placed in such a manner that does not interfere with the movement of the joint.

(j) Pipes, Conduits and Utility Installations: The Contractor shall coordinate the installation of pipes, conduits and utilities as shown on the plans and in accordance with the Contract or as directed by the Engineer. The openings accommodating such pipe, conduit and utility installations shall be incorporated into the formwork by the Contractor.

(k) Anchorages: Anchor bolts and systems shall be set to the requirements of the plans and Contract. Anchor bolts and systems shall be clean and free of dirt, moisture or other foreign materials at the time of installation. The anchor bolts and systems shall be installed prior to placing concrete.

With the Engineer's approval, the Contractor may install anchorages after placement and setting of the concrete or in formed holes. The anchorages shall be installed into drilled or formed holes having a diameter and a depth suitable to receive the bolts in accordance with the grout manufacturer's requirements. Such holes shall be located to avoid damage to the

existing reinforcement. All holes shall be perpendicular to the plane surface. The Contractor shall take every precaution necessary to prevent damage to the concrete due to freezing of water or grout in anchor bolt holes.

(l) Ornament or Reverse Moulds: Ornamental work, when so noted on the plans, shall be formed by the use of reverse moulds. These moulds shall be produced by a qualified manufacturer approved by the Engineer. They shall be built in accordance with the general dimensions and appearance shown on the plans. The Contractor shall submit all detailed drawings, models, or carvings for review by the Engineer before the moulds are made.

The Contractor shall be responsible for their condition at all times, and shall be required to remove and replace any damaged or defective moulds at no additional cost to the State.

The surfaces of the moulds shall be given a coating of form release agent to prevent the adherence of concrete. Any material which will adhere to or discolor the concrete shall not be used.

Form Liners, if required, shall be installed as specified elsewhere.

(m) Removal of Falsework and Forms: The Contractor shall consider the location and character of the structure, the weather, the materials used in the mix, and other conditions influencing the early strength of the concrete when removing forms and falsework. Methods of removal likely to cause damage to the concrete surface shall not be used. Supports shall be removed in such a manner as to permit the structure to uniformly and gradually take the stresses due to its own weight. For structures of 2 or more spans, the sequence of falsework release shall be as specified in the Contract or approved by the Engineer.

Removal shall be controlled by field-cured cylinder tests. The removal shall not begin until the concrete has achieved 75% of the design compressive strength. To facilitate finishing, side forms carrying no load may be removed after 24 hours with the permission of the Engineer, but the curing process must be continued for 7 days.

When the results of field-cured cylinder tests are unavailable, the time periods listed in Table 6.01.03-1, exclusive of days when the temperature drops below 40°F, may govern the removal of forms.

Table 6.01.03-1 Time Restrictions for Removal of Formwork

Structure Element	Minimum Time Period
Arch Centers, centering under beams, pier caps, and unsupported elements	14 days
Slabs on grade, Abutments and Walls	24 hours
Columns	2 days
Bridge Decks	28 days

The Contractor may submit for review and approval by the Engineer, alternate methods to determine the in-place strength of the concrete for removal of forms and falsework.

2. Protection from Environmental Conditions: The concrete shall be protected from damage due to weather or other environmental conditions during placing and curing periods. In-place concrete that has been damaged by weather conditions shall be either repaired to an acceptable condition or removed and replaced as determined by the Engineer.

(a) Rain Protection: The placement of concrete shall not commence or continue unless

adequate protection satisfactory to the Engineer is provided by the Contractor.

(b) Hot Weather Protection: When the ambient air temperature is above 90°F, the forms, which will come in contact with the mix shall be cooled to below 90°F for a minimum of 1 hour prior to and 1 hour after completion of the concrete placement by means of a water spray or other methods satisfactory to the Engineer.

(c) Cold Weather Protection: When there is a probability of ambient air temperature below 40°F during placement and curing, a Cold-Weather Concreting Plan shall be submitted to the Engineer for review and comment. The Plan shall detail the methods and equipment, including temperature measuring devices that will be used to ensure that the required concrete and air temperatures are maintained.

1. Placement: The forms, reinforcing steel, steel beam flanges, and other surfaces which will come in contact with the mix shall be heated to a minimum of 40°F, by methods satisfactory to the Engineer, for a minimum of 1 hour prior to, and maintained throughout, concrete placement.
2. Curing: For the first 6 days, considered the initial cure period, the concrete shall be maintained at a temperature of not less than 45°F and the air temperature surrounding the structure shall be maintained at a temperature of not less than 60°F. When the concrete mix includes pozzolans or slag, the initial cure period shall be increased to 10 days. After the initial cure period, the air surrounding the structure shall be maintained above 40°F for an additional 8 days. If external heating is employed, the heat shall be applied and withdrawn gradually and uniformly so that no part of the concrete surface is heated to more than 90°F or caused to change temperature by more than 20°F in 8 hours. The Engineer may reduce or increase the amount of time that the structure must be protected or heated based on an indication of in-place concrete strength acceptable to the Engineer.

(d) Additional Requirements for Bridge Decks: Prior to the application of curing materials, all the concrete placed on bridge decks shall be protected from damage due to rapid evaporation by methods acceptable to the Engineer. During periods of low humidity (less than 60% relative humidity), sustained winds of 25 mph or more, or ambient air temperatures greater than 80ºF the Contractor shall provide written details of additional measures to be taken during placement and curing.

Protection may include increasing the humidity of the surrounding air with fog sprayers and employing wind-breaks or sun-shades. Additional actions may include reduction of the temperature of the concrete prior to placement, scheduling placement during the cooler times of days or nights, or any combination of these actions.

(e) Concrete Exposed to Salt Water: No Construction joints shall be formed between the levels of extreme low water and extreme high water or the upper limit of wave action as determined by the Engineer.

3. Transportation and Delivery of Concrete: All material delivered to the Project shall be supplied by a producer qualified in accordance with M.03. The producer shall have sufficient plant capacity and trucks to ensure continuous delivery at the rate required to prevent the formation of cold joints.

(a) Material Documentation: All vendors producing concrete must have their weigh scales and mixing plant automated to provide a detailed ticket. Delivery tickets must include the following information:

1. State of Connecticut printed on ticket
2. Name of producer, identification of plant
3. Date and time of day
4. Type of material
5. Cubic yards of material loaded into truck
6. Project number, purchase order number, name of Contractor (if Contractor other than producer)
7. Truck number for specific identification of truck
8. Individual aggregate, cement, water weights and any admixtures shall be printed on plant tickets
9. Water/cement ratio, and
10. Additional water allowance in gallons based on water/cement ratio for mix

A State inspector may be present to monitor batching or weighing operations.

The Contractor shall notify the Engineer immediately if, during the production day, there is a malfunction of the recording system in the automated plant or weigh scales.

Manually written tickets containing all required information may be allowed for up to 1 hour after malfunction provided they are signed by an authorized representative of the producer.

(b) Transportation of Mixture: Trucks delivering concrete shall be qualified in accordance with M.03.

If the concrete mix arrives at the Project with a slump lower than allowed by specification, water may be considered as a means to temper concrete to bring the slump back to within specification. This tempering may only be done prior to discharge with the permission of the Engineer. The quantity of water in gallons added to the concrete cannot exceed the allowance shown on the delivery ticket.

The concrete shall be completely discharged into the forms within 1-1/2 hours from the batch time stamped on the delivery ticket. This time may be extended if the measured temperature of the concrete is below 90ºF. This time may also be reduced if the temperature of the concrete is over 90º F. Rejected concrete shall be disposed of by the Contractor at no cost to the State.

The addition of chemical admixtures or air entrainment admixtures at the Project Site, to increase the workability or to alter the time of set, will only be permitted if prior approval has been granted by the Engineer. The addition of air entrainment admixtures at the Project Site will only be permitted by the producer's quality control staff. The Contractor is responsible for follow-up quality control testing to verify compliance with the Specifications.

4. Acceptance Testing and Test Specimens: The Contractor shall furnish the facilities and concrete required for sampling, transport to the testing location in the field, performing field testing and for casting sample cylinders for compressive-strength determinations. The Department will furnish personnel for sampling and casting Acceptance specimens and the number of specimens required will be determined by the Engineer. The equipment for the Department's testing is provided for elsewhere in the Contract.

(a) Temperature, Air Content and Slump: Field testing in accordance with AASHTO T-23, "Making and Curing Concrete Test Specimens in the Field" will be performed at the point of placement and at a frequency determined by the Engineer.

(b) Acceptance Testing and Compressive Strength Specimens: Concrete samples are to be taken at the point of placement into the forms or molds. Representatives of the Engineer will sample the mix.

Table 6.01.03-2 Plastic Properties of Portland Cement Concrete

Standard Mix Class	Air Content	Slump[3]	Concrete Temperature
PCC0334Z[1] (3300 psi)	6.0 +/- 1.5%	As submitted	60º-90º F
PCC0336Z[1] (3300 psi)			
PCC0446Z[1] (4400 psi)			
PCCXXX8Z[1]	7.5 +/- 1.5%	As submitted	
Modified Standards[2]	6.0 +/- 1.5% [2]	As submitted	
Special Provision Mix[4]	As specified	As submitted	
[1] "Z" denotes the Exposure Factor 0, 1 or 2 as described in Table M.03.02-1a			
[2] Modifications to Standard Mixes, including mixes placed by pumping, shall be reviewed by the Engineer prior to use. These include but are not limited to the use of chemical admixtures such as high range water reducing (HRWR) admixtures and the use of coarse aggregate sizes for that class not specified in M.03.			
[3] If the only modification is the addition of HRWR, the maximum allowable slump shall be 7 inches.			
[4] All concrete mixes with a mix design strength not shown in the table must be approved by the Engineer on a case-by-case basis. Limits on the plastic properties and strength requirements of these mixes are listed in the Specifications.			

The Contractor shall provide and maintain facilities on the Project Site, acceptable to the Engineer, for sampling, transporting the initial sample, casting, safe storage and initial curing of the concrete test specimens as required by AASHTO T-23. This shall include but not be limited to a sampling receptacle, a means of transport of the initial concrete sample from the location of the concrete placement to the testing location, a level and protected area of adequate size to perform testing, and a specimen storage container capable of maintaining the temperature and moisture requirements for initial curing of Acceptance specimens. The distance from the location of concrete placement to the location of testing and initial curing shall be 100 feet or less, unless otherwise approved by the Engineer.

The specimen storage container described in this section is in addition to the concrete cylinder curing box provided for elsewhere in the Contract.

After initial curing, the test specimens will be transported by Department personnel and stored in the concrete cylinder curing box until they can be transported to the Division of Materials Testing for strength evaluation.

(c) Sampling Procedure for Pumping: It is the responsibility of the Contractor to provide concrete that meets specification at the point of placement.

Samples of concrete shall be taken at the discharge end of the pump at the point of placement with the exception of underwater concrete. The Contractor may submit an alternate location to provide a sample from the discharge end of the pump with verification showing that the characteristics of the mix will not be altered from that of which would have been attained at the point of placement. The Engineer will review the documentation and other extenuating circumstances when evaluating the request.

In the case of underwater concrete the Contractor shall submit the proposed sampling location with the submittals required in 6.01.03-II-6(f).

(d) Additional field testing: Additional field testing such as density and yield measurements may be required at the time of placement as determined by the Engineer.

5. Progression Cylinders and Compressive Strength Specimens: Progression Cylinders outlined in this section are field cured compressive strength specimens taken for information related to when a structure or segment of a structure can be loaded or put into service, adequacy of curing and protection of concrete in the structure, or when formwork or shoring may be removed from the structure. The information produced from strength results of Progression Cylinders will not be considered for acceptance of the concrete.

The personnel, equipment, and molds for sampling, casting, curing and testing of Progression Cylinders shall be furnished by the Contractor at no expense to the Department.

Sampling, casting, and field curing of the specimens shall be performed in accordance with AASHTO T23 by an ACI Concrete Field Testing Technician Grade 1 or higher and will be witnessed by a representative of the Department.

The sample shall be taken at the point of placement into the forms or molds from 1 or more of the same truck loads that an Acceptance sample is taken from.

A minimum of 2 of cylinder results will be used to determine in-place strength.

Compression testing shall be performed in accordance with AASHTO T 22 by personnel approved by the Engineer.

A Certified Test Report in accordance with 1.06.07 shall be provided to the Engineer reporting the Progression Cylinder test results. A copy of the results of the compressive strength testing shall be provided to the Engineer at least 24 hours prior to any Project activity that the results may control.

6. Handling and Placing Concrete: Concrete shall be handled, placed, and consolidated by methods acceptable to the Engineer that will not segregate the mix and shall result in a dense homogeneous concrete. The methods used shall not cause displacement of reinforcing steel or other materials to be embedded in the concrete. Concrete shall not be placed until the forms and all materials have been inspected by the Engineer. All mortar from previous placements, debris, and foreign material shall be removed from the forms and steel prior to commencing placement. The forms and subgrade shall be thoroughly moistened with water immediately before concrete is placed. All water that has ponded within the forms shall also be removed. Temporary form spreader devices shall not be left in place.

All laitance or unsound material shall be removed before placing substructure concrete onto the surface of any concrete placed underwater.

Placement of concrete for each section of the structure shall be performed continuously between construction or expansion joints as shown on the plans. The delivery rate, placing sequence and methods shall be such that fresh concrete is always placed and consolidated against previously placed concrete before initial set has occurred. The temperature of the concrete mixture during placement shall be maintained between 60ºF and 90ºF. During and after placement of concrete, care shall be taken not to damage the concrete or break the bond with reinforcing steel. Platforms for workers and equipment shall not be supported directly on any reinforcing steel. Forces that may damage the concrete shall not be applied to the forms or reinforcing steel.

(a) Sequence of Placement: The sequence of placement shall be in accordance with the Contract or as permitted by the Engineer.

Concrete for integral horizontal members, such as caps, slabs, or footings shall not be placed until the concrete for the columns, substructure, culvert walls and similar vertical members has achieved sufficient strength as stated in 6.01.03-II-1(m).

The concrete in arches shall be placed in such a manner as to load the formwork uniformly and symmetrically.

The base slab or footings of cast-in-place box culverts shall reach sufficient strength before the remainder of the culvert is constructed.

(b) Placement Methods: The Contractor shall notify the Engineer at least 24 hours in advance of intention to place concrete.

Vibrators shall not be used to shift the fresh concrete horizontally. Vibrators shall be adequate to consolidate the concrete and integrate it with the previous lift.

The rate of concrete placement must not produce loadings that exceed those considered in the design of the forms.

The use of chutes and pipes for conveying concrete into the forms must be reviewed by the Engineer. Chutes shall be clean, lined with smooth watertight material and, when steep slopes are involved, shall be equipped with baffles or reverses. When the discharge must be intermittent, a hopper or other device for regulating the discharge shall be provided.

Aluminum shall not be permanently incorporated into the concrete unless otherwise specified.

When placing operations involve dropping the concrete more than 5 feet, the Contractor shall take action to prevent segregation of the mix and spattering of mortar on steel and forms above the elevation of the lift being placed. This restriction shall not apply to cast-in-place pilings.

When using stay-in-place forms, concrete shall not be dropped more than 3 feet above the top of the forms, and the concrete shall be discharged directly over the beams or girders.

(c) Pumping: The Contractor shall use equipment specifically manufactured to pump concrete mixes and that meets the needs of the specific concrete placement.

(d) Consolidation: Unless otherwise specified, all concrete, except concrete placed under water, shall be sufficiently consolidated by mechanical vibration immediately after placement.

The Contractor shall provide a sufficient number of commercially available mechanical immersion type vibrators to properly consolidate the concrete immediately after it is placed in the forms unless external form vibrators are used. The Contractor shall have an adequate number of operable vibrators available in case of breakdown.

External form vibrators may be used if submitted prior to concrete placement and reviewed by the Engineer.

Vibration shall not be applied directly to the reinforcement or hardened concrete. Special care shall be taken in placing and consolidating concrete around ornamental moulds, form liners and other embedded items. The vibrator shall not touch these items at any time.

(e) Additional Requirements for Bridge Decks: At least 15 days before the erection of the screed rails, the Contractor shall submit screed erection plans, grades and sequence of concrete placement and proposed rate of placing concrete for review by the Engineer.

These plans shall include details of equipment to be used in the placement and finishing of the concrete, including the number and type of personnel who will be engaged in placing the concrete. The screed equipment shall be a commercially available vibratory system. The use of wooden screeds is prohibited.

When setting screed rails for mechanical finishing, the Contractor shall take into consideration and make proper allowances for the deflection of the bridge superstructure due to all operations.

Screed and runway supports shall not be located on any stay-in-place metal form sheets, form supports or reinforcing steel. The Contractor shall operate the mechanical screed at least 24 hours prior to actual placement of the concrete to verify deck survey and equipment operations to the satisfaction of the Engineer.

A Pre-Placement Meeting shall be held on the project site with Contractor, Engineer and concrete supplier 48 hours before the concrete deck pour. The Pre-Placement Meeting will document and include discussion on the following topics:

1. **Schedule:**
   - **(a)** Deck pour sequence
   - **(b)** Daily start and finish times for concrete delivery
   - **(c)** Anticipated completion time
2. **Key Personnel**:
   - **(a)** Concrete placement foreman
   - **(b)** Total number of personnel involved in deck pour and their roles during the pour
   - **(c)** Concrete supplier
   - **(d)** Concrete pump truck operator/service
   - **(e)** Discuss QC/QA
3. **Placement:**
   - **(a)** List of approved delivery trucks per pour
   - **(b)** Pre-wetting forms prior to placement
   - **(c)** Placement sequence
   - **(d)** Rate of concrete placement and vibrator process
   - **(e)** Monitor concrete temperature during placement
   - **(f)** Transverse joint bulkheads
   - **(g)** Approved concrete low-permeability mix design
4. **Curing:**
   - **(a)** Curing materials (burlap, quilted blankets, etc.)
   - **(b)** Means for pre-soaking curing materials.
   - **(c)** Foggers
   - **(d)** Soaker hoses
   - **(e)** White Plastic Sheeting
   - **(f)** Water source and supply tanks

Concrete shall be deposited in a uniform manner across the entire width being placed, and only 2 passes of the transverse screed will be permitted over a given deck area, unless otherwise allowed by the Engineer.

If the Contractor proposes to place concrete outside of daylight hours, an adequate lighting system must be provided.

Concrete shall be deposited in accordance with the placement sequence as noted on the plans. If no sequence is indicated, the Contractor shall provide a placement sequence to the Engineer for review. The placement sequence shall proceed in such a manner that the total deflection or settlement of supporting members, and the final finishing of the surface will occur before the initial set of the concrete takes place.

At construction joints, concrete shall not be placed against the previously placed concrete for at least 12 hours unless otherwise allowed by the Engineer.

(f) Underwater Placement: Concrete may only be placed under water within a cofferdam unless otherwise specified in the Contract or allowed by the Engineer. Placement shall begin following inspection and acceptance of the depth and character of the foundation material by the Engineer.

Underwater concrete mixes are considered non-standard designs and shall be submitted to the Engineer for approval. Typically a minimum of 10% additional cement than comparable non-underwater mixes will be required.

Underwater concrete shall be placed continuously with the surface of the concrete kept as horizontal as practical. To ensure thorough bonding, each succeeding layer shall be placed before the preceding layer has taken initial set. For large concrete placements, more than 1 tremie or pump shall be used to ensure compliance with this requirement.

Mass concrete placement requirements, outlined in 6.01.03-II-6(g), do not apply to underwater concrete.

To prevent segregation, underwater concrete shall be placed in a compact mass, in its final position, by means of a tremie, concrete pump, or other approved method and shall not be disturbed. Still water shall be maintained at the point of deposit. Cofferdams shall be vented during the placement and curing of the concrete to equalize the hydrostatic pressure and thus prevent flow of water through the concrete.

If a tremie is used, the method of depositing the concrete shall be detailed in a submission to the Engineer as a working drawing for review. The tube shall have watertight couplings and shall permit the free movement of the discharge end over the area of the work.

(g) Mass concrete placement: Mass concrete placement shall be defined as any placement, excluding underwater concrete placement, in which the concrete being cast has dimensions of 5 feet or greater in each of 3 different directions. For placements with a circular cross-section, a mass concrete placement shall be defined as any placement that has a diameter of 6 feet or greater and a height of 5 feet or greater. For all mass concrete placements, the mix temperature shall not exceed 85°F as measured at point of discharge into the forms.

Any special concrete mix design proposed by the Contractor to meet the above temperature requirements shall be submitted to the Engineer for review.

7. Finishing Plastic Concrete: Unless otherwise specified in the Contract, after concrete has been consolidated and prior to final curing, all surfaces of concrete that are not placed against forms shall be struck-off to the planned elevation or slope. The surface shall be finished by floating with an acceptable tool. While the concrete is still in a workable state, all construction and expansion joints shall be tooled with an edger. Joint filler shall be left exposed. For requirements on float finish, refer to 6.01.03-II-10, Finishing Concrete Surfaces.

After completion of the placing and finishing operation and for at least 12 hours after the concrete has set, the Contractor shall not operate any equipment in the immediate vicinity of the

freshly placed concrete if, in the opinion of the Engineer, it could cause excessive vibration, movement or deflection of the forms.

The addition of water to the surface of the concrete to assist in finishing operations will not be permitted.

(a) Bridge Decks: After the concrete has been consolidated and brought to the proper elevation by the screed machine, it shall be finished by use of a suitable float. The Contractor shall not disturb the fresh concrete after it has been finished. All finishing work, including the application of the fog spray and placement of the curing mats, shall be performed from work bridges supported above the deck surface. A work bridge shall be made available to the Engineer for inspection of the concrete work.

Surfaces that are to be covered with a waterproofing membrane shall be finished to a smooth surface, free of mortar ridges and other projections and in accordance with the membrane manufacturer's recommendations.

Unless otherwise noted in the Contract, the concrete wearing surfaces shall be given a skid-resistant texture by dragging, brooming, tining, or by a combination of these methods These methods shall be done after floating and at such time and in such manner that the desired texture will be achieved while minimizing displacement of the larger aggregate particles.

1. Dragging: The surface shall be finished by dragging a seamless strip of damp burlap over the surface. The burlap to be dragged shall consist of sufficient layers and have sufficient length in contact with the concrete to slightly groove the surface. The burlap shall be drawn longitudinally along the surface in a slow manner so as to leave an even texture. The burlap shall be kept damp, clean, and free of particles of hardened concrete. The Contractor may propose an alternate material for the Engineer's consideration.
2. Tining: Tining shall be in a transverse direction using a wire broom, comb, or float having a single row of tines or fins. The tining grooves shall be between 1/16 inch and 3/16 inch wide and between 1/8 inch and 3/16 inch deep, spaced 1/2 inch to 3/4 inch on centers. Tining shall be discontinued 12 inches from the curb line on bridge decks. The area adjacent to the curbs shall be given a light broom finish longitudinally. As an alternative, tining may be achieved using a machine designed specifically for tining or grooving concrete pavements.

   The transverse grooving shall be performed when the grooves can be formed to a maximum depth of 3/16 inch with relative ease and without the walls of the grooves closing in on each other. The tining shall be aligned so as to prevent overlapping of grooves in any 2 successive transverse passes. The Contractor shall measure the depth of the grooves in the presence of the Engineer with an appropriate device to ensure compliance.

(b) Surface Testing and Correction: The completed surface shall be constructed in accordance with grades and cross slopes shown on the plans. The entire surface shall be checked by the Contractor in the presence of the Engineer, with an acceptable 10 foot straightedge.

1. The surface shall not vary more than +/- 1/8 inch over 10 feet for decks which will not be covered with an overlay.
2. The surface shall not vary more than +/- 1/4 inch over 10 feet for decks which will be

covered with an overlay.

Variances greater than these, which, in the opinion of the Engineer, may adversely affect the riding qualities of the surface shall be corrected, and this shall be done at the expense of the Contractor. The Contractor shall submit a corrective procedure to the Engineer for review and approval. The procedure shall correct such irregularities by methods such as, but not limited to, concrete planing or grooving.

8. Bearing Surfaces: Concrete surfaces under metallic masonry plates and elastomeric bearings shall have a float finish. After the concrete has set, the area which will be in contact with the masonry plate shall be ground as necessary to provide full and even bearing. The finished surface shall not vary from a straightedge laid on the surface in any direction within the limits of the masonry plate by more than
0.0625 inch. Surfaces which fail to conform shall be ground or filled until acceptable to the Engineer.

9. Curing Concrete: All newly placed concrete shall be cured so as to prevent loss of water by use of the methods specified. The Engineer may request that the Contractor furnish a curing plan.

The duration of the initial and final curing period in total shall continue uninterrupted for a minimum of 7 days.

(a) Curing Methods:

1. Forms-In-Place Method: Formed surfaces of concrete may be cured by retaining the forms in place without loosening. During periods of hot weather, water shall be applied to the forms until the Engineer determines that it is no longer required.
2. Water Method: Exposed concrete surfaces shall be kept continuously wet by ponding, spraying, or covering with materials that are kept continuously and thoroughly wet. Such materials may consist of cotton mats, multiple layers of burlap, or other approved materials that do not discolor or otherwise damage the concrete.
3. Waterproof Cover Method: This method shall consist of covering exposed surfaces with a waterproof sheet material to prevent moisture loss from the concrete. The concrete shall be wet at the time the cover is installed. The sheets shall be of the widest practicable width and adjacent sheets shall overlap a minimum of 6.0 inches to form a waterproof cover of the entire concrete surface and shall be adequately secured. Broken or damaged sheets shall be immediately repaired and the concrete shall be remoistened.

(b) Additional Requirements for Bridge Decks:

Curing Plan: The Contractor shall submit to the Engineer, at least 14 days prior to the placement of concrete for the bridge deck, a detailed curing plan that describes the following:

A. the initial and final curing durations,
B. equipment and materials to be used for curing concrete and monitoring concrete temperature,
C. and proposed primary and secondary water and heat sources

1. Initial Curing Period: A water fog spray shall be used by the Contractor from the time of initial placement until the final curing period begins. The amount of fog spray shall be strictly controlled so that accumulations of standing or flowing water on the surface of the concrete shall not occur.

Should atmospheric conditions render the use of fog spray impractical, the Contractor shall request approval from the Engineer to use a curing compound that meets the requirements of M.03 in lieu of a fog spray. The application shall be in accordance with the manufacturer's recommendation and be compatible with the membrane waterproofing.

2. Final Curing: After completion of finishing and as soon as any bleed water has dissipated and the concrete reaches sufficient strength to avoid marring, the Final curing period shall begin and the entire concrete surface shall be covered with water-retaining materials such as cotton mats, multiple layers of burlap, or other materials approved by the Engineer. Materials used shall be kept saturated by means of an acceptable sprinkler or wetting system.

   The Contractor may cover the wet water-retaining material with a suitable polyethylene film to minimize evaporation during the curing period. The use of the polyethylene film does not relieve the Contractor from maintaining saturation of the curing materials.

3. Temperature Monitoring: The internal temperature of the concrete shall be monitored with a calibrated continuous recording thermometer for a minimum of 7 days. The air temperature at the concrete surface or the air temperature between the concrete surface and its protective covering shall be monitored with a minimum of 1 recording thermometer.

   The number and placement of the thermometers will be determined by the Engineer. A minimum of 2 thermometers per concrete placement shall be provided by the Contractor.

   The following types of thermometers shall be used to monitor curing temperatures:

   i) Continuously Recording Thermometer: The thermometer shall be capable of continuously recording temperatures within a range of -4ºF to 122ºF for a minimum of 24 hours.

   ii) Maximum–Minimum Recording Thermometer: For all placements, the thermometer shall be capable of recording maximum and minimum temperatures in a range of -4ºF to 122ºF.

10. Finishing Concrete Surfaces: Any minor repairs due to fins, bulges, offsets and irregular projections shall be performed immediately following the removal of forms. For areas of newly placed concrete that are honeycombed or segregated the Contractor shall provide a written corrective procedure for review by the Engineer prior to the work being performed. Construction and expansion joints in the completed work shall be left carefully tooled and free of mortar and concrete. The joint filler shall be left exposed for its full length with clean and true edges.

The cavities produced by form ties and all other holes, broken corners or edges, and other defects shall be cleaned, saturated with water, pointed and trued with a mortar conforming to M.11.04. Cement similar in color to the exposed surface being repaired shall be added to the mortar. Mortar used in pointing shall be used within 1 hour of mixing. The concrete shall be finished as defined below if required and the cure continued as previously specified in 6.01.03-II-9, Curing Concrete.

Finishing work shall not interrupt the curing period unless permitted by the Engineer. The curing period may be extended to provide the minimum total number of days required.

Concrete surface finishes shall be classified as follows:

(a) Float Finish: This finish shall be achieved by placing an excess of material in the form and removing or striking off of such excess forcing the coarse aggregate below the mortar surface. Concave surfaces in which water will be retained will not be allowed. After the concrete has been struck off, the surface shall be thoroughly worked and floated. Before this last finish has set, the surface shall be lightly stripped with a fine brush to remove the surface cement film, leaving a fine-grained, smooth, but sanded texture. Curing, as specified elsewhere, shall follow. Any surfaces that will support appurtenances such as light standards, railing, or fences shall be finished in accordance with 6.01.03-II-8, Bearing Surfaces.

(b) Rubbed Finish: The initial rubbing shall only be allowed within 3 days after placement. The entire surface shall be thoroughly wet with a brush and rubbed with a No. 16 Carborundum Stone or an abrasive of equal quality, bringing the surface to a paste. The rubbing shall be continued sufficiently to remove all form marks and projections, producing a smooth, dense surface without pits or irregularities. The paste formed by the rubbing may be finished by stripping with a clean brush, or it may be spread uniformly over the surface and allowed to re-set. If all or portions of the rubbed surface are unacceptable to the Engineer or a rubbed finish is not provided within 3 days after removal of forms, the Contractor will be directed to provide a grout clean down finish.

(c) Grout Clean-Down Finish: As soon as all cavities have been filled as required elsewhere and the cement mortar has set sufficiently, grout clean-down shall be performed. All burrs, unevenness, laitance, including that in air holes, and any other material which will adversely affect the bond of the grout to the concrete, shall be removed by acceptable methods. This cleaning shall be done from the top or uppermost part of the surface to be finished to the bottom.

A mixture of a fine aggregate and Portland cement shall be thoroughly blended while dry. The proportions shall be such that when mixed with the proper amount of water, the color will match that of the concrete to be finished. Water shall be added to this mixture in an amount which will bring the grout to a workable thick paint-like consistency.

The surface to be treated shall be thoroughly wetted with a sufficient amount of water to prevent the absorption of water from the grout. Grout shall then be applied to the wetted surface before setting of the grout occurs. Grout which has set shall not be re-tempered and shall be disposed of by the Contractor at no cost to the State.

The grout shall be uniformly applied over the entire surface, completely filling all air bubbles and holes. Immediately after applying the grout, the surface shall be floated with a suitable float, scouring the surface vigorously. While the grout is still plastic, all excess grout shall be removed.

After the final rubbing is completed and the surface has dried, it shall be rubbed to remove loose powder and shall be left free from all unsound patches, paste, powder, and objectionable marks. Wetting, application and removal of excess grout shall be completed in 1 work shift.

All finished surfaces shall be cured for a minimum of 24 hours. Horizontal surfaces shall have a float finish and vertical exposed surfaces shall have a rubbed finish. A grout clean down finish may be substituted for a rubbed finish as noted in this section or as directed by the Engineer.

11. Mortar, Grout, Epoxy and Joint Seal:

(a) Mortar and Grout: This work consists of the making and placing of mortar and grout. At least 48 hours prior to the planned use, a copy of the installation instructions and MSDS sheets shall be provided to the Engineer for review and concurrence of their applicability and for verification of proper hole sizes in concrete structures. Such uses include mortar for filling under masonry plates, mortar used to fill voids and repair surface defects, grout used to fill sleeves for anchor bolts, and mortar and grout for other such uses where required or approved.

Concrete areas to be in contact with the mortar or grout shall be cleaned of all loose or foreign material that would in any way prevent bond, and the concrete surfaces shall be flushed with water and allowed to dry until no free-standing water is present.

The mortar or grout shall completely fill and shall be tightly packed into recesses and holes, on surfaces, under structural members, and at other locations specified. After placing, all surfaces of mortar or grout shall be cured as previously specified in 6.01.03-II-9(a)-2, for a period of not less than 3 days.

(b) Epoxy: The epoxy shall be prepared and placed in accordance with the manufacturer's directions and with the equipment prescribed by the manufacturer. Instructions furnished by the supplier for the safe storage, mixing, handling and application of the epoxy shall be followed. Contents of damaged or previously opened containers shall not be used.

(c) Joint Seal: This work consists of sealing joints where shown on the plans or as otherwise directed by the Engineer.

Before placement of the sealing material, the joints shall be thoroughly cleaned of all scale, loose concrete, dirt, dust or other foreign matter. Projections of concrete into the joint space shall be removed. The joint shall be clean and dry before the sealing compound is applied.

The joint sealant shall be prepared and placed in accordance with the manufacturer's directions and with the equipment prescribed by the manufacturer. The sealing compound shall be flush with, or not more than 1/8 inch above the adjacent surface of concrete, cutting off all excess compounds after the application. The joints shall be sealed in a neat and workmanlike manner and when the work is completed, the joints shall effectively seal against infiltration of moisture and water.

The Contractor shall arrange for, and have present at the commencement of the joint-sealing operation, a technically competent manufacturer’s representative knowledgeable in the methods of installation of the sealant. The Contractor shall also arrange to have the representative present at such other times as the Engineer may request.

(d) Closed Cell Elastomer: The closed cell elastomer shall be of the thickness specified and installed as shown on the plans and shall be in accordance with M.03.08-6.

12. Application of Loads: Loads shall not be applied to concrete structures until the concrete has attained sufficient strength and, when applicable, sufficient pre-stressing and post tensioning has been completed, so that damage will not occur. The means to determine when the concrete has attained sufficient strength shall be the use of Progression cylinders as defined elsewhere in this specification, or other means approved in advance by the Engineer.

(a) Earth Loads: The placement of backfill shall not begin until the concrete is cured and has reached at least 80% of its specified strength unless otherwise permitted by the Engineer.

The sequence of placing backfill around structures shall minimize overturning or sliding forces and flexural stresses in the concrete.

(b) Construction Loads: Light materials and equipment may be hand carried onto bridge decks only after the concrete has been in place at least 24 hours providing curing is not interfered with and the surface texture is not damaged.

Prior to the concrete achieving its specified compressive strength, any other live or dead loads imposed on existing, new, or partially completed portions of structures, shall not exceed the reduced load carrying capacity of the structure, or portion of structure. The Contractor may be required to submit calculations to the Engineer that verify these requirements are being met. The compressive strength of concrete (f' c) to be used in computing the load-carrying capacity shall be the smaller of the actual field compressive strength at the time of loading or the specified design strength of the concrete. The means to determine the actual field compressive strength shall be approved by the Engineer.

For post-tensioned structures, no live or dead loads shall be allowed on any span until the steel for that span has been tensioned.

(c) Precast concrete or steel girders shall not be placed on substructure elements until the substructure concrete has attained 85% of its specified strength.

No load shall be allowed on mortar or grout that has been in place less than 72 hours.

(d) Traffic Loads: The concrete deck will not be opened to traffic until at least 14 days after the last placement of deck concrete and until such concrete has attained its specified strength.

13. Dispute Resolution: The basis of any dispute resolution is side-by-side and quality control testing by the Contractor or the Contractor's representative. The Contractor and Engineer should perform independent testing on the material to reasonably establish the true characteristics of the material at the time of delivery. Absent of Contractor QC testing, the Engineer's test results will apply to the quantity of concrete represented by the sample, not to exceed 75 c.y.

Air Content: Contractor QC Testing must be performed by personnel qualified by The American Concrete Institute as an ACI Concrete Field Testing Technician Grade 1 or higher and performed in accordance with AASHTO T-23. If the Contractor's test results vary from those of the Engineer, the Contractor shall immediately notify the Engineer of the difference and work cooperatively to determine the reasonable cause and recognize the valid test. Should there be agreement, the result of the valid test will be used for acceptance and adjustment purposes for that lot of material. Should there not be an agreement as to the valid test, an additional set of tests should be performed. Results of all valid tests on the same lot may be averaged and used for acceptance and adjustment purposes. Should the Contractor wish to perform additional QC testing on subsequent material, the lot sizes may be adjusted to the amount of material included in that specific delivery. Any such QC testing must be witnessed and agreed to by the Engineer.

Compressive Strength: Contractor QC testing for compressive strength must be performed in accordance with AASHTO T-22 by personnel approved by the Engineer. Samples used to dispute the Engineer's test results must be made simultaneously and from the same batch of concrete. Should the Contractor wish to pursue a dispute resolution with regard to compressive strength, the Contractor shall submit in writing to the Engineer all test results, control charts, or other documentation that may be useful in determining if the specific lot(s) of material met the Contract specifications. The Engineer will consider the submittal and may average specific test results on the disputed lot(s) for acceptance and adjustment purposes. Destructive testing of any

kind on the placed concrete structure will not be allowed.

III. Additional Requirements for Surface Repairs and Structural Repairs

1. Work Area Access and Shielding: Prior to removal of existing concrete, the Contractor shall provide access to the anticipated work areas so that the inspector and the Contractor may together determine and delineate the exact limits and locations of the work.

The Contractor shall design, furnish, install and remove a shield(s) to prevent debris from entering areas adjacent or beneath the work. The Contractor shall submit working drawings to the Engineer in accordance with 1.05.02. The shield(s) shall be maintained by the Contractor and remain in place during all phases of the repair work.

2. Concrete Removal: The perimeter of each area to be repaired shall be saw cut as shown on the plans. All concrete within that area shall be removed to at least 1 inch beneath any visible reinforcing steel and to sound concrete. The reinforcing steel shall not be damaged or its bond in the surrounding concrete. The Contractor must use fifteen (15) pound hammers or other methods accepted by the Engineer.

In addition to removal of concrete to a depth of 1 inch below reinforcing steel, localized areas of removal may be required if embedded galvanic anodes are specified in the Contract, to allow a minimum of 2 inches of concrete cover over the anodes.

Any steel reinforcing scheduled to be left in place that is damaged during the concrete removal process shall be replaced in accordance with 6.02 to the satisfaction of the Engineer and at the expense of the Contractor.

Corroded, missing, or broken reinforcing steel shall be replaced in accordance with 6.02 and as shown on the plans or as directed by the Engineer.

The Contractor shall perform the work in a manner that prevents debris from entering roadway lanes or areas below the structure. All debris shall be removed from the Site and disposed of by the Contractor.

3. Surface Preparation: All newly exposed surfaces of concrete shall be sandblasted and be visibly free from oil, solvent, grease, loose particles, or any other foreign matter. Exposed reinforcing steel shall be sandblasted in accordance with SSPC-SP-6, Commercial Blast Cleaning, to remove all contaminants, rust and rust scale.

4. Installation of Embedded Galvanic Anodes: After sandblasting reinforcing steel, galvanic anodes shall be embedded where shown on the plans and in accordance with the Contract.

5. Welded Wire Fabric in Vertical and Overhead Surface Repairs: Prior to installing formwork, steel welded wire fabric meeting the requirements of M.06.01-3 shall be installed at the proper depth in those areas as shown on the plans or directed by the Engineer. The fabric shall be tied to exposed reinforcing steel or anchored to sound concrete using means approved by the Engineer.

6. Formwork: Forms and support systems shall be designed in accordance with 6.01.03-II-1. Forms shall be so designed so that access is from the top of the formwork. If access is not possible from the top of the formwork, the Contractor shall submit a method of concrete placement for review by the Engineer.

7. Concrete Placement and Curing: Bonding compounds shall not be used before or during the placement of the concrete. Exposed surfaces shall be wetted with water immediately prior to placement. There shall be no excessive water on the surface or in the formwork. Light rust on sandblasted reinforcing steel can be anticipated and is acceptable.

The temperature of the air and surface to be repaired at the time of placement and curing shall be a minimum of 45°F. Concrete shall be placed and consolidated immediately with appropriate vibratory equipment.

Forms shall be kept moist and shall be left in place for a minimum of 7 days or as shown on the plans.

8. Form Removal and Sequence of Repair: Form removal shall be in accordance with 6.01.03-II-1(m) unless otherwise noted on the plans. The Contractor shall follow the sequence of repairs shown on the plans.

9. Finishing: Immediately following curing and form stripping, the exposed faces shall be finished in accordance with Subarticle 6.01.03-II-10(c) Grout Clean-Down Finish.

10. Sounding of Completed Repairs: Cured and finished areas may be sounded by the Engineer to detect the presence of subsurface voids or delamination. Such areas shall be removed and replaced by the Contractor at its expense until an acceptable repair is in place as determined by the Engineer.

11. Sealing Concrete Surfaces: After all repairs have been accepted, penetrating sealer shall be applied in accordance with the Contract to the repaired areas as well as all contiguous areas to the repair or as directed by the Engineer.

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

1. Concrete used for new construction: The quantity of concrete used for new construction will be the actual volume in cubic yards of the specified class, with the exception of underwater concrete, completed and accepted within the neat lines as shown on the plans or as ordered by the Engineer. Parapets will be measured for payment by the number of linear feet of parapet, completed and accepted. The length of parapet will be measured along the centerline of the top of the parapet.

When concrete is placed against bedrock, a maximum of 6 additional inches beyond the neat lines can be measured for payment.

No deduction will be made for panels, form liners, reinforcing bars, structural steel shapes or for pile heads. There will be no deduction made for the volume occupied by culvert and drainage pipes, scuppers, weep holes, public utility structures or any other opening, unless the surface area of any such single opening is 9 s.f. or more.

In the case of culverts or drainage pipes, the computation of the surface area will be based on the nominal diameter of the pipe, disregarding the thickness of the shell.

Miscellaneous materials necessary for completion of the work such as felt, mortar, grout, epoxy and joint seal will not be measured for payment.

Incidental work such as forming for anchor bolts, utilities, keyways, and sampling and testing will not be measured for payment.

The work to produce and administer the Concrete Quality Control Plan (CQCP) will not be measured for payment.

2. Underwater Concrete: When underwater concrete is used, it will be measured by the volume in cubic yards within the actual horizontal limits of the cofferdam and between the elevations established by the Engineer.

3. Concrete used for Surface or Structural Repairs: The quantity of concrete used for surface repairs or structural repairs will be the actual volume completed and accepted. Welded wire fabric used in repair areas will not be measured for payment.

4. Joint Filler: This material will be measured by the area in square feet of the joint filler, of the type and thickness specified, installed and accepted.

5. Closed Cell Elastomer: This material will be measured by the volume in cubic inches of elastomer, of the thickness specified, installed and accepted.

6.01.05—Basis of Payment: Payment for this work will be made as follows:

1. Concrete: Progress payments may be allowed for completed major labor elements of work such as forming, placing and curing. Prior to placement, the Contractor shall submit a proposed schedule of values for review and approval by the Engineer.

Payment for any lot of concrete allowed to remain in place will be adjusted when the field and laboratory testing of the material is completed. The quantity of concrete in each lot for new construction will be a maximum of 75 c.y. Payment for each lot of concrete will be adjusted based on the results of the acceptance testing performed by the Engineer.

The pay factors listed in Table 6.01.05-1 apply for Standard and Modified Standard Mix classes with regard to entrained air content.

Table 6.01.05-1 Entrained Air Content Pay Factors

Specified Entrained air (%)*				**Pay factor (%)**
6.0 +/- 1.5%		7.5 +/- 1.5%		1.00 (100)
4.3 and 4.4	7.6 and 7.7	5.8 and 5.9	9.1 and 9.2	0.98 (98)
4.1 and 4.2	7.8 and 7.9	5.6 and 5.7	9.3 and 9.4	0.96 (96)
3.9 and 4.0	8.0and 8.1	5.4 and 5.5	9.5 and 9.6	0.94 (94)
3.7 and 3.8	8.2 and 8.3	5.2 and 5.3	9.7 and 9.8	0.92 (92)
3.5 and 3.6	8.4 and 8.5	5.0 and 5.1	9.9 and 10.0	0.90 (90)
Concrete lots with less than 3.5% or greater than 8.5% entrained air will be rejected.		Concrete lots with less than 5.0% or greater than 10% entrained air will be rejected.		
***Air content measured at time and point of placement**				

The pay factors listed in Table 6.01.05-2a apply for Standard and Modified Standard Mix classes with regard to compressive strength.

Table 6.01.05-2a Compressive Strength Pay Factors

Compressive Strength (%)	**Pay factor (%)**
95 or greater	1.00 (100)
90 to 94.9	0.95 (95)
85 to 89.9	0.90 (90)
*Measured at 28 days	
Concrete lots with less than 85% specified strength will be rejected.	

The pay factors listed in Table 6.01.05-2b apply for Standard and Modified Standard Mix classes with regard to surface resistivity when specified in accordance with AASHTO T 358 using 4 inch × 8-inch cylinders.

Table 6.01.05-2b Permeability Pay Factors

Surface Resistivity (kΩ-cm)*	Pay factor (%)
29 or greater	1 (100)
25 to 28.9	0.85 (85)
21 to 24.9	0.75 (75)
***Measured at 56 days**	
Concrete lots with resistivity values less than 21 will be rejected.	

The payment adjustment value for entrained air, 28-day strength, and permeability if applicable, for any lot of concrete for new construction that is allowed to remain in-place is determined using the formulas listed in Table 6.01.05-3a. An Index Price of $400.00 per c.y. will be used to calculate each adjustment, except for Parapet Concrete, for which an Index Price of $100 per l.f. will be used. The sum of the individual adjustment values will be deducted from the cubic yard or linear foot payment for the appropriate item.

Table 6.01.05-3a Payment Adjustment Formulas for New Construction

Adj (air) = (1 - air pay factor) × Index Price × lot size (c.y. or l.f.)
Adj (strength) = (1 - strength pay factor) × Index Price × lot size (c.y. or l.f.)
Adj (permeability) = (1 – permeability pay factor) × Index Price × lot size (c.y. or l.f.)
Total Adjustment = Adj (air) + Adj (strength) + Adj (permeability)

The payment adjustment value for entrained air and 28-day strength for any lot of repair concrete that is allowed to remain in-place is determined using the formulas listed in Table 6.01.05-3b. An index price of $200.00 per c.f. shall be used to calculate each adjustment. The total adjustment value will be the sum of each individual adjustment value and will be deducted from the cubic foot payment for the appropriate item.

Table 6.01.05-3b Payment Adjustment Formulas for Repair Concrete

Adj (air) = (1 - air pay factor) × $200/c.f. × lot size (c.f.)
Adj (strength) = (1 - strength pay factor) × $200/c.f. × lot size (c.f.)
Total Adj = Adj (air) + Adj (strength)

The Contractor shall request permission from the Engineer to remove and replace a lot(s) of concrete to avoid a negative payment adjustment. Any replacement material will be sampled, tested and evaluated in accordance with this specification.

No direct payment will be made for any labor, equipment or materials used during the sampling and testing of the concrete for Progression or Acceptance. The cost shall be considered as included in the general cost of the work or as stated elsewhere in the Contract. The work of transporting the concrete test specimens, after initial curing, for Acceptance testing will be performed by the Department without expense to the Contractor.

This material used for new construction will be paid for at the Contract unit price per cubic yard or linear foot less any adjustments, for the specified class, complete in place, which price shall include all materials, equipment, tools, labor and work incidental thereto, including Concrete Quality Control Plan, heating, all admixtures, joint sealer, roofing felt, and any miscellaneous materials such as metal flashing and metal used in expansion joints and bearings.

2. Underwater Concrete: When this class of concrete is used, it will be paid for at the Contract unit price per cubic yard for "Underwater Concrete," complete in place, which price shall include all materials, equipment, tools, labor and work incidental thereto.

3. Concrete Used For Structural Repairs or Surface Repairs: The material used for structural repairs or surface repairs will be paid for at the Contract unit price per cubic foot less any adjustments, complete in place, which price shall include saw cutting, removing concrete, sandblasting, cleaning, forming, placing, curing, stripping, and finishing new surfaces, and all materials, equipment, tools, labor and clean-up incidental thereto.

4. Joint Filler: Expansion joint filler will be paid for at the Contract unit price per square foot for "Joint Filler for Bridges" of the type and thickness specified, complete in place, which price shall include all materials, equipment, tools, labor and work incidental thereto.

5. Closed Cell Elastomer: Closed cell elastomer will be paid for at the Contract unit price per cubic inch for “Closed Cell Elastomer” of the thickness specified, complete in place, which price shall include all materials, equipment, tools, labor and work incidental thereto.

Embedded galvanic anodes, deformed steel bars, and penetrating sealer, will be paid for separately.

Pay Item	Pay Unit
Footing Concrete	c.y.
Footing Concrete (Mass)	c.y.
Abutment and Wall Concrete	c.y.
Abutment and Wall Concrete (Mass)	c.y.
Column and Cap Concrete	c.y.
Column and Cap Concrete (Mass)	c.y.
Bridge Deck Concrete	c.y.
Bridge Deck Concrete (SIP Forms)	c.y.
Parapet Concrete	l.f.
Bridge Sidewalk Concrete	c.y.
Approach Slab Concrete	c.y.
Barrier Wall Concrete	c.y.
Underwater Concrete	c.y.
Surface Repair Concrete	c.f.
Structural Repair Concrete	c.f.
Class PCCXXXYZ Concrete	c.y.
(Thickness and Type) Joint Filler for Bridges	s.f.
(Thickness) Closed Cell Elastomer	c.i.

SECTION 6.03 - STRUCTURAL STEEL

Section 6.03 *is amended as follows:*

6.03.03—Construction Methods: *Revise* Subarticle **4(f)** "**High Strength Bolted Connections**" *as follows:*

Replace the first paragraph and Table A: "Minimum Bolt Tension in kips" *with the following:*

" The assembly of structural connections using high-strength bolts shall be installed so as to develop the minimum required bolt tension specified in Table A. The Manufacturer's certified test report; including the rotational capacity test results must accompany the fastener assemblies. Fastener Assemblies delivered without the certified reports will be rejected.

Table A: Minimum Bolt Tension in kips*

Bolt Diameter (Inches)	ASTM F3125 Grade A325	ASTM F3125 Grade A490
5/8	19	24
3/4	28	35
7/8	39	49
1	51	64
1 1/8	64	80
1 1/4	81	102
1 3/8	97	121
1 1/2	118	148

*Equal to 70% of specified minimum tensile strength of bolts (as specified in ASTM Specifications for tests of full-size F3125 Grade A 325 and F3125 Grade A 490 bolts with UNC threads, loaded in axial tension) rounded to the nearest kip.

Revise the last sentence of the sixteenth paragraph, "**Rotational-Capacity Tests**" *as follows:*

" When performed in the field, the procedure shall meet the requirements of ASTM F3125 Annex A2."

In Table C, insert the word "**Grade**" *in the third row before every occurrence of* "**A325**" and "**A490**."

SECTION 6.86 - DRAINAGE PIPES, DRAINAGE PIPE ENDS

6.86.01—Description: This work shall consist of furnishing, preparing and installing drainage pipes of the size and type specified, bedding material, joint sealant, rubber gaskets, clamps, collars, grout, grout collars, drainage trench excavation, backfilling or satisfactory disposal of all materials, the removal of which is necessary for the proper completion of the work, connecting proposed drainage systems to existing systems, plugging or abandoning existing pipes and removal of existing pipe within trench limits, as shown on the plans or as directed by the Engineer.

This Section shall also include removal of drainage pipes outside of drainage trench excavation limits, as defined in 2.86.03-1.

6.86.02—Materials: The materials for this work shall meet the following requirements:

Drainage Pipe, Drainage Pipe Ends, Sealers, Gaskets and connection hardware shall meet the requirements of M.08.01.

Bedding Material shall meet the requirements of M.08.03-1.

Granular Fill, if necessary, shall meet the requirements of M.02.01.

Brick Masonry shall meet the requirements of M.11.03 and Mortar shall meet the requirements of M.11.04.

Concrete used for Concrete Pipe Connections shall be Class "F" Concrete meeting the requirements of M.03.

6.86.03—Construction Methods:

(1) Drainage Trench Excavation: Drainage trench excavation and backfilling shall be performed in accordance with 2.86.03 and the requirements of the plans.

Where drainage pipe is to be laid below the surface, a drainage trench shall be excavated to the required depth, the bottom of which shall be graded to the elevation of the bottom of the bedding material.

Where drainage pipe is to be laid in a fill area, the embankment shall be placed and compacted to a minimum elevation 12 inches above the top of the proposed pipe, whereupon the drainage trench excavation shall be performed and the pipe installed.

(2) Rock in Drainage Trench Excavation: When rock, as defined in 2.86.01-2, is encountered, work shall be performed in accordance with 2.86.03 and the requirements of the plans.

(3) Drainage Pipe Installation: New or re-laid drainage pipes shall be installed on 4 inches of bedding material (12 inches if over rock in ledge formation), the details as shown on the plans, or as directed by the Engineer. Prior to placement of the drainage pipe, in accordance with the plans, bedding material shall be pre-shaped to 10% of the total height

of the pipe in order to keep the pipe in the center of the trench. Following placement of the drainage pipe, bedding material backfill shall be placed in accordance with the following table:

Internal Pipe Diameter	**Required Bedding Material Backfill**
< 48 inches*	25% of total height of the pipe
≥ 48 inches*	12 inches above the top of the pipe
*Includes pipe arch of equivalent internal horizontal span See Standard Drawing	

The placement of the drainage pipe shall start at the downstream end and progress upstream or as shown on the plans, or as directed by the Engineer. All drainage pipes shall be carefully laid in the center of the drainage trench, true to the lines and grades given. Bell ends shall face upgrade and all joints shall be tight.

Joints in concrete pipe shall be sealed with cold-applied bituminous sealer, preformed plastic gaskets or flexible, watertight, rubber-type gaskets. Portland cement mortar shall not be used for sealing pipe joints except with permission of the Engineer.

When cold-applied bituminous sealer is used, the bell and spigot ends shall be wiped clean and dry before applying the bituminous sealer to the pipe ends. Before the drainage pipes are placed in contact with each other, the spigot or tongue end shall be completely covered with bituminous sealer; then the pipe shall be laid to line and grade so the inside surface of all abutting pipes are flush. Additional bituminous sealer shall be applied to the joint after the connection has been made to ensure a water tight connection.

Where the end of an existing drainage pipe is not compatible with the end of a proposed concrete pipe, the Contractor shall align the inner diameters of the pipes being connected, butt the pipe ends together, and construct a cast-in-place concrete pipe connection, as shown in the plans. Incompatible bell/spigot or tongue/groove ends shall be cut off as required to ensure the interior drainage pipe walls are aligned to provide a smooth transition between the pipes.

Metal pipe and pipe arches shall be carefully joined and firmly clamped together by approved connecting bands, which shall be properly bolted in place before any backfill is placed.

Newly installed drainage pipe which is not in true alignment, or which shows any settlement or distortion, shall be reinstalled in accordance with 1.05.03.

When drainage pipe outside of proposed drainage trench limits is to be removed, it shall be removed to the limits shown on the plans and all remaining pipes shall be plugged with cement masonry.

Where shown on the plans or directed by the Engineer, the Contractor shall plug abandoned existing pipes with cement masonry.

(4) Drainage Pipe End Installation: Reinforced concrete drainage pipe ends shall be placed on a prepared bed of the existing ground and accurately aligned as shown on the plans. The joints shall be sealed as specified in 6.86.03-3 and backfill shall be placed around both sides of the unit simultaneously to the elevation shown on the plans.

Metal drainage pipe ends shall be placed on a prepared bed of the existing ground and accurately aligned as shown on the plans. After the attachment of the drainage pipe end, backfill shall be placed around both sides of the unit up to the elevation shown on the plans, exercising caution to avoid displacement or deformation of the unit.

6.86.04—Method of Measurement: This work will be measured as follows:

Drainage Trench Excavation, in accordance with 2.86.04, will not be measured for payment.

Rock in Drainage Trench Excavation will be measured in accordance with 2.86.04.

Bedding Material will not be measured for payment.

New and Re-laid Pipes and Pipe Arches will be measured for payment by the actual number of linear feet of pipe or pipe arch of the various sizes and types, completed and accepted and measured in place along the invert. Coupling bands and fittings for pipes and pipe arches will not be measured for payment.

Reinforced Concrete Drainage Pipe Ends and Metal Drainage Pipe Ends will be measured for payment as separate units.

Corrugated Metal Pipe Elbows (of the Size and Type specified) will be measured for payment by the actual number of linear feet of pipe elbows completed and accepted, based on 6 linear feet per elbow, as shown on the plans. Coupling bands for elbows will not be measured for payment.

Concrete Pipe Connection will be measured for payment by the number of each concrete pipe connection constructed at locations where proposed concrete pipes tie into an existing pipe with an incompatible end, completed and accepted by the Engineer.

Removal of drainage pipe outside of drainage trench excavation limits, as defined in 2.86.03, will be measured for payment by the actual number of linear feet of drainage pipe removed.

There will be no measurement for plugging existing pipes with cement masonry.

6.86.05—Basis of Payment:

Drainage Trench Excavation for the installation of drainage pipes will not be paid separately but shall be included in the Contract unit price for the respective drainage pipe or pipe end item(s), in accordance with the provisions of 2.86.05.

Rock in Drainage Trench Excavation will be paid for in accordance with the provisions of 2.86.05.

Bedding Material necessary for the installation of drainage items described herein will be included in the Contract unit price for the respective drainage pipe or pipe end item(s). Bedding material required to fill voids when rock in drainage trench is encountered will not be measured for payment but shall be included in the Contract unit price for "Rock in Drainage Trench Excavation," in accordance with 2.86.05.

New Pipes and Pipe Arches will be paid for at the Contract unit price per linear foot for "(Size and Type) Pipe (Thickness) – 0' to 10' Deep," "(Size and Type) Pipe (Thickness) – 0' to 20' Deep," "(Size) Pipe Arch (Thickness) – 0' to 10' Deep" or "(Size) Pipe Arch (Thickness) – 0' to 20' Deep" complete in place, including materials, drainage trench excavation, bedding material, equipment, tools, and labor incidental thereto.

Relaid Pipes and Pipe Arches will be paid for at the Contract unit price per linear foot for "Relaid Pipe (Size and Type) – 0' to 10' Deep," "Re-laid Pipe (Size and Type) – 0' to 20' Deep," "Relaid Pipe Arch (Size and Type) – 0' to 10' Deep," or "Relaid Pipe Arch (Size and Type) – 0' to 20' Deep," complete in place, including all materials, drainage trench excavation, bedding material, equipment, tools, and labor incidental thereto.

Reinforced Concrete Drainage Pipe Ends and Metal Drainage Pipe Ends will be paid for at the Contract unit price for each drainage pipe end of the Size and Type specified, complete in place, including all excavation, materials, attachment systems, equipment, tools and labor incidental thereto.

Corrugated Metal Pipe Elbows will be paid for at the Contract unit price per linear foot for "(Size and Type) Corrugated Metal Pipe Elbow" including all materials, drainage trench excavation, bedding material, equipment, tools, and labor incidental thereto.

Concrete Pipe Connection will be paid for at the Contract unit price each for "Concrete Pipe Connection" complete in place, including all materials, equipment, tools and labor incidental thereto.

Removal of drainage pipes of all types and sizes, outside of drainage trench excavation limits, as defined in 2.86.03-1, will be paid for at the Contract unit price per linear foot for "Remove Existing Pipe – 0' to 10' Deep," or "Remove Existing Pipe – 0' to 20' Deep," which price shall include excavation, temporary trench protection, backfill, and all equipment, tools and labor incidental thereto.

There will be no direct payment for the plugging of existing drainage pipes, but the cost thereof shall be included in the respective drainage Contract item(s).

Pay Item	Pay Unit
(Size and Type) Pipe (Thickness) – 0' to 10' Deep	l.f.
(Size and Type) Pipe (Thickness) – 0' to 20' Deep	l.f.
(Size and Type) Pipe Arch (Thickness) – 0' to 10' Deep	l.f.
(Size and Type) Pipe Arch (Thickness) – 0' to 20' Deep	l.f.
Relaid (Size and Type) Pipe– 0' to 10' Deep	l.f.
Relaid (Size and Type) Pipe– 0' to 20' Deep	l.f.
(Size and Type) Relaid Pipe Arch – 0' to 10' Deep	l.f.
(Size and Type) Relaid Pipe Arch – 0' to 20' Deep	l.f.
(Size) Reinforced Concrete Drainage Pipe End	ea.
(Size) Metal Drainage Pipe End	ea.
(Size and Type) Corrugated Metal Pipe Elbow	l.f.
Concrete Pipe Connection	ea.
Remove Existing Pipe – 0' to 10' Deep	l.f.
Remove Existing Pipe – 0' to 20' Deep	l.f.

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

Article 10.00.03 – Plans:
In the first paragraph, replace the 2nd, 3rd, and 4th sentences with the following:

> The Contractor shall digitally mark, in red, any changes on the plan(s) using a pdf program.
>
> The Contractor shall submit the digital pdf file(s) to the Engineer and to DOT.TrafficElectrical@ct.gov, for Traffic Signals, prior to requesting the Functional Inspection.
>
> Also prior to requesting the Functional Inspection, the Contractor shall deliver to the Engineer the following:

In the first paragraph, last sentence, in item no. 1, replace "Four (4)" with "Digital PDF Files and Five (5)" [paper prints of schematics and wiring diagrams…].

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:

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

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

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

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

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

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

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

SECTION M.03 - PORTLAND CEMENT CONCRETE

Replace Section M.03 in its entirety with the following:

M.03.01—Component Materials

1. **Coarse Aggregate:** Coarse aggregate shall meet the requirements of M.01.
2. **Fine Aggregate:** Fine aggregate shall meet the requirements of M.01.
3. **Cement:**

(a) Portland: Types I, II, and III Portland cement shall meet the requirements of AASHTO M 85. Type I and Type III Portland cement shall be used only when required or expressly permitted by the Project specification or the Engineer. The use of Type I or III will require that these mixtures be submitted as Non-standard Mix Designs. All cement shall be provided by a mill participating in the Departments' Cement Certification program. The requirements of the Certification Program are detailed in the Departments' Quality Assurance Program for Materials.

(b) Pre-Blended Cements: Binary or Ternary cements consisting of Portland Cement and supplemental cementitious materials may be used provided that all the requirements of M.03.01- 3(a) and -3(c) are met.

(c) Replacement Materials: Unless already approved as a Standard Mix Design, any Contractor proposed Mix Designs with partial replacement of Portland Cement (PC) with fly ash or ground granulated blast furnace slag (GGBFS), shall be submitted in writing to the Engineer for approval prior to the start of work, on a project-by-project basis. The type of material, source, and the percentage of the PC replaced shall be clearly indicated. Upon request, a Certified Test Report for the cement replacement material shall be provided to the Engineer for use during the Mix Design review.

1. Fly Ash: Fly ash to be used as a partial replacement for Portland cement shall meet the requirements of AASHTO M 295, either Class C or Class F, including the uniformity requirements of Table 2A. Loss on Ignition for either class of fly ash shall not exceed 4.0%. Fly ash may be used to replace up to a maximum of 20% of the required Portland cement for mixes without permeability requirements. For mixes with permeability requirements, the maximum of 20% may be exceeded. The fly ash shall be substituted on a weight basis, with a minimum of 1 lb. of fly ash for 1 lb. of Portland cement. Different classes of fly ash or the same class from different sources shall not be permitted on any single project without the written approval of the Engineer.

2. Ground Granulated Blast Furnace Slag (GGBFS): GGBFS used as a partial replacement for Portland cement shall meet the requirements of AASHTO M 302/ASTM C989, Grade 100 or 120. As determined by the Engineer, GGBFS may be used to replace a maximum of 30% of the required Portland cement for mixes without permeability requirements. For mixes with permeability requirements, the maximum of 30% may be exceeded. The Engineer may restrict or prohibit the use of GGBFS if ambient temperatures anticipated during the placement and initial curing of the concrete are low. The GGBFS shall be substituted on a weight basis, with a minimum of 1 lb. of slag for 1 lb. of Portland cement. Different sources of GGBFS shall not be permitted on any single project without the written approval of the Engineer.

4. Water: All water used in the mixing of concrete shall be odorless and clear in appearance. Surface water may be used if not taken from shallow or muddy sources; classified as Class C or Class D on the Department of Energy and Environmental Protection (DEEP) Water Quality Classification mapping; and accommodations have been made to prevent contaminants from entering the supply to the satisfaction of the Engineer. The Engineer may request that water from any surface or ground source be tested in accordance with AASHTO T26 and AASHTO D512 if the appearance or scent of the water is suspect. To be acceptable, the pH of the water must not be less than 6.0 or greater than 8.0 and Chloride Ion Concentration of the water must not exceed 250ppm. Potable water taken directly from a municipal or regional water supply may be used for mixing concrete without testing. Heating or cooling of water may be required to meet mix temperature requirements at time of placement.

5. Admixtures: All admixtures shall perform their function without injurious effects upon the concrete. If requested by the TDC, the Contractor shall present a certified statement from a recognized laboratory attesting to this requirement. A "recognized" laboratory is any cement and concrete laboratory approved and inspected regularly by the Cement and Concrete Reference Laboratory (CCRL). The statement shall contain results of compression tests of cylinder specimens made with concrete utilizing the admixture(s) in proportions equal to those proposed by the Contractor. The results of at least 5 standard 6 inch x 12 inch cylinders of each mix design shall be listed with the results of at least 5 like-sized cylinders not utilizing the admixture(s). Specimens must be made and cured in the laboratory in accordance with AASHTO T 126 and will be tested in accordance with AASHTO T 22.

(a) Air-Entraining Admixtures: In the event that air entrained concrete is required, an admixture meeting the requirements of AASHTO M 154 may be used. Tests for 7 and 28-day compressive and flexural strengths and resistance to freezing and thawing are required whereas tests for bleeding, bond strength and volume change will not be required.

(b) Other Chemical Admixtures: In the event that concrete properties are specified that require the use of additional admixtures, or the Contractor proposes the use of additional admixtures to facilitate placement, the admixtures shall meet the requirements of AASHTO M194M/M, including the 1 year performance data.

M.03.02—Mix Design Requirements

1. Standard ConnDOT Mix Designs: Standard Mix Designs shall be designed in accordance with applicable sections of ACI 211 and ACI 318. The mixtures shall consist of Portland cement, fine aggregate, coarse aggregate, admixtures, and water proportioned in accordance with Table M.03.02-1. The mixtures shall also be designed to obtain the plastic properties of Portland cement concrete as specified in Table 6.01.03-2.

Table M.03.02-1 Standard Portland Cement Concrete Mixes

Class[1]	Max. Water/Cement[2] ratio	Min. Cement[2] Content - lb./c.y.	Air Content %	Electrical Resistivity (Permeability) kΩ-cm AASHTO T 358
PCC0223Z	0.69	455	6 +/- 1.5	NA
PCC0334Z	0.48	615		NA
PCC0336Z	0.50	564		NA
PCC0354Z	0.49	615		NA
PCC0446Z	0.44	658		NA
PCC04462	0.42			29 minimum
PCC0556Z	0.40			NA
PCC05562	0.40			29 minimum
PCCXXX81[3]	0.46		7.5 +/- 1.5	15 maximum
PCCXXX82	0.40			29 minimum

[1] PCCXXYZ where:
PCC = Portland Cement Concrete
XXX = 28-day minimum compressive strength (psi/100)
Y = Nominal Maximum Aggregate Size (U.S. Sieve No. Designation)
Z = Exposure Factor (See Table M.03.02-1a)

[2] Portland Cement may be partially replaced within a Standard Mix Design by other approved cementitious material meeting the requirements of M.03.01-3(c) if permitted by the Engineer.

[3] When this class is paid for in a surface or structural repair concrete item, the plastic properties necessary for confined placement to ensure appropriate workability for consolidation within the forms shall be noted on the delivery ticket by the concrete supplier.

Table M.03.02-1a Exposure Factor per Application

Exposure		Application
0	Benign	Elements not exposed to weather (buried, enclosed)
1	Moderate	Elements not in contact with salt water or deicing chemicals
2	Severe	Elements in contact with salt water, deicing chemicals, flowing/standing water

Mix designs shall indicate the dosage of admixtures anticipated to provide plastic properties required in the Project specification. Plastic properties of standard mix classes of concrete in the plastic state are listed in Table 6.01.03-2.

Standard Mix Designs are required to be designed and submitted by the concrete producers, and are approved by the Department on a standing basis. Submittal or re-approval of these Standard Mix Designs on an annual basis is not required. Previously approved producer-designed Standard Mixes that have a record of satisfactory performance may be utilized on Department projects unless there is a change in the gravimetric properties or the sources of any materials. Revisions to the Standard Mix Designs, which include changes in component sources, can be submitted at any time to the TDC, but must be approved prior to use on Department projects.

2. Non-Standard CTDOT Mix Designs: Any proposed Mix Designs that do not comply with Table M.03.02-1 are required to be submitted 15 days prior to use on a project-by-project basis and be approved by the TDC prior to use. The use of an approved admixture with an otherwise approved Standard Mix Design is not considered non-standard.

All Non-standard Mix Designs used for load-bearing structures shall contain a minimum of 658 lb./c.y. of cementitious materials.

Concrete used in applications such as flowable fill or controlled low-strength material may be designed with less than 658 lb./c.y. of cementitious materials.

M.03.03—Producer Equipment and Production Requirements

1. General Requirements: The source of the concrete must be approved by the Engineer prior to use on Department projects. Specifically the location and capacity of the central mix or dry batch plant, and complement of truck mixers/haulers, shall be adequate for continuous placement of concrete on a typical Department project. Approval may be revoked at any time in accordance with 1.06.01.

(a) Inspection: The production facility supplying hydraulic cement concrete shall have a current Certification of Ready Mixed Concrete Production Facilities from the National Ready Mixed Concrete Association (NRMCA), or equivalent certification approved by the Engineer.

(b) In addition to the requirements of approved third party certification, the facility shall produce batch tickets that meet the requirements of 6.01.03-3(a).

(c) Quality Control: The Contractor is responsible for all aspects of Quality Control (QC). As determined by the Engineer, should material delivered to a project not meet specification, the Contractor may be required to submit to the Engineer a corrective procedure for approval within 3 calendar days. The procedure shall address any minor adjustments or corrections made to the equipment or procedures at the facility.

(d) Suspension: As determined by the Engineer, repeated or frequent delivery of deficient material to a Department project may be grounds for suspension of that source of material. A detailed QC plan that describes all QC policies and procedures for that facility may be

required to formally address quality issues. This plan must be approved by the Engineer and fully implemented, prior to reinstatement of that facility.

2. Hand Mixed Concrete: Hand mixing shall be permitted only with the permission of the Engineer. Hand mixed batches shall not exceed 1/2 c.y. in volume. Hand mixing will not be permitted for concrete to be placed under water.

M.03.04—Curing Materials

1. Water: Any water source deemed acceptable by the Engineer for mixing concrete may be used to provide water for curing purposes. Surface water may be used if classified as Class C or Class D on the Department of Energy and Environmental Protection (DEEP) Water Quality Classification mapping and accommodations have been made to prevent contaminants from entering the supply to the satisfaction of the Engineer. In general, water shall not be taken from shallow or muddy sources. In cases where sources of supply are relatively shallow, the intake pipe shall be enclosed to exclude silt, mud, grass, etc.; and the water in the enclosure shall be maintained at a depth of not less than 2 feet under the intake pipe.

2. Mats: Mats for curing concrete shall be capable of maintaining moisture uniformly on the surface of the concrete. The mats shall not contain any materials such as dyes, sugar, etc., that may be injurious to the concrete.

The length or width of the mats shall be sufficient to cover all concrete surfaces being cured. Should more than one mat be required, sufficient overlap shall be provided by the Contractor as determined by the Engineer.

3. Liquid Membrane-Forming Compound: Liquid membrane-forming compound shall meet the requirements of AASHTO M 148 Type 2, Class B, or shall be a water-soluble linseed oil-based compound meeting the requirements of AASHTO M 148, Type 2.

4. White Polyethylene Sheeting (Film): White polyethylene sheeting (film) shall meet the requirements of AASHTO M 171.

M.03.05—Non Shrink, Non Staining Grout

1. Bagged (pre-mixed): Bagged (pre-mixed) formulations of non-shrink grout shall meet the requirements of ASTM C1107. The grout shall be mixed with potable water for use. The grout shall be mixed to a flowable consistency as determined by ASTM C230. All bagged material shall be clearly marked with the manufacturer's name, date of production, batch number, and written instructions for proper mixing, placement and curing of the product.

2. Bulk: The Contractor may formulate and design a grout mix for use on the Project in lieu of using a pre-bagged product. The Contractor shall obtain prior written approval of the Engineer for any such proposed Mix Design. Any such Mix Design shall include the proportions of hydraulic cement, potable water, fine aggregates, expansive agent, and any other necessary additive or admixture. This material shall meet all of the same chemical and physical requirements as shall the pre-bagged grout, in accordance with ASTM C1107.

M.03.06—Expansive Cement for Anchoring

The premixed anchoring cement shall be non-metallic, concrete gray in color and prepackaged. The mix shall consist of hydraulic cement, fine aggregate, expansive admixtures and water meeting the following requirements:

1. The anchoring cement shall have a minimum 24 hour compressive strength of 2,600 psi when tested in accordance with ASTM C109.

2. The water content of the anchoring cement shall be as recommended by the manufacturer. Water shall meet the requirements of M.03.01-4.

The Contractor shall provide a Certified Test Report and Materials Certificate for the premixed anchoring cement in accordance with 1.06.07. The Contractor shall also provide, when requested by the Engineer, samples of the premixed anchoring cement for testing and approval.

M.03.07—Chemical Anchors

Chemical anchor material must be listed on the Departments' Qualified Products List and approved by the Engineer for the specified use.

The chemical anchor material shall be epoxy or polyester polymer resin. It shall not contain any metals or other products that promote corrosion of steel. The Contractor shall supply the Engineer with a Certified Test Report and Materials Certificate for the chemical anchor material in accordance with 1.06.07. When requested by the Engineer, the Contractor shall also provide samples of the chemical anchor material.

M.03.08—Joint Materials

1. Transverse Joints for Concrete Pavement: Transverse joints shall consist of corrosion resistant load transfer devices, poured joint seal and in addition, in the case of expansion joints, expansion joint filler all meeting the following requirements:

(a) The corrosion resistant load transfer device shall be coated steel or sleeved steel or be made of corrosion resistant material. The dimensions of any devices used shall be as shown on the plans, exclusive of any coating or sleeving. Core material of coated or sleeved metallic devices shall be steel meeting the requirements of AASHTO M 255M/M 255 Grade 520, or steel having equal or better properties and approved by the Engineer. Nonmetallic devices shall meet the various strength requirements applicable to metallic devices as well as all other requirements stated herein.

(b) All coated load transfer devices shall meet the requirements of AASHTO M 254. Uncoated or sleeved load transfer devices shall meet the applicable physical requirements of AASHTO M 254. The use of field applied bond breakers will not be permitted.

(c) The basis of acceptance for corrosion resistant load transfer devices shall be the submission by the Contractor of a minimum of 2 samples accompanied by Certified Test Reports meeting the requirements of 1.06.07 demonstrating that the load transfer device meets the requirements of AASHTO M 254 for the type of device supplied. The Engineer reserves the right to reject any load transfer device deemed unsatisfactory for use.

2. Joint Filler for Concrete Curbing: Expansion joint filler shall be either preformed expansion joint filler or wood joint filler as indicated on the plans and shall meet the following requirements:

(a) Preformed expansion joint filler shall be the bituminous cellular type and shall meet the requirements of AASHTO M 213.

(b) Boards for wood joint filler shall have 2 planed sides and shall be redwood, cypress or white pine. Redwood and cypress boards shall be of sound heartwood. White pine boards shall be of sound sapwood. Occasional small, sound knots and medium surface checks will be permitted provided the board is free of any defects that will impair its usefulness for the purpose intended. The joint filler may be composed of more than one length of board in the length of the joint, but no board of a length less than 6 feet shall be used; and the

separate boards shall be held securely to form a straight joint. Boards composed of pieces that are jointed and glued shall be considered as one board.

(c) Dimensions shall be as specified or shown on the plans; and tolerances of plus 1/16 inch thickness, plus 1/8 inch depth and plus 1/4 inch length will be permitted.

(d) All wood joint filler boards shall be given a preservative treatment by brushing with creosote oil meeting the requirements of AASHTO M 133. After treatment, the boards shall be stacked in piles, each layer separated from the next by spacers at least 1/4 inch thick; and the boards shall not be used until 24 hours after treatment. Prior to concreting, all exposed surfaces of the wood filler shall be given a light brush coating of form oil.

(e) Testing of board expansion joint filler shall be in accordance with pertinent sections of AASHTO T 42.

3. Longitudinal Joint Devices: The metal used in the fabrication of longitudinal joint devices shall meet ASTM requirements for each type of metal used. The dimensions shall be as shown on the plans.

4. Expansion Joint Fillers for Bridges and Bridge Bearings:

(a) Preformed expansion joint filler for bridges shall meet the requirements of AASHTO M 153, Type I or
Type II.

(b) Pre-molded expansion joint filler for bridge bearings shall meet the requirements of AASHTO M 33.

5. Joint Sealants:

(a) Joint Sealer for Pavement: The joint sealer for pavement shall be a rubber compound of the hot-poured type and shall meet the requirements of AASHTO M 324 Type II unless otherwise noted on the plans or in the special provisions.

(b) Joint Sealer for Structures: Structure joint sealers shall be one of the following type sealants:

1. Where "Joint Seal" is specified on the plans, it shall meet the requirements of the Federal Specifications SS-S-200-E (Self-leveling type), TT-S-0227E (COM-NBS) Type II-Class A (Non-sag type), or 1 component polyurethane-base elastomeric sealants conforming to FS TT-S-00230C Type II-Class A or an approved equal.

   A Certified Test Report will be required in accordance with 1.06.07, certifying that the sealant meets the requirements set forth in the Federal Specification. Should the consignee noted on a Certified Test Report be other than the Prime Contractor, a Materials Certificate shall be required to identify the shipment.
2. Where "Silicone Joint Sealant" is specified on the plans, it shall be one of the following or an approved equal:
   i. Sealant, manufactured by the Dow Corning Corporation, Midland, Michigan 48686-0994
   ii. Dow Corning 888 Silicone Joint Sealant or
   iii. Dow Corning 888-SL Self-Leveling Silicone Joint 48686-0994

6. Closed Cell Elastomer: The closed cell elastomer shall meet the requirements of ASTM D1056, Grade RE-41 B2. The elastomer shall have a pressure-sensitive adhesive backing on one side.

The Contractor shall deliver the closed cell elastomer to the job site a minimum of 30 days prior to installation. Prior to the delivery of the closed cell elastomer, the Contractor shall notify the Engineer of the date of shipment and the expected date of delivery. Upon delivery of the closed cell elastomer to the job site, the Contractor shall immediately notify the Engineer.

Each separate length, roll or container shall be clearly tagged or marked with the manufacturer's name, trademark and lot number. A lot is defined as that amount of closed cell elastomer manufactured at 1 time from 1 batch of elastomer. A batch is defined as that amount of elastomer prepared and compounded at 1 time. The Contractor shall furnish a Certified Test Report in accordance with 1.06.07, confirming that the closed cell elastomer meets the requirements set forth in these specifications. Should the co-signee noted on a Certified Test Report be other than the Prime Contractor, a Materials Certificate shall be required to identify shipment.

The Contractor shall furnish a 1 foot length of closed cell elastomer in each lot for purposes of inspection and testing by the Engineer. The Engineer will cut a 1 foot sample from each lot and inspect the sample for conformance to size, and perform physical tests on the sample as deemed necessary.

The Engineer shall reject any lot or portion of a lot that does not meet the requirements stated herein. A rejected lot or portion of a lot may be resubmitted provided the Contractor has removed or corrected, in a manner acceptable to the Engineer, all non-conforming material.

M.03.09—Protective Compound/Sealers

The brand and type of material must be listed on the Department's Qualified Products List and approved by the Engineer for the specified use.

M.03.10—Formwork

1. Stay-in-place Forms: Material for stay-in-place metal forms shall be made of zinc-coated (galvanized) steel sheet meeting ASTM Specification A653 (Structural Steel (SS) Grade 33 through 80). The minimum thickness shall be 20 gauge. Coating weight shall meet the requirements of ASTM A924, Class G235, and shall otherwise meet all requirements relevant to steel stay-in-place metal forms and the placing of concrete as specified herein and as noted in the Contract.

Form supports shall either be fabricated and meet the same material requirements as the forms, or be fabricated from structural steel meeting the requirements of ASTM A36 and shall be hot-dip galvanized in accordance with ASTM A123.

Lightweight filler material for forms shall be as recommended by the form manufacturer.

2. Temporary Forms and Falsework: Forms and Falsework shall be of wood, steel or other material approved by the Engineer. This approval does not relieve the Contractor from employing adequately sized materials of sufficient rigidity to prevent objectionable distortion of the formed concrete surfaces caused by pressure of the plastic concrete and other loads incidental to the construction operations.

SECTION M.04 - BITUMINOUS CONCRETE MATERIALS

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

M.04.01—Bituminous Concrete Materials and Facilities
M.04.02—Mix Design and Job Mix Formula (JMF)
M.04.03—Production Requirements

M.04.01—Bituminous Concrete Materials and Facilities: Each source of material, Plant, and laboratory used to produce and test bituminous concrete must be qualified on an annual basis by the Engineer. AASHTO or ASTM Standards noted with an (M) have been modified and are detailed in Table M.04.03-5.

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

1. Coarse Aggregate: All coarse aggregate shall meet the requirements listed in M.01.

2. Fine Aggregate: All fine aggregate shall meet the requirements listed in M.01.

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

4. Performance Graded (PG) Asphalt Binder:

(a) General:

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

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

iii. The Contractor shall submit the name(s) of personnel responsible for receipt, inspection, and record keeping of PG binder. Contractor Plant personnel shall document specific storage tank(s) where binder will be transferred and stored until used and provide binder samples to the Engineer upon request. The person(s) shall assure that each shipment is accompanied by a statement certifying that the transport vehicle was inspected before loading was found acceptable for the material shipped and that the binder is free of contamination from any residual material, along with 2 copies of the bill of lading.

iv. The blending or combining of PG binders in 1 storage tank at the Plant from different suppliers, grades, or additive percentages is prohibited.

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

(c) Standard Performance Grade (PG) Binder:

i. Standard PG binder shall be defined as "Neat." Neat PG binders shall be free from modification with: fillers, extenders, reinforcing agents, adhesion promoters,

thermoplastic polymers, acid modification and other additives such as re-refined motor oil, and shall indicate such information on each bill of lading and Certified Test Report.

ii. The standard asphalt binder shall be PG 64S-22.

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

(e) Warm Mix Additive or Technology:

i. The warm mix additive or technology must be listed on the North East Asphalt User Producer Group (NEAUPG) Qualified Warm Mix Asphalt (WMA) Technologies List at the time of bid, which may be accessed online at http://www.neaupg.uconn.edu.

ii. The warm mix additive shall be blended with the asphalt binder in accordance with the manufacturer's recommendations.

iii. The blended binder shall meet the requirements of AASHTO M 332 and shall be graded or verified in accordance with AASHTO R 29 for the specified binder grade. The Contractor shall submit a Certified Test Report showing the results of the testing demonstrating the binder grade. In addition, it must include the grade of the virgin binder, the brand name of the warm mix additive, the manufacturer's suggested rate for the WMA additive, the water injection rate (when applicable), and the WMA Technology manufacturer's recommended mixing and compaction temperature ranges.

5. Emulsified Asphalts:

(a) General:

i. The emulsified asphalt shall meet the requirements of AASHTO M 140(M) or AASHTO M 208 as applicable.

ii. The emulsified asphalts shall be free of contaminants such as fuel oils and other solvents.

iii. The blending at mixing Plants of emulsified asphalts from different suppliers is prohibited.

(b) Basis of Approval:

i. The request for approval of the source of supply shall list the location where the material is manufactured, the handling and storage methods, and certifications in accordance with AASHTO R 77. Only suppliers that have an approved "Quality Control Plan for Emulsified Asphalt" formatted in accordance with AASHTO R 77 and that submit monthly split samples per grade to the Engineer may supply emulsified asphalt to Department projects.

ii. Each shipment of emulsified asphalt delivered to the Project site shall be accompanied with the corresponding Certified Test Report listing Saybolt viscosity, residue by evaporation, penetration of residue, and weight per gallon at 77°F and Material Certificate.

iii. Anionic emulsified asphalts shall meet the requirements of AASHTO M-140. Materials

used for tack coat shall not be diluted and meet grade RS-1 or RS-1h. When ambient temperatures are 80°F and rising, grade SS-1 or SS-1h may be substituted if permitted by the Engineer.

iv. Cationic emulsified asphalt shall meet the requirements of AASHTO M-208. Materials used for tack coat shall not be diluted and meet grade CRS-1. The settlement and demulsibility test will not be performed unless deemed necessary by the Engineer. When ambient temperatures are 80°F and rising, grade CSS-1 or CSS-1h may be substituted if permitted by the Engineer.

6. Reclaimed Asphalt Pavement (RAP):

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

(b) Basis of Approval: The RAP material will be accepted on the basis of one of the following criteria:

i. When the source of all RAP material is from pavements previously constructed on Department projects, the Contractor shall provide a Materials Certificate listing the detailed locations and lengths of those pavements and that the RAP is only from those locations listed.

ii. When the RAP material source or quality is not known, the Contractor shall request approval from the Engineer at least 30 calendar days prior to the start of the paving operation. The request shall include a Material Certificate and applicable test results stating that the RAP consists of aggregates that meet the specification requirements of M.04.01-1 through M.04.01-3 and that the binder in the RAP is substantially free of solvents, tars and other contaminants. The Contractor is prohibited from using unapproved material on Department projects and shall take necessary action to prevent contamination of approved RAP stockpiles. Stockpiles of unapproved material shall remain separate from all other RAP materials at all times. The request for approval shall include the following:

1. A 50-lb. sample of the RAP to be incorporated into the recycled mixture.
2. A 25-lb. sample of the extracted aggregate from the RAP.

7. Crushed Recycled Container Glass (CRCG):

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

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

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

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

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

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

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

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

10. Plant Requirements:

(a) General: The Plant producing bituminous concrete shall comply with AASHTO M 156.

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

Type of silo cylinder	Maximum storage time for all classes (hr)	
	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	TBD by the Engineer

*Not to exceed HMA limits

(c) Documentation System: The mixing Plant documentation system shall include equipment for accurately proportioning the components of the mixture by weight and in the proper order, controlling the cycle sequence, and timing the mixing operations. Recording equipment shall monitor the batching sequence of each component of the mixture and produce a printed record of these operations on each Plant ticket, as specified herein.

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

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

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

For batch Plants, the Plant ticket shall be produced for each bath and maintained by the vendor for a period of 3 years after the completion of the Project. In addition, an asterisk (*)

shall be automatically printed next to any individual batch weight(s) exceeding the following tolerances:

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

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

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

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

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

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

(f) RAP: RAP moisture content shall be determined a minimum of twice daily (prior to production and halfway through production).

(g) Asphalt Binder: A binder log shall be submitted to the Department's Central Lab on a monthly basis.

(h) Warm mix additive: For mechanically foamed WMA, the water injection rate shall be monitored during production and not exceed 2.0% by total weight of binder. For additive added at the Plant, the dosage rate shall be monitored during production.

(i) Testing Laboratory: The Contractor shall maintain a laboratory to test bituminous concrete mixtures during production. The laboratory shall have a minimum of 300 s.f., have a potable water source and drainage in accordance with the CT Department of Public Health Drinking Water Division, and be equipped with all necessary testing equipment as well as with a PC, printer, and telephone with a dedicated hard-wired phone line. In addition, the PC shall have a high speed internet connection and a functioning web browser with unrestricted access to https://ctmail.ct.gov . This equipment shall be maintained in working order at all times and be made available for use by the Engineer.

The laboratory shall be equipped with a heating system capable of maintaining a minimum temperature of 65°F. It shall be clean and free of all materials and equipment not associated with the laboratory. Sufficient light and ventilation must be provided. During summer months

adequate cooling or ventilation must be provided so the indoor air temperature shall not exceed the ambient outdoor temperature.

The laboratory testing apparatus, supplies, and safety equipment shall be capable of performing all the applicable tests in their entirety that are referenced in AASHTO R 35 and AASHTO M 323. The Contractor shall ensure that the Laboratory is adequately supplied at all times during the course of the Project with all necessary testing 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, and gyratory compactor, clearly showing calibration and/or inspection dates, in accordance with AASHTO R 18. The Contractor shall notify the Engineer if any modifications are made to the equipment within the laboratory. The Contractor shall take immediate action to replace, repair, or recalibrate any piece of equipment that is out of calibration, malfunctioning, or not in operation.

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

1. Curb Mix:

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

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

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

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

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

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

Mix	Curb Mix	Production Tolerances from JMF Target
Grade of PG Binder content %	**PG 64S-22 6.5 - 9.0**	**0.4**
Sieve Size		
No. 200	3.0 - 8.0 (b)	2.0
No. 50	10 - 30	4
No. 30	20 - 40	5
No. 8	40 - 70	6
No. 4	65 - 87	7
1/4 inch		
3/8 inch	95 - 100	8
1/2 inch	100	8
3/4 inch		8
1 inch		
2 inch		
Additionally, the fraction of material retained between any 2 consecutive sieves shall not be less than 4%.		
Mixture Temperature		
Binder	325°F maximum	
Aggregate	280-350°F	
Mixtures	265-325°F	
Mixture Properties		
Air Voids (VA) %	0 – 4.0 (a)	
Notes: (a) Compaction Parameter 50 gyrations (N_{des}) (b) The percent passing the No. 200 sieve shall not exceed the percentage of bituminous asphalt binder.		

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

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

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

All bituminous concrete mixes shall be tested for stripping susceptibility by performing the TSR test procedure in accordance with AASHTO T 283(M) at a minimum every 36 months. The compacted specimens may be fabricated at the Plant and then tested at an AMRL accredited facility. A minimum of 45000 grams of laboratory or plant blended mixture and the

corresponding complete Form MAT-412s shall be submitted to the Division of Material Testing (DMT) for design TSR testing verification. The mixture submitted shall be representative of the corresponding mix design as determined by the Engineer.

i. Superpave Mixtures with RAP: RAP may be used with the following conditions:
   - RAP amounts up to 15% may be used with no binder grade modification.
   - RAP amounts up to 20% may be used provided a new JMF is approved by the Engineer. The JMF submittal shall include the grade of virgin binder added. The JMF shall be accompanied by a blending chart and supporting test results in accordance with AASHTO M 323 Appendix X1, or by testing that shows the combined binder (recovered binder from the RAP, virgin binder at the mix design proportions, warm mix asphalt additive and any other modifier if used) meets the requirements of the specified binder grade.
   - Two (2) representative samples of RAP shall be obtained. Each sample shall be split, and 1 split sample shall be tested for binder content in accordance with AASHTO T 164 and the other in accordance with AASHTO T 308.
   - RAP material shall not be used with any other recycling option.

ii. Superpave Mixtures with RAS: RAS may be used solely in HMA S1 mixtures with the following conditions:
   - RAS amounts up to 3% may be used.
   - RAS total binder replacement up to 15% may be used with no binder grade modification.
   - RAS total binder replacement up to 20% may be used provided a new JMF is approved by the Engineer. The JMF submittal shall include the grade of virgin binder added. The JMF shall be accompanied by a blending chart and supporting test results in accordance with AASHTO M 323 Appendix X1, or by testing that shows the combined binder (recovered binder from the RAP, virgin binder at the mix design proportions, warm mix asphalt additive and any other modifier if used) meets the requirements of the specified binder grade.
   - Superpave Mixtures with RAS shall meet AASHTO PP 78 design considerations.

iii. Superpave Mixtures with CRCG: CRCG may be used solely in HMA S1 mixtures. One percent (1%) of hydrated lime, or other accepted non-stripping agent, shall be added to all mixtures containing CRCG. CRCG material shall not be used with any other recycling option.

(b) Basis of Approval: The following information must be included in the JMF submittal:

i. Gradation, consensus properties and specific gravities of the aggregate, RAP or RAS.
ii. Average asphalt content of the RAP or RAS by AASHTO T 164.
iii. Source of RAP or RAS and percentage to be used.
iv. Warm mix Technology, manufacturer's recommended additive rate and tolerances, and manufacturer recommended mixing and compaction temperatures.
v. TSR test report and anti-strip manufacturer and recommended dosage rate if applicable.
vi. Mixing and compaction temperature ranges for the mix with and without the warm-mix technology incorporated.
vii. JMF ignition oven correction factor by AASHTO T 308.

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

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

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

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

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

TABLE M.04.02-2: Superpave Master Range for Bituminous Concrete Mixture Design Criteria

	S0.25		**S0.375**		**S0.5**		**S1**	
Sieve	Control Points		Control Points		Control Points		Control Points	
inches	Min (%)	Max (%)	Min (%)	Max (%)	Min (%)	Max (%)	Min (%)	Max (%)
2.0	-	-	-	-	-	-	-	-
1.5	-	-	-	-	-	-	100	-
1.0	-	-	-	-	-	-	90	100
3/4	-	-	-	-	100	-	-	90
1/2	100	-	100	-	90	100	-	-
3/8	97	100	90	100	-	90	-	-
No. 4	72	90	-	72	-	-	-	-
No. 8	32	67	32	67	28	58	19	45
No. 16	-	-	-	-	-	-	-	-
No. 30	-	-	-	-	-	-	-	-
No. 50	-	-	-	-	-	-	-	-
No. 100	-	-	-	-	-	-	-	-
No. 200	2.0	10.0	2.0	10.0	2.0	10.0	1.0	7.0
VMA (%)	16.5 ± 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 / effective binder	0.6 - 1.2		0.6 - 1.2		0.6 - 1.2		0.6 - 1.2	
TSR	≥ 80%		≥ 80%		≥ 80%		≥ 80%	
T-283 Stripping	Minimal as determined by the Engineer							

(c) Mix Status: Each facility will have each type of bituminous concrete mixture rated based on the results of the previous year of production. Mix status will be provided to each bituminous concrete Producer prior to the beginning of the paving season.

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

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

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

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

Mix status is defined as:

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

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

1. there are no compliant acceptance production test results submitted to the Department from the previous year;
2. there is a source change in one or more aggregate components;
3. there is a component percentage change of more than 5% by weight;
4. there is a change in RAP percentage;
5. the mixture has a rating of less than 70% from the previous season;
6. it is a new JMF not previously submitted; or
7. the average of 10 consecutive acceptance results for VFA, Density to N_{ini} or dust to effective binder ratio does not meet the criteria in tables M.04.02-2 and M.04.02-4.

Bituminous concrete mixtures rated with a "PPT" status cannot be used on Department projects. Testing shall be performed by the Producer with NETTCP certified personnel on material under this status. Test results must confirm that specification requirements in Tables M.04.02-2 through M.04.02-4 are met and the binder content (Pb) meets the requirements in Table M.04.03-2 before material can be used. One of the following methods must be used to verify the test results:

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

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

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

Witnessing or verifying by the Department of compliant test results will change the mix's status to "A"

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

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

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

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

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

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

Traffic Level	Design ESALs	Number of Gyrations by Superpave Gyratory Compactor			Percent Density of Gmm from HMA/ WMA Specimen			Voids Filled with Asphalt (VFA) Based on Nominal Mix Size - Inch			
	(million)	N_{ini}	N_{des}	N_{max}	N_{ini}	N_{des}	N_{max}	0.25	0.375	0.5	1
1	<0.3	6	50	75	≤91.5	96.0	≤98.0	70-80	70-80	70-80	67-80
2	0.3 to <3.0	7	75	115	≤90.5	96.0	≤98.0	65-78	65-78	65-78	65-78
3	≥3.0	7	75	115	≤90.0	96.0	≤98.0	65-77	65-76	65-75	65-75

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

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

M.04.03—Production Requirements:

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

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

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

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

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

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

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

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

2. Acceptance Requirements:

(a) General:

For those mixes with a total estimated project tonnage over 500 tons, a NETTCP HMA Paving Inspector certified Contractor representative shall obtain a field sample of the material placed at the project site in accordance with AASHTO T 168 using the procedure indicated in Section 5.2.3 or an alternate procedure approved by the Engineer. Sampling from the truck at the Plant in accordance with AASHTO T 168 using the procedure indicated in Section 5.2.2 will be allowed for those mixes with a total estimated project tonnage equal to or less than 500 tons. Regardless of sampling location, the sample shall be quartered by the Contractor in accordance with AASHTO R 47 and placed in an approved container. The container shall be sealed with a security tape provided by the Department and labelled to include the project number, date of paving, mix type, lot and sublot numbers and daily tonnage. The minimum weight of each quartered sample shall be 14000 grams. The Contractor shall transport one of the containers to the Departments Central Laboratory in Rocky Hill, retain one of the sealed containers for potential use in dispute resolution and test the remaining samples for acceptance in accordance with past practice.

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

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

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

Should the Department be unable to validate the Contractor's acceptance test result(s) for a lot of material, the Engineer will use results from verification testing and re-calculate the pay adjustment for that lot. The Contractor may request to initiate the dispute resolution process in writing within 24 hours of receiving the adjustment and must include supporting documentation or test results to justify the request.

(b) Curb Mix Acceptance Sampling and Testing Procedures: Curb Mixes shall be tested by the Contractor at a frequency of 1 test per every 250 tons of cumulative production, regardless of the day of production.

When these mix designs are specified, the following acceptance procedures and AASHTO test methods shall be used:

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

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

Notes: [(1)] One (1) set equals 2 each of 6-inch molds. Molds to be compacted to 50 gyrations.
[(2)] Once per year or when requested by the Engineer.

i. Determination of Off-Test Status:
1. Curb Mix is considered "off test" when the test results indicate that any single value for bitumen content or gradation are not within the tolerances shown in Table M.04.02-1 for that mixture. If the mix is "off test," the Contractor must take immediate actions to correct the deficiency and a new acceptance sample shall be tested on the same day or the following day of production.
2. When multiple silos are located at 1 site, mixture supplied to 1 project is considered as coming from 1 source for the purpose of applying the "off test" status.
3. The Engineer may cease supply from the Plant when test results from 3 consecutive samples are not within the JMF tolerances or the test results from 2 consecutive samples not within the control points indicated in Table M.04.02-1 regardless of production date.

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

(c) Superpave Mix Acceptance:

i. Sampling and Testing Procedures

Production Lot: The lot will be defined as one of the following types:
- Non-PWL Production Lot for total estimated Project quantities per mixture less than 3500 tons: All mixture placed during a single continuous paving operation.
- PWL Production Lot for total estimated Project quantities per mixture of 3500 tons or more: Each 3500 tons of mixture produced within 30 calendar days.

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

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

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

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

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

One (1) acceptance sample shall be obtained and tested per sub lot with quantities over 125 tons. The Engineer may direct that additional acceptance samples be obtained. For non-PWL lots, one (1) acceptance test shall always be performed in the last sub lot based on actual tons of material produced.

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

The payment adjustment will be calculated as described in 4.06.

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

Daily Quantity Produced in Tons (Lot)	Number of Sub Lots/Tests
0 to 125	0, Unless requested by the Engineer
126 to 500	1
501 to 1,000	2
1,001 to 1,500	3
1,500 or greater	1 per 500 tons or portions thereof

The following test procedures shall be used for acceptance:

TABLE M.04.03-3: Superpave Acceptance Testing Procedures

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

Notes: (1) One (1) set equals 2 each of 6-inch molds. Molds to be compacted to Nmax for PPTs and to Ndes for production testing. The first sub lot of the year shall be compacted to N_{max}.

(2) Average value of 1 set of 6-inch molds.

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

The Contractor shall perform TSR testing within 30 days after the start of production for all design levels of HMA- and PMA- S0.5 Plant-produced mixtures, in accordance with AASHTO T 283(M). The TSR test shall be performed at an AMRL certified laboratory by NETTCP certified technicians. The compacted specimens may be fabricated at the Plant and then tested at an AMRL accredited facility. A minimum of 45000 grams of plant blended mixture and the corresponding complete Form MAT-412s shall be submitted to the DMT for production TSR testing verification. The mixture submitted shall be representative of the corresponding mix design as determined by the Engineer. Additionally, the TSR test report and tested specimens shall be submitted to the Engineer for review. Superpave mixtures that require anti-strip additives (either liquid or mineral) shall continue to meet all requirements specified herein for binder and bituminous concrete. The Contractor shall submit the name, manufacturer, percent used, technical datasheet and SDS for the anti-strip additive (if applicable) to the Engineer.

i. Determination of Off-Test Status:
   1. Superpave mixes shall be considered *"off test"* when any control point sieve, binder content, VA, VMA, and Gmm value is outside of the limits specified in Table M.04.03-4 or the target binder content at the Plant is below the minimum binder

content stated in Table M.04.02-5. Note that further testing of samples or portions of samples not initially tested for this purpose cannot be used to change the status.

2. Any time the bituminous concrete mixture is considered off-test:
   A. The Contractor shall notify the Engineer when the Plant is *"off test"* for any mix design that is delivered to the Project in any production day. When multiple silos are located at 1 site, mixture supplied to 1 project is considered as coming from 1 source for the purpose of applying the *"off test"* determination.
   B. 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 with the specifications. A PC test will not be used for acceptance and is solely for the use of the Contractor in its quality control process.

ii. Cessation of Supply for Superpave Mixtures in Non-PWL Lots:

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

1. four (4) consecutive tests in any combination of VA, VMA or Gmm, regardless of date of production, or
2. two (2) consecutive tests in the control point sieves in 1 production shift.

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

iii. JMF revisions:

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

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

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

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

TABLE M.04.03-4: Superpave Mixture Production Requirements

	S0.25		**S0.375**		**S0.5**		**S1**		Tolerances
Sieve	Control Points		Control Points		Control Points		Control Points		From JMF Targets[2]
inches	Min (%)	Max (%)	Min (%)	Max (%)	Min (%)	Max (%)	Min (%)	Max (%)	+/- Tolerance
1.5	-	-	-	-	-	-	100	-	
1.0	-	-	-	-	-	-	90	100	
3/4	-	-	-	-	100	-	-	90	
1/2	100	-	100	-	90	100	-	-	
3/8	97	100	90	100	-	90	-	-	
No. 4	72	90	-	72	-	-	-	-	
No. 8	32	67	32	67	28	58	19	45	
No. 16	-	-	-	-	-	-	-	-	
No. 200	2.0	10.0	2.0	10.0	2.0	10.0	1.0	7.0	
Pb	JMF value		JMF value		JMF value		JMF value		0.3[3]
VMA (%)	16.5		16.0		15.0		13.0		1.0[4]
VA (%)	4.0		4.0		4.0		4.0		1.0[5]
Gmm	JMF value		JMF value		JMF value		JMF value		0.030
Mix Temp. – HMA[6]	265-325°F [1]		265-325°F [1]		265-325°F [1]		265-325°F [1]		
Mix Temp. – PMA[6]	285-335°F [1]		285-335°F [1]		285-335°F [1]		285-335°F [1]		
Prod. TSR	N/A		N/A		≥80%		N/A		
T-283 Stripping	N/A		N/A		Minimal TBD by the Engineer		N/A		

Notes: [1] 300°F minimum after October 15.
[2] JMF tolerances shall be defined as the limits for production compliance.
[3] 0.4 for PWL lots
[4] 1.3 for all PWL lots except S/P 0.25 mixes. 1.1 for S/P 0.25 Non-PWL lots. 1.4 for S/P 0.25 PWL lots
[5] 1.2 for PWL lots
[6] Also applies to placement

Table M.04.03-5:
Modifications to Standard AASHTO and ASTM Test Specifications and Procedures

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

SECTION M.06 - METALS

Section M.06 *is amended as follows:*

M.06.01—Reinforcing Steel:

Delete the entire last paragraph in Subarticle 1 "**Bar Reinforcement"** *that reads:* "Prior to the incorporation… …and type of bar reinforcement."

M.06.02—Structural Steel:

Revise Subarticle 2 "**Anchor Bolts**" *as follows:*

"**(a)** Anchor bolt assemblies shall meet the requirements of ASTM F1554, and the grade shall be as specified on the plans. All components of the bolt assembly shall be galvanized in accordance with ASTM F2329."

Replace Subarticle 3 "**High Strength Bolts**" *with the following:*

" **3. High-Strength Bolts:** High-strength bolts, including suitable nuts and hardened washers, shall meet the following requirements:

(a) High-strength bolts shall meet the requirements of ASTM F3125 Grade A325 or ASTM F3125 Grade A490 as shown on the plans. High-strength bolts used with coated steel shall be mechanically galvanized, unless otherwise specified. High-strength bolts used with uncoated weathering grades of steel shall be Type 3.

Nuts for ASTM F3125 Grade A325 bolts shall meet the requirements of ASTM A563, Grades DH, DH3, C, C3 and D. Where galvanized high-strength bolts are used, the nuts shall be galvanized, heat-treated Grade DH. Where Type 3 high-strength bolts are used, the nuts shall be Grade C3 or DH3.

Nuts for ASTM F3125 Grade A490 bolts shall meet the requirements of ASTM A563, Grade DH. Where Type 3 high-strength bolts are used, the nuts shall be Grade DH3.

All galvanized nuts shall be lubricated with a lubricant containing a visible dye of any color that contrasts with the color of the galvanizing. Black bolts must be oily to the touch when delivered and installed.

Circular flat and square or rectangular beveled, hardened steel washers shall meet the requirements of ASTM F436. Unless otherwise specified, galvanized washers shall be furnished when galvanized high-strength bolts are specified, and washers with atmospheric corrosion resistance and weathering characteristics shall be furnished when Type 3 high-strength bolts are specified.

Compressible-washer-type direct tension indicator washers, used in conjunction with high-strength bolts, shall meet the requirements of ASTM F959. Where galvanized high-strength bolts are used, the washers shall be galvanized in accordance with ASTM B695,

Class 55. Where Type 3 high-strength bolts are used, the washers shall be galvanized in accordance with ASTM B695, Class 55 and coated with epoxy.

(b) Identifying Marks: ASTM F3125 Grade A325 for bolts and the specifications referenced therein for nuts require that bolts and nuts manufactured to the specification be identified by specific markings on the top of the bolt head and on one face of the nut. Markings may be raised or depressed at the manufacturer's option and shall be visible after coating if coating is required. Head markings must identify the grade by the symbol "A325," the manufacturer and the type, if Type 3. Nut markings must identify the grade, the manufacturer and if Type 3, the type. Markings on direct tension indicators must identify the manufacturer and Type "A325." Other washer markings must identify the manufacturer and if Type 3, the type.

ASTM F3125 Grade A490 for bolts and the specifications referenced therein for nuts require that bolts and nuts manufactured to the specifications be identified by specific markings on the top of the bolt head and on one face of the nut. Markings may be raised or depressed at the manufacturer's option and shall be visible after coating if coating is required. Head markings must identify the grade by the symbol "A490," the manufacturer and the type, if Type 3. Nut markings must identify the grade, the manufacturer and if Type 3, the type. Markings on direct tension indicators must identify the manufacturer and Type "A490." Other washer markings must identify the manufacturer and if Type 3, the type.

ASTM F3125 Grade A325 and ASTM F3125 Grade A490 bolt lengths up to 4 times the diameter which are fully threaded but which are not required to be fully threaded by the relevant ASME standard shall be marked with a "T" immediately after the grade designation, for example "A325T." Bolts with any other non-standard dimensions, including thread length, shall be marked with an "S" immediately after the grade designation, for example "A325S." All other markings, if used, such as a private label distributor's mark shall also be separate and distinct.

(c) Dimensions: Bolt and nut dimensions shall meet the requirements for Heavy Hexagon Structural Bolts and for Heavy Semi-Finished Hexagon Nuts given in ASME Standard B18.2.6.

(d) Galvanized Bolts: Galvanized bolts shall meet the requirements of ASTM F3125 Grade A325, Type 1. The bolts shall be hot-dip galvanized in accordance with ASTM F2329, to a thickness of 50 μm or mechanically galvanized in accordance with ASTM B695, Class 55. Bolts, nuts, and washers of any assembly shall be galvanized by the same process. The nuts shall be overtapped to the minimum amount required for the fastener assembly, and shall be lubricated with a lubricant containing a visible dye so a visual check can be made for the lubricant at the time of field installation. Galvanized bolts shall be tension tested after galvanizing. ASTM F3125 Grade A490 bolts shall be uncoated or shall be coated in accordance with either ASTM F1136 Grade 3 or ASTM F2833 Grade 1.

(e) Test Requirements: The maximum hardness of ASTM F3125 Grade A325 bolts shall be 34 HRC. The maximum hardness of ASTM F3125 Grade A490 bolts shall be 38 HRC.

Plain, ungalvanized nuts shall have a minimum hardness of 89 HRB.

Proof load tests, in accordance with the requirements of ASTM F606 Method 1, shall be required for the bolts. Wedge tests of full-size bolts are required in accordance with Section 10.1 of ASTM F3125. Galvanized bolts shall be wedge tested after galvanizing.

Proof load tests of ASTM A563 are required for nuts. Proof load tests for nuts used with galvanized bolts shall be performed after galvanizing, overtapping and lubricating.

Rotational-capacity tests are required and shall be performed on all plain or galvanized (after galvanizing) bolt, nut and washer assemblies by the manufacturer or distributor prior to shipping and by the Contractor at the Site.

The thickness of galvanizing on bolts, nuts and washers shall be measured. On bolts, it shall be measured on the wrench flats or on top of the bolt head, and on nuts it shall be measured on the wrench flats.

(f) Certified Test Reports and Materials Certificates: The Contractor shall submit notarized copies of Certified Test Reports and Materials Certificates in accordance with Article 1.06.07 for fastener assemblies. In addition the Certified Test Reports and Materials Certificates shall include the following:

1. Mill test reports shall indicate the place where the material was melted and manufactured.
2. Test reports for proof load tests, wedge tests, and rotational-capacity tests shall indicate where the tests were performed, date of tests, location of where the components were manufactured and lot numbers.
3. The test report for galvanized components shall indicate the thickness of the galvanizing.

(g) Material Samples: Prior to incorporation into the work, the Contractor shall submit samples of the bolt assemblies to the Engineer for testing in accordance with the latest edition of the "Materials Testing Manual (Chapter 8, Minimum Schedule for Acceptance Testing)." Samples shall be submitted for each diameter, length, material designation, grade, coating and manufacturer of bolt assembly."

M.06.03—Galvanizing:

Replace the entire subarticle with the following:

" **M.06.03—Galvanizing:** Unless otherwise specified on the plans or in the special provisions, the zinc coating on all iron and steel materials, other than wire, shall meet the requirements of ASTM A123, A153 or F2329, whichever shall apply.

When mechanical galvanizing is used it shall meet the requirements of ASTM B695 Class 55."

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 journeyperson 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 journeyperson, 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.

SMALL CONTRACTOR AND SMALL CONTRACTOR MINORITY BUSINESS ENTERPRISES (SET-ASIDE)

March, 2001

NOTE: Certain of the requirements and procedures stated in this "Special Provision" are applicable prior to the execution of the Contract.

I. GENERAL

A. The Contractor shall cooperate with the Connecticut Department of Transportation (CONNDOT) in implementing the required contract obligations concerning "Small Contractor" and "Small Contractor Minority Business Enterprise" use on this Contract in accordance with Section 4a-60g of the Connecticut General Statutes as revised. References, throughout this "Special Provision", to "Small Contractors" are also implied references to "Small Contractor Minority Business Enterprises" as both relate to Section IIA of these provisions. The Contractor shall also cooperate with CONNDOT in reviewing the Contractor's activities relating to this provision. This "Special Provision" is in addition to all other equal opportunity employment requirements of this Contract.

B. For the purpose of this "Special Provision", the "Small Contractor(s)" and "Minority Business Enterprise(s)" named to satisfy the set-aside requirement must be certified by the Department of Administrative Services, Business Connections/ Set-Aside Unit [(860) 713-5236 www.das.state.ct.us/busopp.htm] as a "Small Contractor" and "Minority Business Enterprises" as defined by Section 4a-60g Subsections (1) and (3) of the Connecticut General Statutes as revised and is subject to approval by CONNDOT to do the work for which it is nominated pursuant to the criteria stipulated in Section IIC-3.

C. Contractors who allow work which they have designated for "Small Contractor" participation in the pre-award submission required under Section IIC to be performed by other than the approved "Small Contractor" organization and prior to concurrence by CONNDOT, will not be paid for the value of the work performed by organizations other than the "Small Contractor" designated.

D. If the Contractor is unable to achieve the specified contract goals for "Small Contractor" participation, the Contractor shall submit written documentation to CONNDOT's Manager of Construction Operations indicating his/her good faith efforts to satisfy goal requirements. Documentation is to include but not be limited to the following:

1. A detailed statement of the efforts made to select additional subcontract opportunities for work to be performed by each "Small Contractor" 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 contracts with each "Small Contractor", including the names, addresses, dates and telephone numbers of each "Small Contractor" contacted, and a description of the information provided to each "Small Contractor" regarding the scope of services and anticipated time schedule of items proposed to be subcontracted and the nature of response from firms contacted.

3. For each "Small Contractor" that placed a subcontract quotation which the Contractor considered not to be acceptable, provide a detailed statement of the reasons for this conclusion.

4. Documents to support contacts made with CONNDOT requesting assistance in satisfying the contract specified or adjusted "Small Contractor" dollar requirements.

5. Document other special efforts undertaken by the Contractor to meet the defined goal.

E. Failure of the Contractor to have at least the specified dollar amount of this contract performed by "Small Contractor" as required in Section IIA of this "Special Provision" will result in the reduction in contract payment to the Contractor by an amount equivalent to that determined by subtracting from the specific dollar amount required in Section IIA, the dollar payments for the work actually performed by each "Small Contractor". The deficiency in "Small Contractor" achievement, will therefore, be deducted from the final contract payment. However, in instances where the Contractor can adequately document or substantiate its good faith efforts made to meet the specified or adjusted dollar amount to the satisfaction of CONNDOT, no reduction in payments will be imposed.

F. All records must be retained for a period of three (3) years following completion of the contract and shall be available at reasonable times and places for inspection by authorized representatives of CONNDOT.

G. Nothing contained herein, is intended to relieve any contractor or subcontractor or material supplier or manufacturer from compliance with all applicable Federal and State legislation or provisions concerning equal employment opportunity, affirmative action, nondiscrimination and related subjects during the term of this Contract.

II. **SPECIFIC REQUIREMENTS**

In order to increase the participation of "Small Contractors", CONNDOT requires the following:

A. Not less than **10** (%) percent of the **final** value of this Contract shall be subcontracted to and performed by, and/or supplied by, manufactured by and paid to "Small Contractors" and/or "Small Contractors Minority Business Enterprises".

If the above percentage is zero (0%) AND an asterisk (*) has been entered in the adjacent brackets [ ], this Contract is 100% solely set-aside for participation by "Small Contractors" and/or "Small Contractors Minority Business Enterprises".

B. The Contractor shall assure that each "Small Contractor" will have an equitable opportunity to compete under this "Special Provision", particularly by arranging solicitations, time for the preparation of Quotes, Scope of Work, and Delivery Schedules so as to facilitate the participation of each "Small Contractor".

C. The Contractor shall provide to CONNDOT's Manager of Contracts within Seven (7) days after the bid opening the following items:

1. An affidavit (Exhibit I) completed by each named "Small Contractor" subcontractor listing a description of the work and indicating the dollar amount of all contract(s) and/or subcontract(s) that have been awarded to him/her for the current State Fiscal Year (July 1 - June 30) does not exceed the Fiscal Year limit of $10,000,000.00.

2. A certification of work to be subcontracted (Exhibit II) signed by both the Contractor and the "Small Contractor" listing the work items and the dollar value of the items that the nominated "Small Contractor" is to perform on the project to achieve the minimum percentage indicated in Section IIA above.

3. A certification of past experience (Exhibit III) indicating the scope of work the nominated "Small Contractor" has performed on all projects, public and private, for the past two (2) years.

4. In instances where a change from the originally approved named "Small Contractor" (see Section IB) is proposed, the Contractor is required to submit, in a reasonable and expeditious manner, a revised submission, comprised of the documentation required in Section IIC, Paragraphs 1, 2 and 3 and Section E together with documentation to substantiate and justify the change, (i.e., documentation to provide a basis for the change) to CONNDOT's Manager of Construction Operations for its review and approval prior to the implementation of the change. The Contractor must

demonstrate that the originally named "Small Contractor" is unable to perform in conformity to specifications, or unwilling to perform, or is in default of its contract, or is overextended on other jobs. The Contractor's ability to negotiate a more advantageous contract with another "Small Contractor" is not a valid basis for change. Documentation shall include a letter of release from the originally named "Small Contractor" indicating the reason(s) for the release.

D. After the Contractor signs the Contract, the Contractor will be required to meet with CONNDOT's Manager of Construction Operations or his/her designee to review the following:

1. What is expected with respect to the "Small Contractor" set aside requirements.

2. Failure to comply with and meet the requirement can and will result in monetary deductions from payment.

3. Each quarter after the start of the "Small Contractor" the Contractor shall submit a report to CONNDOT's Manager of Construction Operations indicating the work done by, and the dollars paid to each "Small Contractor" to date.

4. What is required when a request to sublet to a "Small Contractor" is submitted.

E. The Contractor shall submit to CONNDOT's Manager of Construction Operations all requests for subcontractor approvals on standard forms provided by the Department.

If the request for approval is for a "Small Contractor" subcontractor for the purpose of meeting the contract required "Small Contractor" percentage stipulated in Section IIA, a copy of the legal contract between the Contractor and the "Small Contractor" subcontractor must also be submitted at the same time. Any subsequent amendments or modifications of the contract between the Contractor and the "Small Contractor" subcontractor must also be submitted to CONNDOT's Manager of Construction Operations with an explanation of the change(s). The contract must show items of work to be performed, unit prices and, if a partial item, the work involved by both parties.

In addition, the following documents are to be attached:

(1) A statement explaining any method or arrangement for renting equipment. If rental is from a Contractor, a copy of Rental Agreement must be submitted.

(2) A statement addressing any special arrangements for manpower.

(3) A statement addressing who will purchase material.

F. Contractors subcontracting with a "Small Contractor" to perform work or services as required by this "Special Provision" shall not terminate such firms without advising CONNDOT, in writing, and providing adequate documentation to substantiate the reasons for termination if the designated "Small Contractor" firm has not started or completed the work or the services for which it has been contracted to perform.

G. Material Suppliers or Manufacturers

If the Contractor elects to utilize a "Small Contractor" supplier or manufacturer to satisfy a portion or all of the specified dollar requirements, the Contractor must provide the Department with:

1. An executed Affidavit Small Contractor (Set-Aside) Connecticut Department of Transportation Affidavit Supplier or Manufacturer (sample attached), and

2. Substantiation of payments made to the supplier or manufacturer for materials used on the project.

Brokers and packagers shall not be regarded as material Suppliers or manufacturer.

H. Non-Manufacturing or Non-Supplier "Small Contractor" Credit

Contractors may count towards its "Small Contractor" goals the following expenditures with "Small Contractor" firms that are not manufacturers or suppliers:

1. 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, material or supplies necessary for the performance of the contract provided that the fee or commission is determined by the Department of Transportation to be reasonable and consistent with fees customarily allowed for similar services.

2. The fees charged for delivery of materials and supplies required on a job site (but not the cost of the materials and supplies themselves) when the hauler, trucker, or delivery service is not also the manufacturer of or a

regular dealer in the materials and supplies, provided that the fee is determined by the Department of Transportation to be reasonable and not excessive as compared with fees customarily allowed for similar services.

3. The fees or commissions charged for providing any bonds or insurance specifically required for the performance of the Contract, provided that the fee or commission is determined by the Department of Transportation to be reasonable and not excessive as compared with fees customarily allowed for similar services.

III. BROKERING

For the purpose of this "Special Provision", a "Broker" is one who acts as an agent for others in negotiating contracts, purchases, sales, etc., in return for a fee or commission. Brokering of work by a "Small Contractor" is not allowed and is a contract violation.

IV. PRE-AWARD WAIVERS:

If the Contractor's submission of the "Small Contractor" listing, as required by Section IIC indicates that it is unable, by subcontracting to obtain commitments which at least equal the amount required by Section IIA, it may request, in writing, a waiver of up to 50% of the amount required by Section IIA. To obtain such a waiver, the Contractor must submit a completed "Application for Waiver of Small Contractor Minority Business Enterprise Goals" to CONNDOT's Manager of Contracts which must also contain the following documentation:

1. Information described in Section ID.

2. For each "Small Contractor" contacted but unavailable, a statement from each "Small Contractor" confirming its unavailability.

Upon receipt of the submission requesting a waiver, the CONNDOT's Manager of Contracts shall submit the documentation to the Director of the Office of Contract Compliance who shall review it for completeness. After completion of the Director of Contract Compliance's review, she/he should write a narrative of his/her findings of the application for a waiver, which is to include his/her recommendation. The Director of Contract Compliance shall submit the written narrative to the Chairperson of the DBE Screening Committee at least five (5) working days before the scheduled meeting. The Contractor shall be invited to attend the meeting and present his/her position. The DBE Screening Committee shall render a decision on the waiver request within five (5) working days after the meeting. The DBE Screening Committee's decision shall be final. Waiver applications are available from the CONNDOT Manager of Contracts.

EXHIBIT I Mar. 01

SMALL CONTRACTOR/*MINORITY BUSINESS ENTERPRISE
(* Delete if not Applicable)
SET-ASIDE PROGRAM
(QUALIFICATION AFFIDAVIT)

PROJECT(s) _____
(INCLUDING TOWN & DESCRIPTION)

STATE OF _____CONNECTICUT_____

COUNTY OF_____

I_____,ACTING IN BEHALF
NAME OF PARTY SIGNING AFFIDAVIT
OF_____,DO HEREBY CERTIFY
PERSON FIRM OR ORGANIZATION
AND AFFIRM THAT THE INFORMATION SET FORTH BELOW IS TRUE AND ACCURATE TO THE BEST OF MY KNOWLEDGE. AS OF THIS DATE_____THE LIST OF SMALL CONTRACTOR SET-ASIDE PROGRAM - CONTRACTS AND/OR SUBCONTRACTS AWARDED DURING THE CURRENT FISCAL YEAR (JULY 1 - JUNE 30) 20_____ IS AS FOLLOWS:

Col. 1 TOWN AND PROJECT NUMBER	Col. 2 STATE AGENCY WHICH AWARDED CONTRACT	Col. 3 CONTRACT AMOUNT AWARDED UNDER THIS PROGRAM	Col. 4 AMOUNT OF WORK SUBCONTRACTED FROM OTHER FIRMS UNDER THIS PROGRAM	Col. 5 TOTAL AMOUNT OF ALL WORK UNDER THIS PROGRAM Col. 3 Plus Col. 4
	TOTALS	$	$	$

_____
NAME OF PERSON, FIRM OR ORGANIZATION

(FIRM SEAL)

_____
SIGNATURE & TITLE OF OFFICIAL

SWORN TO AND SUBSCRIBED BEFORE ME BY_____

WHO IS PERSONALLY KNOWN TO ME, THIS_____DAY OF_____, 20_____

_____
(NOTARY PUBLIC)

MY COMMISSION EXPIRES_____SEAL

PLEASE NOTE THAT ALL THE WORK AWARDED OR SUBCONTRACTED TO YOUR FIRM UNDER THE SET-ASIDE PROGRAM IN A FISCAL YEAR (JULY 1-JUNE 30) INCLUDING THIS PROJECT, CANNOT BE MORE THAN $10,000,000.00

Mar.01

EXHIBIT II

CERTIFICATION OF WORK TO BE SUBCONTRACTED
NOMINATED SMALL CONTRACTOR/*MINORITY BUSINESS ENTERPRISE

* Delete if not applicable

DEPARTMENT OF TRANSPORTATION
CONTRACT DIVISION
2800 BERLIN TURNPIKE
NEWINGTON, CT 06111

PLEASE INCLUDE A COPY OF CERTIFICATION LETTER

CONTRACTOR_____

ADDRESS_____

TOWN_____PROJECT NO._____

DESCRIPTION OF PROJECT_____

_____

CONTRACT BID AMOUNT $_____

DATE_____

Listed below is the Nominated Small Contractor/Minority Business Enterprise for the above project and the requested data:

Name, Address & Tel No. of the Nominated Firm	ITEM(s)NUMBER(s) and Description of the Item(s) to be performed by and paid to the Subcontractor	Quantities (indicate if partial)	Prime's Bid Amount For Item	Dollar Amount Subcontracted	Small Business Set-Aside Dollar Requirement

Signed By _____
Small Contractor/*Minority Business Enterprise
(Subcontractor)

Signed By_____
Contractor

Title_____

Mar.01

EXHIBIT III

CERTIFICATION
PAST CONSTRUCTION EXPERIENCE

SMALL CONTRACTOR / * MINORITY BUSINESS ENTERPRISES

* Delete if not applicable

PLEASE LIST ALL CONSTRUCTION PROJECTS YOUR ORGANIZATION HAS WORKED ON IN THE PAST TWO FISCAL YEARS

PROJECT LOCATION NUMBER AND DESCRIPTION APPLICABLE	CONTRACT AMOUNT	IF WORK PERFORMED AS PRIME GIVE OWNERS NAME IF WORK PERFORMED AS SUBCONTRACTOR GIVE CONTRACTORS NAME	START DATE	ACTUAL OR ESTIMATED COMPLETION DATE	NAME AND PHONE OF OWNER OR PRIME CONTRACTOR AS

SIGNED BY: _____

SMALL BUSINESS CONTRACTOR
*MINORITY BUSINESS ENTERPRISES

D.O.T. PROJECT NO. _____

* Delete if not applicable

MARCH, 2001

SMALL CONTRACTOR/SMALL CONTRACTOR MINORITY BUSINESS ENTERPRISE (MBE) (SET-ASIDE) CONNECTICUT DEPARTMENT OF TRANSPORTATION AFFIDAVIT – SUPPLIER OR MANUFACTURER

This affidavit must be completed by the State Contractor's designated Small Contractor/ Small Contractor Minority Business Enterprise (MBE), notarized and attached to the contractor's request to utilize a Small Contractor/Small Contractor Minority Business Enterprise (MBE) supplier or manufacturer as a credit towards its Small Contractor/Small Contractor Minority Business Enterprise (MBE) contract requirement; failure to do so will result in not receiving credit towards the contract Small Contractor/Small Contractor Minority Business Enterprise (MBE) requirement.

State Project No. _____
Federal Aid Project No. _____
Description of Project _____

I, _____, acting in behalf of _____
(Name of person signing Affidavit) (Small Contractor/Small Contractor MBE contractor person,
_____ of which I am the_____ affirm that _____
firm, association or certify and corporation) (Title of Person) (Small
_____is a certified Small Contractor/Small
Contractor/Small Contractor MBE person, firm, association or corporation)
Contractor Minority Business Enterprise, as defined by Section 4a-60g of the Connecticut General Statutes, as revised.

I further certify and affirm that _____
(Small Contractor/Small Contractor MBE person, firm, association or corporation)
will assume the actual and contractual responsibility for the provision of the materials and/or supplies sought by _____. If a manufacturer, I produce goods from raw
(State Contractor)
materials or substantially alter them before resale, or if a supplier, I perform a commercially useful function in the supply process.

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

_____
(Name of Small Contractor/Small Contractor MBE person, firm, association or corporation)

_____
(Signature and Title of Official making the Affidavit)

Subscribed and sworn to before me, the _____ day of _____ 200____.

_____
Notary Public (Commissioner of the Superior Court)

My Commission Expires _____

CERTIFICATE OF CORPORATION

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

(Corporate Seal)

ITEM #0020801A - ASBESTOS ABATEMENT

Description:

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

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

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

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

Materials:

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

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

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

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

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

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

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

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

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

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

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

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

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

Construction Methods:

(1) Pre-Abatement Submittals and Notices

(a) The scope of work for this project includes the removal of exterior non-friable ACM, which is not defined as "Asbestos Abatement" under the CTDPH Asbestos Abatement Standards (19a-332a-1) nor as Regulated asbestos containing materials (RACM) under the EPA Asbestos NESHAP. Therefore, the Contractor is **not required to submit an Asbestos Abatement Notification to CTDPH or EPA, prior to the commencement of work, so long as work practices will not render more than 25 square feet (SF) (CTDPH) or 160 SF (EPA) of the exterior non-friable ACM into a friable state.**

(b) Fifteen (15) working days prior to the commencement of asbestos abatement work, the Contractor shall submit to the Engineer for review and acceptance and/or acknowledgment of the following:

1. Permits and licenses for the removal of asbestos-containing or contaminated materials, including a CTDPH valid asbestos removal contractor's license.

2. Documentation dated within the previous twelve (12) months, certifying that all employees have received USEPA Model Accreditation Plan approved asbestos worker/supervisor training in the proper handling of materials that contain asbestos; understand the health implications and risks involved, including the illnesses possible from exposure to airborne asbestos fibers; understands the use and limits of respiratory equipment to be used; and understands the results of monitoring of airborne quantities of asbestos as related to health and respiratory equipment as indicated in 29 CFR 1926.1101 on an initial and annual basis, and copies of all employees CTDPH asbestos worker and/or supervisor licenses.

3. Documentation from the Contractor, typed on company letterhead and signed by the Contractor, certifying that all employees listed therein have received the following:

    a. medical monitoring within the previous twelve (12) months, as required in 29 CFR 1926.1101;
    b. respirator fit testing within the previous twelve (12) months as detailed in 29 CFR 1910.134 (for all employees who must also don a tight-fitting face piece respirator).

4. Copies of the EPA/State-approved certificates for the proposed asbestos landfill.

(c) No abatement shall commence until a copy of all required submittals have been received and found acceptable to the Engineer. Those employees added to the Contractor's original list will be allowed to perform work only upon submittal to, and receipt of, all required paperwork by the Engineer.

(2) Asbestos Abatement Provisions:

(a) General Requirements

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

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

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

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

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

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

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

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

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

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

(b) Set-Up

Pre-clean the work areas using HEPA filtered equipment (vacuum) and/or wet methods as appropriate, collecting and properly containing all loose debris as asbestos-containing/asbestos contaminated waste. Vacuum units, of suitable size and capabilities for the project, shall have HEPA filters capable of trapping and retaining at least 99.97 percent of all monodispersed particles

of three micrometers in diameter or larger. Do not use methods that raise dust, such as dry sweeping or vacuuming with equipment not equipped with HEPA filters.

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

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

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

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

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

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

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

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

(c) Personnel Protection

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

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

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

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

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

(d) Asbestos Abatement Procedures

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

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

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

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

Bridges

Bridge No. 01743B, I-84 WB over Ridgewood Road, West Hartford, CT

Includes the removal of:

- **Light grey brittle caulking around base supports of railing.**

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

Bridge No. 01744, I-84 EB over Berkshire Road, West Hartford, CT

Includes the removal of:

- **Light grey brittle caulking around base supports of railing.**

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

Bridge No. 01745, I-84 WB over Berkshire Road, West Hartford, CT

Includes the removal of:

- **Light grey brittle caulking around base supports of railing.**

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

Signs

Sign Support No. 21682

Includes the removal of:

- **Off-white brittle caulking around base of sign support/foundation.**

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

Sign Support No. 21683

Includes the removal of:

- **Off-white brittle caulking around base of sign support/foundation.**

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

Sign Support No. 21685

Includes the removal of:

- **Off-white brittle caulking around base of sign support/foundation.**

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

Additional Notes:

Further ACM is known to exist at Bridge Nos. 01743A and 01747, but is not expected to be impacted by the bridge rehabilitation project:

- **Eight (8) transite pipe conduits (under side of Bridge No. 01747)**
- **Light grey brittle caulking around base supports of railing (top side Bridge No. 01743A).**
- **Tar-like pipe penetrations material (underside of box culvert – Bridge No. 01746)**

Contractor is advised that the above ACM is present and should take precautions so as not to disturb the ACM while performing renovation activity. ACM transite pipe shall be protected during other bridge constructions operations where they could potentially be impacted.

Should ACM be required to be impacted during construction, or upon discovery of any previously unidentified suspect ACM material during construction activities, work shall cease immediately until the Engineer can determine the extent of any ACM impact and implement proper procedures.

During removal, the Contractor shall spray asbestos materials with amended water using airless spray equipment capable of providing a "mist" application to reduce the release of airborne fibers. Spray equipment shall be capable of mixing wetting agent with water and capable of generating

sufficient pressure and volume. Hose length shall be sufficient to reach all of the Regulated Area. Do not "flood" the area with hose type water supply equipment with the potential to create water releases and/or run-off from the regulated area.

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

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

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

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

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

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

The Contractor shall remove contamination from the exteriors of the scaffolding, ladders, extension cords, hoses and other equipment inside the Regulated Area. Cleaning may be accomplished by brushing, HEPA vacuuming and/or wet cleaning. The Contractor shall wet wipe the Regulated Area using cotton rags or lint free paper towels. Rags and towels shall be disposed of after each use. Workers should avoid the use of dirty rags to insure proper cleaning of surfaces.

Waste water shall be filtered using best available technology into leak-proof containers prior to being transported to a sanitary sewer for discharge.

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

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

(e) Air Monitoring Requirements

1. The Contractor shall:

    a. Provide air monitoring equipment including sample filter cassettes of the type and quantity required to properly monitor operations and personnel exposure surveillance throughout the duration of the project.

    b. Conduct personnel exposure assessment air sampling, as necessary, to assure that workers are using appropriate respiratory protection in accordance with OSHA Standard 1926.1101. Documentation of air sampling results must be recorded at the work site within twenty-four (24) hours and shall be available for review until the job is complete.

2. The Project Monitor, acting as the representative of the Engineer during abatement activities, will:

    a. Collect air samples in accordance with the current revision of the NIOSH 7400 Method of Air Sampling for Airborne Asbestos Fibers while overseeing the activities of the Abatement Contractor. Frequency and duration of the air sampling during abatement will be representative of the actual conditions at the abatement site. The size and configuration of the asbestos project will be a factor in the number of samples required to monitor the abatement activities and shall be determined by the Project Monitor. The following schedule of samples may be collected by the Project Monitor:

        1. Pre-Abatement (Optional)
            a. Background areas
            b. Area(s) adjacent to Work Area(s)
            c. Work Area(s)

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

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

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

(f) Post Abatement Work Area Deregulation

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

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

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

(g) Waste Disposal

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

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

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

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

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

Transport vehicles hauling ACM waste shall have appropriate USDOT placards visible on all four (4) sides of the vehicle.

The Contractor shall dispose of asbestos-containing and/or asbestos contaminated material at an EPA authorized site and must be in compliance with the requirements of the Special Waste Provisions of the Office of Solid Waste Management, Department of Energy & Environmental Protection, State of Connecticut, or other designated agency having jurisdiction over solid waste disposal.

Any asbestos-containing and/or asbestos-contaminated waste materials which also contain other hazardous contaminants shall be disposed of in accordance with the EPA's Resource Conservation and Recovery Act (RCRA), CTDEEP and ConnDOT requirements. Materials may be required to be stored on-site and tested by the Project Monitor to determine proper waste disposal requirements.

(h) Project Closeout Data:

1. Provide the Engineer, within 30 days of completion of asbestos abatement, a compliance package; which shall include, but not be limited to, the following:

    a. Asbestos Abatement Site Supervisor job log;
    b. OSHA personnel air sampling data;
    c. Completed waste shipment records.

The Contractor shall submit the original completed waste shipment records to the Engineer.

Method of Measurement:

No measurement will be made for the work in this Section. The completed work shall be paid as a lump sum.

Basis of Payment:

The lump sum bid price for this item shall include the specialty services of the Asbestos Removal Contractor including: labor, materials, equipment, insurance, permits, notifications, submittals, personal air sampling, personal protection equipment, temporary enclosures, utility costs,

incidentals, fees and labor incidental to the removal, transport and disposal of ACM, including close out documentation.

Final payment for asbestos abatement will not be made until all the project closeout data submittals have been completed (including waste shipment record(s) signed by an authorized disposal facility representative) and provided to the Engineer. Once the completed package has been received in its entirety, the Engineer will make the final payment to the Contractor.

Pay Item	Pay Unit
Asbestos Abatement	Lump Sum

ITEM #0020903A - LEAD COMPLIANCE FOR MISCELLANEOUS EXTERIOR TASKS

Description:

Work under this item shall include the special handling measures and work practices required for miscellaneous exterior tasks that impact materials containing or covered by lead paint. Lead paint includes paint found to contain **any** detectable amount of lead by Atomic Absorption Spectrophotometry (AAS) or X-Ray Fluorescence (XRF). Examples of typical miscellaneous exterior tasks includes; work impacting signs, guiderails, minor bridge rehabilitation, catenary structures, canopy structures, spot paint removal, etc.

All activities shall be performed in accordance with the OSHA Lead in Construction Regulations (29 CFR 1926.62), the USEPA RCRA Hazardous Waste Regulations (40 CFR Parts 260 through 274), and the CTDEEP Hazardous Waste Regulations (RCSA 22a-209-1 and 22a-449(c)).

All activities shall be performed by individuals with appropriate levels of OSHA lead awareness and hazard communication training and shall supervised by the Contractors Competent Person on the job site at all times. The Contractors Competent Person is one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

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

Materials:

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

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

The following material requirements are to be met if to be used during the work:

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

Polyethylene disposable bags shall be minimum six (6) mils thick.

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

Cleaning Agents and detergent shall be lead specific, such as TriSodium Phosphate (TSP).

Chemical strippers and chemical neutralizers shall be compatible with the substrate as well as with each other. Such chemical stripper shall contain less than 50% Volatile Organic Compounds (VOCs) by weight in accordance with RCSA 22a-174-40 Table 40-1.

Labels and warning signs shall conform to 29 CFR 1926.62, 40 CFR 260 through 274 and 49 CFR 172 as appropriate.

Air filtration devices and vacuum units shall be equipped with High-Efficiency Particulate Air (HEPA) filters.

Construction Methods:

(1) Pre-Abatement Submittals and Notices

A. Prior to the start of **any** work on a contiguous per site basis that will generate hazardous lead waste above conditionally exempt small quantities (greater than 100 kg/month or greater than 1000 kg at any time), the Contractor shall obtain from the Engineer on a contiguous per site basis a temporary EPA Hazardous Waste Generators ID number, unless otherwise directed by the Engineer.

B. Fifteen (15) working days prior to beginning work that impacts lead paint, the Contractor shall submit the following to the Engineer:

1. Work plan for work impacting lead paint including engineering controls, methods of containment of debris and work practices to be employed, as needed, to minimize employee exposure and prevent the spread of lead contamination outside the Regulated Area.

2. Copies of all employee certificates, dated within the previous twelve (12) months, relating to OSHA lead awareness and hazard communication training and training in the use of lead-safe work practices. SSPC training programs may be accepted as meeting these requirements if it can be demonstrated that such training addressed all required topics.

   This information shall be updated and resubmitted annually, or as information changes, for the duration of the activities impacting lead to verify continued compliance.

3. Name and qualifications of Contractor's OSHA Competent Person under 29 CFR 1926.62.

4. Documentation from the Contractor, typed on company letterhead and signed by the Contractor, certifying that all employees listed therein have received the following:

   a. medical monitoring within the previous twelve (12) months, as required in 29 CFR 1926.62;
   b. biological monitoring within the previous six (6) months, as required in 29 CFR 1926.62;
   c. respirator fit testing within the previous twelve (12) months, as required in 29 CFR 1910.134 (for those who don a tight-fitting face piece respirator)

   This information shall be updated and resubmitted annually, or as information changes, for the duration of the activities impacting lead to verify continued compliance.

5. Names of the proposed non-hazardous construction and demolition (C&D) lead debris bulky waste disposal facility (CTDEEP-permitted Solid Waste landfill).

6. Names of the proposed scrap metal recycling facilities. The Contractor shall submit to the Engineer all documentation necessary to demonstrate the selected facility is able to accept lead-painted scrap metal.

7. Names of the proposed hazardous waste disposal facility (selected from the Department approved list provided herein), and copies of each facilities acceptance criteria and sampling frequency requirements.

8. Copies of the proposed hazardous waste transporters current USDOT Certificate of Registration for Hazardous Materials Transport, and the proposed transporters current Hazardous Waste Transporter Permits for the State of Connecticut and the waste destination State.

9. Negative exposure assessments conducted within the previous 12 months documenting that employee exposure to lead for each task is below the OSHA Action Level of 30 $\mu g/m^3$. If a negative exposure assessment has not been conducted, the Contractor shall submit its air monitoring program for the work tasks as part of the Work Plan. Until a negative exposure assessment is developed for each task impacting lead paint, the Contractor shall ensure that all workers and authorized persons entering the Regulated Area wear protective clothing and respirators in accordance with OSHA 29 CFR 1926.62.

No activity shall commence until all required submittals have been received and found acceptable to the Engineer. Those employees added to the Contractor's original list will be allowed to perform work only upon submittal of acceptable documentation to, and review by, the Engineer.

Contractor shall provide the Engineer with a minimum of 48 hours notice in advance of scheduling, changing or canceling work activities.

(2) Lead Abatement Provisions

A. General Requirements:

All employees of the Contractor who perform work impacting lead paint shall be properly trained to perform such duties. In addition, the Contractor shall instruct all workers in all aspects of personnel protection, work procedures, emergency evacuation procedures and use of equipment including procedures unique to this project.

Contractor shall provide all labor, materials, tools, equipment, services, testing, and incidentals which are necessary or required to perform the work in accordance with applicable governmental regulations, industry standards and codes, and these Specifications.

Prior to beginning work, the Engineer and Contractor shall perform a visual survey of each work area and review conditions.

As necessary, the Contractor shall:

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

If adequate electrical supply is not available at the site, the Contractor shall supply temporary power. Such temporary power shall be sufficient to provide adequate lighting and power the Contractor's equipment. The Contractor is responsible for proper connection and installation of electrical wiring and shall ensure safe installation of electrical equipment in compliance with applicable electrical codes and OSHA requirements.

If water is not available at the site for the Contractor's use, the Contractor shall supply sufficient water for each shift to operate the wash facility/decontamination shower units in addition to the water needed at the work area.

The Engineer may provide a Project Monitor to monitor compliance of the Contractor and protect the interests of the Department. In such cases, no activity impacting lead paint shall be performed until the Project Monitor is on-site. Where no Project Monitor will be provided, Contractor shall proceed at the direction of the Engineer. Environmental sampling, including ambient air sampling, TCLP waste stream sampling, and dust wipe sampling, will be conducted by the State as it deems necessary throughout the project. Air monitoring to comply with the Contractor's obligations under OSHA remains solely responsibility of the Contractor.

If at any time, procedures for engineering, work practice, administrative controls or other topics are anticipated to deviate from those documented in the submitted and accepted Lead Work Plan, the Contractor shall submit a modification of its existing plan for review and acceptance by the Engineer prior to implementing the change.

If air samples collected outside of the Regulated Area during activities impacting lead paint indicate airborne lead concentrations greater than original background levels or 30 ug/m^3, whichever is larger, or if at any time visible emissions of lead paint extend out from the Regulated Area, an examination of the Regulated Area shall be conducted and the cause of such emissions corrected. Cleanup of surfaces outside the Regulated Area using HEPA vacuum equipment or wet cleaning techniques shall be done prior to resuming work.

Work outside the initial designated area(s) will not be paid for by the Engineer. The Contractor will be responsible for all costs incurred from these activities including repair of any damage.

B. Regulated Area

The Contractor shall establish a Regulated Area through the use of appropriate barrier tape or other means to control unauthorized access into the area where activities impacting lead paint are occurring. Warning signs meeting the requirements of 29 CFR 1926.62 shall be posted at all approaches to Regulated Areas. These signs shall read:

DANGER
LEAD WORK AREA
MAY DAMAGE FERTILITY OR THE UNBORN CHILD
CAUSES DAMAGE TO THE CENTRAL NERVOUS SYSTEM
DO NOT EAT, DRINK, OR SMOKE IN THIS AREA

The Contractor shall implement appropriate engineering controls such as poly drop cloths, local exhaust ventilation, wet dust suppression methods, etc. as necessary, and as approved by the Engineer, to prevent the spread of lead contamination beyond the Regulated Area in accordance with the Contractor's approved work plan. Should the previously submitted work plan prove to be insufficient to contain the contamination, the Contractor shall modify its plan and submit it for review by the Engineer.

C. Wash Facilities:

The Contractor shall provide handwash facilities in compliance with 29 CFR 1926.51(f) and 29 CFR 1926.62 regardless of airborne lead exposure.

If employee exposure to airborne lead exceeds the OSHA Permissible Exposure Limit of 50 micrograms per cubic meter (μg/m^3), shower rooms must be provided. The Shower Room shall be of sufficient capacity to accommodate the number of workers. One shower stall shall be provided for each eight (8) workers. Showers shall be equipped with hot and cold or warm running water. Shower water shall be collected and filtered using best available technology and disposed of in accordance with all Federal, State and local laws, regulations and ordinances.

D. Personal Protection:

The Contractor shall initially determine if any employee performing construction tasks impacting lead paint may be exposed to lead at or above the OSHA Action Level of 30 $\mu g/m^3$. Assessments shall be based on initial air monitoring results as well as other relevant information. The Contractor may rely on historical air monitoring data obtained within the past 12 months under workplace conditions closely resembling the process, type of material, control methods, work practices and environmental conditions used and prevailing in the Contractors current operations to satisfy the exposure assessment requirements. Monitoring shall continue as specified in the OSHA standard until a negative exposure assessment is developed.

Until a negative exposure assessment is developed for each task impacting lead paint, the Contractor shall ensure that all workers and authorized person entering the Regulated Area wear protective clothing and respirators in accordance with OSHA 29 CFR 1926.62. Protective clothing shall include impervious coveralls with elastic wrists and ankles, head covering, gloves and foot coverings. Sufficient quantities shall be provided to last throughout the duration of the project.

Protective clothing provided by the Contractor and used during chemical removal operations shall be impervious to caustic materials. Gloves provided by the Contractor and used during chemical removal shall be of neoprene composition with glove extenders.

Respiratory protective equipment shall be provided and selection shall conform to 42 CFR Part 84, 29 CFR Part 1910.134, and 29 CFR Part 1926.62. A formal respiratory protection program must be implemented in accordance with 29 CFR Part 1926.62 and Part 1910.134.

E. Air Monitoring Requirements

The Contractor shall:

1. Provide air monitoring equipment including sample filter cassettes of the type and quantity required to properly monitor operations and personnel exposure surveillance throughout the duration of the project.

2. Conduct initial exposure monitoring to determine if any employee performing construction tasks impacting lead paint may be exposed to lead at or above the OSHA Action Level of 30 micrograms per cubic meter. Monitoring shall continue as specified in the OSHA standard until a negative exposure assessment is developed.

3. Conduct personnel exposure assessment air sampling, as necessary, to assure that workers are using appropriate respiratory protection in accordance with OSHA Standard 1926.62. Documentation of air sampling results must be recorded at the work site within twenty-four (24) hours and shall be available for review until the job is complete.

F. Lead Abatement Procedures

The Contractor's Competent Person shall be at the job site at all times during work impacting lead.

Work impacting lead paint shall not begin until authorized by the Engineer, following a pre-work visual inspection by the Project Monitor or Engineer to verify existing conditions.

Any activity impacting lead painted surfaces shall be performed in a manner which minimizes the spread of lead dust contamination and generation of airborne lead.

The Contractor shall conduct exposure assessments for all tasks which impact lead paint in accordance with 29 CFR 1926.62(d) and shall implement appropriate personal protective equipment until negative exposure assessments are developed.

All work impacting the materials identified below shall be conducted within an established Regulated Area with a remote wash facility/decontamination system in accordance with "C. Wash Facilities" and the OSHA Lead in Construction Standard. In accordance with 29 CFR 1926.62, engineering controls and work practices shall be utilized to prevent the spread of lead dust and debris beyond the Regulated Area and limit the generation of airborne lead. All wastes containing lead paint shall be properly contained and secured for storage, transportation and disposal.

The Contractor shall ensure proper entry and exit procedures for workers and authorized persons who enter and leave the Regulated Area. All workers and authorized persons shall leave the Regulated Area and proceed directly to the wash or shower facilities where they will HEPA vacuum gross debris from work suit, remove and dispose of work suit, wash and dry face and hands, and vacuum clothes. Lead chips and dust must not be removed by blowing or shaking of clothing. Wash water shall be collected, filtered, and disposed of in accordance with Federal, State and local water discharge standards. Any permit required for such discharge shall be the responsibility of the Contractor.

No one shall eat, drink, smoke, chew gum or tobacco, or apply cosmetics while in the Regulated Area.

Data from the limited lead testing performed by the Engineer is documented in the reports listed in the "Notice to Contractor – Hazardous Materials Investigations" or is presented herein. Under no circumstances shall this information be the sole means used by the Contractor for determining the extent of lead painted materials. The Contractor shall be responsible for verification of all field conditions affecting performance of the work as described in these Specifications in accordance with OSHA, USEPA, USDOT and CTDEEP standards. Compliance with the applicable requirements is solely the responsibility of the Contractor.

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

Bridge No. 01743B, I-84 WB over Ridgewood Road, West Hartford, CT

- **Detectable amounts of lead were identified on the painted structural steel/metal bridge component surfaces of Bridge No. 01743B.**

Girders, Cross Beams, Beam Ends, Bearings, Rockers, Diaphragms, Railings, etc.	**Metal**	**Grey**	**0.2-33.0 mg/cm^2**

- **TCLP waste stream sampling/analysis of the paint associated with the structural steel/metal bridge component surfaces of the bridge characterized the paint waste as RCRA hazardous waste.**

Paint debris (railings)	**91 mg/l**
Paint debris (structural)	**480 mg/l**

Bridge No. 01744, I-84 EB over Berkshire Road, West Hartford, CT

- **Detectable amounts of lead were identified on the painted structural steel/metal bridge component surfaces of Bridge No. 01744.**

Girders, Cross Beams, Beam Ends, Bearings, Rockers, Diaphragms, Railings, etc.	**Metal**	**Grey**	**0.3-26.2 mg/cm^2**

- **TCLP waste stream sampling/analysis of the paint associated with the structural steel/metal bridge component surfaces of the bridge characterized the paint waste as RCRA hazardous waste.**

Paint debris	**540 mg/l**

Bridge No. 01745, I-84 WB over Berkshire Road, West Hartford, CT

- **Detectable amounts of lead were identified on the painted structural steel/metal bridge component surfaces of Bridge No. 01745.**

Girders, Cross Beams, Beam Ends, Bearings, Rockers, Diaphragms, Railings, etc.	**Metal**	**Grey**	**1.9-27.4 mg/cm^2**

- **TCLP waste stream sampling/analysis of the paint associated with the structural steel/metal bridge component surfaces of the bridge characterized the paint waste as RCRA hazardous waste.**

Paint debris	**470 mg/l**

Sign Support Nos. 21579, 21580 & 21581, West Hartford, CT

- **Detectable amounts of lead were identified on the painted metal sign support component surfaces of Sign Support Nos. 21579 & 21581. The paint at Sign Support No. 21580 was found to be homogeneous to Sign Support Nos. 21579 & 21581.**

Sign Support & Base	**Metal**	**Grey**	**0.5 mg/cm^2**

- **TCLP waste stream sampling/analysis of the paint associated with the sign support component surfaces characterized the paint waste as non-RCRA, non-hazardous waste.**

Paint debris (21579)	**1.2 mg/l**
Paint debris (21580)	**Homogeneous to 21579 & 21581**
Paint debris (21581)	**1.4 mg/l**

Sign Support Nos. 21682, 21683 & 21685, West Hartford, CT

- **No detectable amounts of lead were identified on the painted metal sign support component surfaces of Sign Support No. 21682. The paint at Sign Support No. 21683 & 21685 was found to be homogeneous to Sign Support No. 21682.**

Sign Support & Base	**Metal**	**Grey**	**0.0 mg/cm^2 ND<0.10% by weight**

- **Since no detectable amount of lead in paint were identified, any paint waste generated would be classified as non-hazardous, non-RCRA waste.**

Additional Notes:

Further, it is not projected for paint to be impacted on structural steel/metal bridge components at Bridge Nos 01743A, 03486, 03489, 03490 & 01747, however the Contractor is advised that the lead paint is present or presumed on these bridges and should take precautions so as not to disturb the lead paint while performing renovation activities. If lead

paint is to be impacted at these bridges, then all OSHA Lead in Construction Regulations, EPA RCRA, CTDEEP Regulations and this Item shall apply.

While conducting work to the bridge/sign support components, where it is necessary to impact the lead painted surfaces, the Contractor shall either:

a. **Remove the paint to be impacted prior to impacting the substrate in accordance with OSHA Lead in Construction Standard 29CFR 1926.62, or**
b. **Impact the substrate using mechanical means with the paint in place in accordance with OSHA Lead in Construction Standard 29CFR 1926.62.**

The Contractor shall submit a Work Plan to ConnDOT outlining the exact procedures that will be used to perform the work, contain the spread of lead debris and protect the employees performing the required renovation work impacting the lead paint. No work shall be started by the Contractor until the Work Plan is approved by the Engineer.

All work impacting the lead paint materials shall be conducted within an established Regulated Area with a remote wash facility/decontamination system in accordance with "C. Wash Facilities" and the OSHA Lead in Construction Standard. In accordance with 29 CFR 1926.62, engineering controls and work practices shall be utilized to prevent the spread of lead dust and debris beyond the Regulated Area and limit the generation of airborne lead. All wastes containing lead paint shall be properly contained and secured for storage, transportation and disposal.

The Engineer has characterized the paint waste stream associated with the structural steel/metal bridge components at Bridge Nos. 01743B, 01744 & 01745 as hazardous waste. If the paint is removed from the metal railing surfaces, the paint shall be handled and disposed of in accordance with USEPA/CTDEEP Hazardous Waste Regulations as described under this Item 0020903A.

The Engineer has characterized the paint waste stream associated with Sign Support Nos. 21579, 21580 & 21581 as non-hazardous. If the paint is required to be removed from the metal surfaces of the sign support components, the paint shall be handled and disposed of as non-hazardous, non-RCRA waste as described under this Item 0020903A.

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

Should lead contamination be discovered outside of the Regulated Area, the Contractor shall immediately stop all work in the Regulated Area, eliminate causes of such contamination and take steps to decontaminate non-work areas.

Special Requirements:

1. Demolition/Renovation:

    a. Demolish/renovate in a manner which minimizes the spread of lead contamination and generation of lead dust.

    b. Implement dust suppression controls, such as misters, local exhaust ventilation, etc. to minimize the generation of airborne lead dust.

    c. Segregate work areas from non-work areas through the use or barrier tape, drop cloths, etc.

    d. Clean up immediately after renovation/demolition has been completed

2. Chemical Removal:

    a. Apply chemical stripper in quantities and for durations specified by manufacturer.

    b. Where necessary, scrape lead paint from surface down to required level of removal (i.e. stabilized surface, bare substrate with no trace of residual pigment, etc.). Use sanding, hand scraping, and dental picks to supplement chemical methods as necessary.

    c. Apply neutralizer compatible with substrate and chemical agent to substrate following removal in accordance with manufacturer's instructions.

    d. Protect adjacent surfaces from damage from chemical removal.

    e. Maintain a portable eyewash station in the work area.

    f. Wear respirators that will protect workers from chemical vapors.

    g. Do not apply caustic agents to aluminum surfaces.

3. Mechanical Paint Removal:

    a. Provide sanders, grinders, rotary wire brushes, or needle gun removers equipped with a HEPA filtered vacuum dust collection system. Cowling on the dust collection system for orbital-type tools must be capable of maintaining a continuous tight seal with the surface being abated. Cowling on the dust collection system for

reciprocating-type tools shall promote an effective vacuum flow of loosened dust and debris. Inflexible cowlings may be used on flat surfaces only. Flexible contoured cowlings are required for curved or irregular surfaces.

b. Provide HEPA vacuums that are high performance designed to provide maximum static lift and maximum vacuum system flow at the actual operating vacuum condition with the shroud in use. The HEPA vacuum shall be equipped with a pivoting vacuum head.

c. Remove lead paint from surface down to required level of removal (i.e. stabilized surface, bare substrate with no trace of residual pigment, etc.). Use chemical methods, hand scraping, and dental picks to supplement abrasive removal methods as necessary.

d. Protect adjacent surfaces from damage from abrasive removal techniques.

e. "Sandblasting" type removal techniques shall not be allowed.

4. Component Removal/Replacement:

a. Wet down components which are to be removed to reduce the amount of dust generated during the removal process.

b. Remove components utilizing hand tools, and follow appropriate safety procedures during removal. Remove the components by approved methods which will provide the least disturbance to the substrate material. Do not damage adjacent surfaces.

c. Clean up immediately after component removals have been completed. Remove any dust located behind the component removed.

G. Prohibited Removal Methods:

The use of heat guns in excess of 700 degrees Fahrenheit to remove lead paint is prohibited.

The use of sand, steel grit, air, CO_2, baking soda, or any other blasting media to remove lead or lead paint without the use of a HEPA ventilated contained negative pressure enclosure is prohibited.

Power/pressure washing shall not be used to remove lead paint.

Compressed air shall not be utilized to remove lead paint.

Chemical strippers containing Methylene Chloride are prohibited. Any chemical stripping may be prohibited on a project by project basis.

Power tool assisted grinding, sanding, cutting, or wire brushing of lead paint without the use of cowled HEPA vacuum dust collection systems is prohibited.

Lead paint burning, busting of rivets painted with lead paint, welding of materials painted with lead paint, and torch cutting of materials painted with lead paint is prohibited. Where cutting, welding, busting, or torch cutting of materials is required, lead paint in the affected area must be removed first.

Chemical stripping of coatings from bridge components is generally prohibited unless specifically allowed on a project by project basis.

H. Clean-up and Visual Inspection:

The Contractor shall remove and containerize all lead waste material and visible accumulations of debris, paint chips and associated items.

During clean-up the Contractor shall utilize rags and sponges wetted with lead-specific detergent and water as well as HEPA filtered vacuum equipment.

The Engineer will conduct a visual inspection of the work areas in order to document that all surfaces have been maintained as free as practicable of accumulations of lead in accordance with 29 CFR 1926.62(h). If visible accumulations of waste, debris, lead paint chips or dust are found in the work area, the Contractor shall repeat the cleaning, at the Contractor's expense, until the area is in compliance. The visual inspection will detect incomplete work, damage caused by the abatement activity, and inadequate clean up of the work site.

I. Post-Work Regulated Area Deregulation:

Following an acceptable visual inspection, any engineering controls implemented may be removed.

A final visual inspection of the work area shall be conducted by the Competent Person and the Project Monitor or Engineer to ensure that all visible accumulations of suspect materials have been removed and that no equipment or materials associated with the lead paint removal remain. If this final visual inspection is acceptable, the Contractor will reopen the Regulated Area and remove all signage.

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

J. Waste Disposal/Recycling:

Non-metallic building debris waste materials tested and found to be non-hazardous shall be disposed of properly at a CTDEEP approved Solid Waste landfill as described under this Item

0020903A.

Metallic debris shall be segregated and recycled as scrap metal at an approved metal recycling facility.

Concrete, brick, etc. coated with any amount of lead paint cannot be crushed, recycled or buried on-site to minimize waste disposal unless tested and found to meet the RSR GA/Residential standards.

Hazardous lead debris shall be disposed of as described under this Item 0020903A.

The Contractor shall comply with the latest requirements of the USEPA RCRA Hazardous Waste Regulations 40 CFR 260-274 and the DEEP Hazardous/Solid Waste Management Standards 22a-449(c).

Hazardous lead debris shall be transported from the Project by a licensed hazardous waste transporter approved by the Department and disposed of at an EPA-permitted and Department-approved hazardous waste landfill within 90 days from the date of generation.

The Contractor must use one or more of the following Department-approved disposal facilities for the disposal of hazardous waste:

Clean Earth of North Jersey, Inc., (CENJ) 115 Jacobus Avenue, South Kearny, NJ 07105 Phone: (973) 344-4004; Fax: (973) 344-8652	Clean Harbors Environmental Services, Inc. 2247 South Highway 71, Kimball, NE 69145 Phone: (308) 235-8212; Fax: (308) 235-4307
Clean Harbors of Braintree, Inc. 1 Hill Avenue, Braintree, MA 02184 Phone: (781) 380-7134; Fax: (781) 380-7193	ACV Enviro(CycleChem)(General Chem Co) 217 South First Street, Elizabeth, NJ 07206 Phone: (908) 355-5800; Fax (908) 355-0562
Triumverate (EnviroSafe Corp Northeast) (Jones Environmental Services (NE), Inc.) 263 Howard Street, Lowell, MA 01852 Phone: (978) 453-7772; Fax: (978) 453-7775	US Ecology Environmental Quality Detroit, Inc. 1923 Frederick Street, Detroit, MI 48211 Phone: (800) 495-6059; Fax: (313) 923-3375
Stericycle (Republic Environmental Systems) 2869 Sandstone Drive, Hatfield, PA 19440 Phone: (215) 822-8995; Fax: (215) 997-1293	Clean Habors – Spring Grove Facility 4879 Spring Grove Ave, Cincinnati OH 45322 Phone: (513) 681-6242; Fax: (513) 681-0869
Envirite of PA (US Ecology) 730 Vogelsong Road, York, PA 17404 Phone: (717) 846-1900; Fax: (717) 854-6757	Stablex, Canada, Inc. 760 Industrial Bl, Blainville Quebec J7C3V4 Phone: (451) 430-9230; Fax: (451) 430-4642
Environmental Quality Company: Wayne Disposal Facility 49350 North I-94 Service Drive Belleville, MI 48111 Phone: (800) 592-5489; Fax: (800) 592-5329	Stericycle (Northland Environmental, Inc.) (PSC Environmental Systems) 275 Allens Avenue, Providence, RI 02905 Phone: (401) 781-6340; Fax: (401) 781-9710

The Contractor shall submit in writing (1) a letter listing the names of the hazardous waste disposal facilities (from the above list) that the Contractor will use to receive hazardous material from this Project, and (2) a copy of each facility's acceptance criteria and sampling frequency requirements.

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.

Prior to the generation of any hazardous waste, the Contractor shall notify the Engineer of its selected hazardous waste transporter and disposal facility. The Contractor must submit to the Engineer (1) the transporter's current US DOT Certificate of Registration and (2) the transporter's current Hazardous Waste Transporter Permits for the State of Connecticut, the hazardous waste destination state and any other applicable states. The Engineer will then obtain on a contiguous per site basis a temporary EPA Generators ID number for the site that he will forward to the Contractor. Any changes in transporter or facility shall be immediately forwarded to the Engineer for review.

Handling, storage, transportation and disposal of hazardous waste materials generated as a result of execution of this project shall comply with all Federal, State and Local regulations including the USEPA RCRA Hazardous Waste Regulations (40 CFR Parts 260-271), the CTDEEP Hazardous Waste Regulations (22a-209 and 22a-449(c)), and the USDOT Hazardous Materials Regulations (49 CFR Part 171-180).

All debris shall be contained and collected daily or more frequently as directed by the Engineer, due to debris buildup. Debris shall be removed by HEPA vacuum collection. Such debris and paint chips shall be stored in leak-proof storage containers in the secured storage site, or as directed by the Engineer. The storage containers and storage locations shall be reviewed by the Engineer and shall be located in areas not subject to ponding. Storage containers shall be placed on pallets and closed and covered with tarps at all times except during placement, sampling and disposal of the debris.

Hazardous waste materials are to be properly packed and labeled for transport by the Contractor is accordance with EPA, CTDEEP and USDOT regulations. The disposal of debris characterized as hazardous waste shall be completed within 90 calendar days of the date on which it began to be accumulated in the lined containers. Storage of containers shall be in accordance with current DEEP/EPA procedures.

The Contractor shall label hazardous waste storage containers with a 6-inch square, yellow, weatherproof, Hazardous Waste sticker in accordance with USDOT regulations.

Materials other than direct paint related debris which are incidental to the paint removal work activities (tarps, poly, plywood, PPE, gloves, decontamination materials, etc.) which may be

contaminated with lead, shall be stored separately from the direct paint debris, and shall be sampled by the Engineer for waste disposal characterization testing. Such materials characterized as hazardous shall be handled/disposed of as described herein, while materials characterized as non-hazardous shall be disposed of as non-hazardous CTDEEP Solid Waste.

Direct paint related debris materials not previously sampled and characterized for disposal, which may be originally presumed to be hazardous waste, shall also be stored separately and sampled by the Engineer for ultimate waste disposal characterization testing and handled/disposed of based on that testing.

Project construction waste materials unrelated to the paint removal operations shall NOT be combined/stored with paint debris waste and/or incidental paint removal materials as they are not lead contaminated and shall NOT be disposed of as hazardous waste. The Engineer's on-site Inspectors shall conduct inspections to verify materials remain segregated.

The Contractor shall obtain and complete all paperwork necessary to arrange for material disposal, including disposal facility waste profile sheets. It is solely the Contractor's responsibility to co-ordinate the disposal of hazardous materials with its selected treatment/recycling/disposal facility(s). Upon receipt of the final approval from the facility, the Contractor shall arrange for the loading, transport and treatment/recycling/disposal of the materials in accordance with all Federal and State regulations. **No claim will be considered based on the failure of the Contractor's disposal facility(s) to meet the Contractor's production rate or for the Contractor's failure to select sufficient facilities to meet its production rate.**

The Contractor shall process the hazardous waste such that the material conforms with the requirements of the selected treatment/disposal facility, including but not limited to specified size and dimension. Refusal on the part of the treatment/disposal facility to accept said material solely on the basis of non-conformance of the material to the facility's physical requirements is the responsibility of the Contractor and no claim for extra work shall be accepted for reprocessing of said materials to meet these requirements.

All DOT shipping documents, including the Uniform Hazardous Waste Manifests utilized to accompany the transportation of the hazardous waste material shall be prepared by the Contractor and reviewed/signed by an authorized agent representing ConnDOT, as Generator, for each load of hazardous material that is packed to leave the site. The Contractor shall not sign manifests on behalf of the State as Generator. The Contractor shall forward the appropriate original copies of all manifests to the Engineer the same day the material leaves the Project site.

Materials not related to lead paint removal and/or characterized as non-hazardous waste shall NOT be shipped for hazardous waste disposal in accordance with USEPA RCRA hazardous waste minimization requirements.

A load-specific certificate of disposal, signed by the authorized agent representing the waste disposal facility, shall be obtained by the Contractor and promptly delivered to the Engineer for each load.

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

- All vehicles departing the site are to be properly logged to show the vehicle identification, driver's name, time of departure, destination, and approximate volume, and contents of materials carried. Vehicles shall display the proper USDOT placards for the type and quantity of waste;

- No materials shall leave the site unless a disposal facility willing to accept all of the material being transported has agreed to accept the type and quantity of waste;

- Documentation must be maintained indicating that all applicable laws have been satisfied and that the materials have been successfully transported and received at the disposal facility; and,

- The Contractor shall segregate the waste streams (i.e. concrete, wood, etc.) as directed by the receiving disposal facility.

Any spillage of debris during disposal operations during loading, transport and unloading shall be cleaned up in accordance with EPA 40 CFR 265 Subparts C & D, at the Contractor's expense.

The Contractor is liable for any fines, costs or remediation costs incurred as a result of their failure to be in compliance with this Item and all Federal, State and Local laws.

K. Project Closeout Data:

Provide the Engineer, within thirty (30) days of completion of the project site work, a compliance package; which shall include, but not be limited to, the following:

1. Competent persons (supervisor) job log;
2. OSHA-compliant personnel air sampling data;
3. Completed waste shipment papers for non-hazardous lead construction and demolition (C&D) waste disposal or recycling and scrap metal recycling.
4. Copies of completed Hazardous Waste Manifests (signed by authorized disposal facility representative).

Method of Measurement:

The completed work shall be paid as a lump sum. This item will include all noted services, equipment, facilities, testing and other associated work for up to three (3) ConnDOT project representatives. Services provided to any ConnDOT project representatives in excess of three (3) representatives will be measured for payment in accordance with Article 1.09.04 – "Extra and Cost-Plus Work."

Basis of Payment:

The lump sum price bid for this item shall include: services, materials, equipment, all permits, notifications, submittals, personal air sampling, personal protection equipment, temporary enclosures, incidentals, fees and labor incidental to activities impacting lead removal, treatment and handling of lead contaminated materials, and the transport and disposal of any hazardous and/or non-hazardous lead construction and demolition (C&D) bulky waste.

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

Pay Item	Pay Unit
Lead Compliance for Miscellaneous Exterior Tasks	Lump Sum

END OF SECTION

ITEM #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 Areas of Environmental Concern (AOEC). 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, 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 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 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, 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(s) 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, as shown on the Plan, 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, including current 8-hour refresher 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 ensure 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 at the 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/incident, the Contractor shall complete and submit to the Engineer an accident report.

(xiv) Confined space entry procedures: Confined space entry procedures, both permit- 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 in 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 at the 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 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 #0101143A - HANDLING AND DISPOSAL OF REGULATED ITEMS (ESTIMATED COST)

Description:

Work under this item shall include the management (handling and disposal) of regulated items and all associated work by persons who are employed by a CTDEEP permitted Spill Contractor and trained/certified in accordance with OSHA Hazard Communication regulations. Regulated items include hazardous and other materials and wastes, the disposal of which is restricted by Federal and/or State laws and regulations, and which may be a component of equipment or other items located on-site. Regulated items include those listed herein, or additional similar items identified on site by the Engineer. Work under this item does not include asbestos containing materials, lead paint, contaminated or hazardous soils.

Activities shall be performed in accordance with, but not limited to, the current revision of the USEPA & CTDEEP Hazardous Waste Regulations (40 CFR 260-282, 22a-209 and 22a-449(c)), USEPA PCB Regulations (40 CFR 761), USEPA Protection of Stratospheric Ozone (40 CFR 82), OSHA Hazard Communication (29 CFR 1910.1200), OSHA Hazardous Waste & Emergency Response Regulations (29 CFR 1910.120), USDOT Hazardous Materials Regulation (49 CFR 171-180), OSHA, RCRA, CERCLA, CAA, TSCA, and all other laws and regulations.

The work activities include the removal, handling, packing, labeling, transport, manifesting, and recycling or disposal of various regulated items at the Project site prior to beginning planned renovation/demolition activities.

The Contractor is solely responsible for verifying actual locations and quantities of the items with hazardous/regulated material/waste constituents and for their proper handling and disposal. The recycling or proper disposal, as appropriate, of all regulated items shall be completed prior to the initiation of any demolition or renovation activities.

Materials:

All materials shall be suitable for the management of regulated items and shall meet all applicable federal, state and local regulations. Such materials include, but are not limited to, proper containers, packing materials, labels, signs, shipping papers, personnel protective equipment (PPE) and spill kits.

Construction Methods:

(1) Allowable Disposal/Recycling Facilities

Disposal facilities for RCRA-hazardous, TSCA-hazardous, Connecticut Regulated, and Universal wastes shall be chosen from among those listed below. No other facility shall be used for these types of wastes without the written approval of the Engineer.

Advanced Disposal Services
Greentree Landfill
635 Toby Road
Kersey, PA 15846
Phone: (814) 265-1744 Fax: (814) 265-8745
MSW, C&D, asbestos, PCB remediation waste <50 ppm, petroleum contaminated soils, nonhazardous solid wastes

Advanced Disposal
(managed by Interstate Waste Services)
7095 Glades Pike
Summerset, PA 15501
Phone: (814) 444-0112 Fax: (814) 444-0127
MSW, C&D debris, residual waste, sewer sludge, incinerator ash, asbestos

Allied Waste Niagara Falls Landfill, LLC
5600 Niagara Falls Blvd.
Niagara, NY 14304
Phone: (716) 285-3344 Fax: (716) 285-3398
Non-hazardous waste, industrial solid waste, municipal sewage treatment sludge, contaminated soil & debris, asbestos waste, C&D debris, industrial process sludge

American Lamp Recycling, LLC
26 Industrial Way
Wappingers Falls, NY 12590
Phone: (845) 896-0058 Fax: (845) 896-1520
Mercury containing device, universal waste

Tradebe (Bridgeport United Recycling, Inc.)
50 Cross Street
Bridgeport, CT 06610
Phone: (203) 334-1666 Fax: (203) 334-1439
RCRA & CRW waste oil, fuel, wastewater

Clean Earth of Carteret
24 Middlesex Ave..,
Carteret, NJ 07008
Phone: (732) 541-8909 Fax: (732) 541-8505
Concrete, brick, block, street sweepings, stone, rock, asphalt and petroleum contaminated soil

Clean Earth of Philadelphia, Inc.
3201 South 61 St.,
Philadelphia, PA 19153
Phone: (215) 724-5520 Fax: (215) 724-2939
Petroleum contaminated soil

Clean Earth of North Jersey, Inc. (aka CENJ)
115 Jacobus Ave,
South Kearny, NJ 07105
Phone: (973) 344-4004 Fax: (973) 344-8652
RCRA liquid and solid, asbestos

Clean Earth of Southeast Pennsylvania, Inc.
7 Steel Road,
Morrisville, PA 19067
Phone: (215) 428-1700 Fax: (215) 428-1704
Petroleum contaminated soil

Clean Harbors Environmental Services, Inc.
2247 South Hwy. 71,
Kimball, NE 69145
Phone: (308) 235-1012 Fax: (308) 235-4307
RCRA liquid, solid & sludge

Clean Harbors Environmental Services, Inc.
Cleveland Facility
2900 Rockefeller Ave.,
Cleveland, OH 44115
Phone: (216) 429-2401 Fax: (216) 883-1918
RCRA liquid: aqueous organic & inorganic wastewater

Clean Harbors Environmental Services, Inc.
Spring Grove Facility
4879 Spring Grove Ave.,
Cincinnati, OH 45232
Phone: (513) 681-6242 Fax: (513) 681-0869
RCRA liquid, solid & sludge: aqueous organic & inorganic wastewater, PCB wastewater treatment

Clean Harbors of Baltimore, Inc.
1910 Russell St,
Baltimore, MD 21230
Phone: (410) 244-8200 Fax: (410) 752-2647
RCRA liquid: aqueous organic & inorganic wastewater

Clean Harbors of Braintree, Inc.
1 Hill Avenue,
Braintree, MA 02184
Phone: (781) 380-7134 Fax: (781) 380-7193
RCRA & TSCA liquid & solid

Clean Harbors of Connecticut, Inc.
51 Broderick Road,
Bristol, CT 06010
Phone: (860) 583-8917 Fax: (860) 583-1740
RCRA & CRW liquid

Clean Harbors of Woburn
(Murphy's Waste Oil Services, Inc.)
252 Salem Street,
Woburn, MA 01801
Phone: (781) 935-9066 Fax: (781) 935-8615
RCRA liquid: oil, oil/water mixtures; CRW oil filters, oily soil & debris, F001/F002 contaminated oils, antifreeze

Clinton Landfill
242 Church Street
Clinton, MA 01510
Phone: (978) 365-4110 Fax: (978) 365-4106
Comm-97 soils and other materials subject to a BUD and additional review by MADEP (*2-week lead time for review by MADEP)

Colonie Landfill (Waste Connections, Inc.)
1319 Louden Rd,
Cohoes, New York 12047
Phone: (518) 783-2827 Fax: (518) 786-7331
Non-haz. wastes, special wastes, contaminated soil

Cumberland County Landfill
(aka Community Refuse Services
Managed by Interstate Waste Services)
135 Vaughn Road,
Shippensburg, PA 17257
Phone: (717) 729-2060 Fax: (717) 423-6822
Municipal solid waste, non-hazardous waste

ACV Enviro (aka Cycle Chem & General Chemical Corp.)
217 South First Street,
Elizabeth, NJ 07206
Phone: (908) 355-5800 Fax: (908) 355-0562
RCRA, TSCA liquid and solid

Envirite of PA (US Ecology)
730 Vogelsong Road,
York, PA 17404
Phone: (717) 846-1900 Fax: (717) 854-6757
RCRA hazardous wastes

Environmental Quality Company:
Wayne Disposal Facility
(aka EQ Michigan Disposal Waste Treatment Plant and Wayne Disposal Inc. Site #2)
49350 North I-94 Service Drive
Belleville, MI 48111
Phone: (734) 697-2200 Fax: (734) 699-3499
RCRA & TSCA liquid and solid

US Ecology (Environmental Quality Detroit Inc.)
1923 Frederick Street,
Detroit MI 48211
Phone: (734) 329-8017 Fax: (313) 923-3375
RCRA & CRW liquid wastewater

Environmental Soil Management of New York, LLC (ESMI of New York)
304 Towpath Road,
Fort Edward, NY 12828
Phone: (518) 747-5500 Fax: (518) 747-1181
Petroleum contaminated soil

Environmental Soil Management of NH
67 International Dr.
Loudon, NH 03307
Phone: (603) 783-0228 Fax: (603) 783-0104
Petroleum contaminated soil

Triumvirate (Formerly EnviroSafe Corporation Northeast & Jones Environmental Services)
263 Howard Street,
Lowell, MA 01852
Phone: (978) 453-7772 Fax: (978) 453-7775
RCRA & TSCA liquid and solid

Hazelton Creek Properties, LLC*
(Hazelton Mine Reclamation Project)
280 South Church St.,
Hazelton, PA 18201
Phone: (570) 574-1010 Fax: (570) 457-3395
Fresh, brackish or marine dredge material, coal ash, cement kiln dust, lime kiln dust, co-gen ash, regulated fill
*Please note that if this facility is to be used, each bin letter will require an additional 10 day (or more) waiting period on top of the 15 day lab period designated in the specs to allow for PADEP review.

Heritage Hazardous Waste Landfill (Heritage Environmental Services, LLC)
4370 W County Rd 1275 N
Roachdale, IN 46172
Phone:(765) 435-2704 Fax: (315) 687-3898
Hazardous Wastes, Asbestos

Manchester Landfill
311 Olcutt St.,
Manchester, CT 06040
Phone: (860) 647-3248 Fax: (860) 647-3238
Municipal solid waste, non-hazardous waste, contaminated soil

Northeast Lamp Recycling, Inc.
250 Main Street,
East Windsor, CT 06088
Phone: (860) 292-1992 Fax: (860) 292-1114
CRW solid waste, mercury containing devices & universal waste

Stericycle (Northland Environmental, LLC)
(aka PSC Environmental Systems)
275 Allens Ave.,
Providence RI 02905
Phone: (401) 781-6340 Fax: (401) 781-9710
RCRA liquid and solid

Ontario County Landfill
(Managed by Casella Waste)
3555 Post Farm Road,
Stanley, NY 14561
Phone: (585) 526-4420 Fax: (585) 526-5459
Municipal solid waste, non-hazardous waste solid, special wastes including asbestos, ash from boilers/incinerators, contaminated soil, demo debris

Paradise Heating Oil, Inc.
Quimby Street,
Ossining, NY 10562
Phone: (631) 926-2576 Fax: (718) 294-2226
CRW waste oil liquid

Phoenix Soil, LLC
58 North Washington Street
Plainville, CT 06062
Phone: (860) 747-8888 Fax: (203) 757-4933
Contaminated Soil

Red Technologies Soil
232 Airline Avenue
Portland, CT 06980
Phone: (860) 342-1022 Fax: (860) 342-1042
Temporary Storage & Transfer of contaminated soil

Republic Services Conestoga Landfill
420 Quarry Road
Morgantown, PA 19543
Phone: (610) 286-6844 Fax: (610) 286-7048
MSW, C&D debris, residual waste, contaminated soil, asbestos *Please note that if this facility is to be used, each bin letter will require an additional 10 day (or more) waiting period on top of the 15 day lab period designated in the specs to allow for PADEP review.

Stericycle (Formerly Republic Environmental Systems (aka Philip Services Corporation (PSC) Republic)
2869 Sandstone Dr.,
Hatfield PA 19440
Phone: (215) 822-8995 Fax: (215) 997-1293
RCRA & TSCA industrial solid & sludge, aqueous waste, contaminated soil, PCB waste, oil & petroleum waste, organic waste

Soil Safe, Inc.
378 Route 130, Logan Township,
Bridgeport NJ 08085
Phone: (410) 872-3990 x1120
Fax: (410) 872-9082
Soil contaminated with petroleum or metals, some industrial waste solids

The Southbridge Recycling & Disposal Park
165 Barefoot Rd.
Southbridge, MA 01550
Phone: (508) 765-9723, (603) 235-3597
Fax: (508) 765-6812
MSW, non-hazardous C & D waste, contaminated soil for cover

Stablex Canada, Inc.
760 Industrial Blvd.
Blainville Quebec J7C 3V4
Phone: (450) 430-9230 Fax: (450) 430-4642
RCRA liquid and solid, industrial wastes

Ted Ondrick Company, LLC
58 Industrial Road,
Chicopee, MA 01020
Phone: (413) 592-2566 Fax: (413) 592-7451
Petroleum contaminated soil

Tradebe Treatment & Recycling
136 Gracey Ave.
Meriden, CT 06451
Phone: (203) 238-8114 Fax: (203) 238-6772
RCRA, CRW wastewater, oil, hazardous waste fuels, hazardous and non-hazardous waste water

Tunnel Hill Reclamation
2500 Township Road, 205 Route 2
New Lexington, OH 43764
Phone: (914) 713-0203 Fax: (914) 713-0672
Municipal solid waste, non-hazardous waste, contaminated soils

Waste Management
RCI Fitchburg Landfill
Fitchburg Princeton Road,
Westminister, MA 01473
Phone: (978) 355-6821 Fax: (978) 355-6317
Solid: MSW, non-hazardous waste, C&D, contaminated soil for use as cover material under MADEP COMM-97 policy

Turnkey Landfill (Waste Management of NH)
TLR III Refuse Disposal Facility
90 Rochester Neck Road, PO Box 7065
Rochester, NH 03839
Phone: (603) 330-2197 Fax: (603) 330-2130
Solid: MSW, C&D, PCB remediation waste (<50ppm), virgin petroleum contaminated soil, CRW solid waste

The category of material accepted by each facility listed above is for informational purposes only. The Contractor shall verify facility acceptance of each type of regulated item.

(2) Submittals

Thirty (30) days prior to commencement of work involving the management of regulated items, the Contractor shall submit to the Engineer for approval, the following documentation:

1. Copy of Spill Contractor Permit registration issued by the CTDEEP.
2. Hazard communication training for all employees performing this work.
3. Names of the treatment facilities, recycling facilities and/or disposal facilities the Contractor intends to use to receive each type of regulated item.
4. Hazardous Material Transporter USDOT Certificate of Registration for each waste transporter.
5. Hazardous Material Transporter Permit for the State of Connecticut, the destination state(s), and all other applicable states for each waste transporter.

Contractor shall provide the Engineer with a minimum of 48 hours notice in advance of scheduling, changing or canceling work activities.

(3) Regulated Item Management Provisions

(a) General Requirements

The Contractor's OSHA Competent Person shall be in control on the job site at all times during hazardous material management work activities. This person must be capable of identifying existing hazards, possess the authority to implement corrective measures to reduce/eliminate the hazards, comply with applicable Federal, State and Local regulations that mandate work practices, and be capable of performing the work of this contract. All employees who perform regulated material management related work shall be properly trained and qualified to perform such duties.

All labor, materials, tools, equipment, services, testing, insurance, and incidentals which are necessary or required to perform the work in accordance with applicable governmental regulations, industry standards and codes, and these specifications, shall be provided by the Contractor.

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

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

Inventory data from investigative surveys throughout the buildings are included herein and are presented for informational purposes only. Under no circumstances shall this information be the sole means used by the Contractor for determining the quantities or extent of the regulated items to be managed. The Contractor shall be responsible for verification of all field conditions affecting performance of the work. The Contractor shall submit to the Engineer for concurrence any additional items not listed herein that it believes to be regulated items included under this item. However, compliance with applicable requirements is solely the responsibility of the Contractor.

The Engineer will provide a Project Monitor to monitor the activities of the Contractor and inspect the work required. Environmental sampling shall be conducted as deemed necessary by the Engineer. Spill areas shall be cleaned by the Contractor until accepted by the Engineer. The Engineer may sample the spill area to demonstrate Contractor compliance with an acceptable standard.

(b) Personnel Protection

Prior to commencing work, the Contractor shall provide hazard communication training to all employees as necessary in accordance with OSHA 29 CFR 1926.59 and 29 CFR 1910.1200 and instruct all workers in all aspects of personnel protection, work procedures, emergency procedures and use of equipment including procedures unique to this project. Worker health and safety protocols that address potential and/or actual risk of exposure to site specific hazards are solely the responsibility of the Contractor.

The Contractor shall provide respiratory protection that meets the requirements of OSHA as required in 29 CFR 1910.134 and 29 CFR 1926.1000. A formal respiratory protection program, including appropriate medical surveillance, must be implemented in accordance with OSHA standards. The Contractor shall, as necessary, conduct exposure assessment air sampling, analysis and reporting to ensure the workers are afforded appropriate respiratory protection.

The Contractor shall provide and require all workers to wear appropriate personnel protective equipment, including protective clothing and respiratory protection, as required, within regulated work areas which exceed OSHA Personnel Exposure Limits (PELs) or when handling hazardous materials.

(c) Regulated Item Management Work Procedures

The Contractor shall not begin work until the Project Monitor is on-site.

Prior to beginning work on-site, the Contractor shall prepare waste characterization profile forms for each type of waste stream to be generated and forward such forms to the Engineer for review, approval and signature. Upon approval, the Contractor shall forward such forms to the appropriate disposal facilities for acceptance.

The Contractor shall utilize all appropriate engineering controls and safety and protective equipment while performing the work in accordance with OSHA, USEPA, USDOT, CTDEEP and Connecticut Department of Public Health DPH regulations.

The Contractor shall employ work practices so as to minimize the disturbance of the constituents in the regulated items, and prevent breakage and spills. In the event of a spill, the Contractor shall cordon off the area and notify the Engineer. The Contractor is responsible to have spills and the effected areas decontaminated to the acceptance of the Engineer by personnel trained in hazardous waste operator emergency response.

The Contractor shall carefully and properly remove, handle, pack, label and manifest all of the regulated items in waste containers specified and suitable to contain the waste in accordance with all federal and state regulations.

Prior to transportation and recycling and/or disposal, all proper USEPA, OSHA, CTDEEP and USDOT labels and placards shall be affixed to the waste containers and hazardous materials shipping papers such as waste manifests/bills of lading shall be completed.

Prior to renovation/demolition, properly remove, handle, pack, label, transport, manifest and recycle or dispose of the regulated items from those listed below:

The following hazardous/regulated materials, wastes and items have been identified at the bridge and will be impacted by the rehabilitation work.

Bridge Nos. 01743B, 01744 & 01745, West Hartford, CT

Luminaire Light Fixtures under Bridge:

- **Connecticut Regulated Waste (CRW) – PCB/DEHP ballasts**
- **Universal waste (UW) –Hg lamps & Used Electronic Ballasts**

Upon discovery of any previously unidentified regulated items during renovation activities, the Contractor shall immediately notify the Engineer and work shall cease in that area until the Engineer can determine the extent of any impact and proper handling procedures are implemented.

Luminaire Light Fixtures were also identified under Bridge No. 01743A, however they are not projected to be impacted.

Efforts shall be made to recycle the constituents of the regulated items rather than dispose of them in accordance with the waste minimization efforts required under RCRA.

RCRA hazardous waste shall not be stored on the job site in excess of 90 calendar days from the accumulation start date.

Connecticut Regulated Waste shall not be transported to a RCRA or TSCA permitted facility for disposal, unless otherwise allowed by the Engineer in writing.

All non-RCRA hazardous waste materials, regulated waste materials and recyclable waste items shall be manifested separately from RCRA and TSCA hazardous waste, and documented properly on non-hazardous waste manifests, waste shipment records, bills of lading or other appropriate shipping papers for transportation to the recycling and/or disposal facility.

The Contractor shall prepare each lab pack list and shipping document (manifests, waste shipment records, bills of lading, etc.) with all of the required information completed (including types of waste, proper shipping name, categories, packing numbers, amounts of waste, etc.) in accordance with applicable federal and state regulations. The document will be signed by an authorized agent representing ConnDOT as the Generator for each load that is packed to leave the site.

The Contractor shall forward the appropriate original copies of shipping papers to the Engineer the same day the regulated items leave the project site.

All vehicles departing the site transporting hazardous materials shall display proper USDOT placards, as appropriate for the type of waste being transported.

(d) Project Closeout Documents:

Within thirty (30) days after completion of the on-site project work, the Contractor shall submit to the Engineer copies of the following completed documents:

1. Hazardous Waste Manifests
2. Waste Shipment Records/Bills of Lading
3. Recycling Receipts

Documents 1. through 3. must include the signature of an authorized disposal facility representative acknowledging receipt of hazardous materials.

Method of Measurement:

The work of "Handling and Disposal of Regulated Items" shall be provided for in accordance with Article 1.04.05 – Extra Work.

Basis of Payment:

The work of "Handling and Disposal of Regulated Items" shall be paid for in accordance with Article 1.04.05 – Extra Work, which price shall include the management, removal, handling, packing, labeling, transport, manifesting, recycling or disposal of the regulated constituents in the specific equipment/items scheduled for impact at the project site, and all equipment, materials, tools and labor incidental to the work.

Final payment will not be made until completed copies of all Manifest(s), Waste Shipment Records, Bills of Lading and/or Recycling Receipts have been provided to the Engineer. Once completed and facility-signed copies have been received in their entirety, the Engineer will make the final payment.

Pay Item	Pay Unit
Handling and Disposal of Regulated Items (Estimated Cost)	est.

END OF SECTION

ITEM #0108100A - LUMP SUM INCENTIVE PAYMENT (ESTIMATED COST)

Description: Under this item, the Contractor will receive a Lump Sum Incentive Payment earned in accordance with the MILESTONE INCENTIVE AND MILESTONE LIQUIDATED DAMAGES PROVISIONS included in this Contract.

Basis of Payment: The "Lump Sum Incentive Payment" will be applied as noted in the MILESTONE INCENTIVE AND MILESTONE LIQUIDATED DAMAGES PROVISIONS.

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 this Contract.

Pay Item	Pay Unit
Lump Sum Incentive Payment (Estimated Cost)	EST

ITEM #0202452A - TEST PIT

Description: This work shall consist of the excavation of test pits where necessary to locate or examine utilities, including but not limited to water, gas, sanitary sewer, storm and electric facilities.

This work shall consist of the satisfactory removal of all materials including, but not limited to, sawcutting pavements and sidewalks, pavement and sidewalk removal, excavation, shoring and bracing, water removal from within pit, stockpiling, satisfactory disposal of surplus or unsuitable material, backfilling, compacting, pavement repair, sidewalk repair, etc.

Test pits shall be dug as necessary for the Contractor to determine subsurface conditions as indicated on the Contract Drawings or as directed by the Engineer.

This work shall include the coordination with the affected utility companies. Any damage caused by the Contractor or Subcontractors, as determined by the Engineer, shall be corrected by the Contractor in accordance with these specifications.

Materials: All materials shall be provided by the Contractor and shall meet the current standards of the affected service.

Construction Methods: Coordinate excavation of test pits with respective utility company, and other owners having facilities in the vicinity. Check with "Call Before You Dig", 1/800/922-4455 before digging.

Give sufficient notice and allow ample delay time for others to perform necessary work. A minimum of 30 days shall be allowed by the Contractor to ensure the test pits are performed prior to the beginning of other construction work in the area of a proposed test pit.

Notify the Department, Engineer, and Utility Companies one-week in advance of digging each test pit.

Perform all work in conformance with applicable safety codes.

Sawcut pavement, sidewalk, curbs or other hard surface materials in neat and straight line. Excavate pits providing clean-cut vertical sides. Provide sheeting, bracing and dewatering wherever necessary.

Dig test pits ensuring that underground utilities or structures are not damaged. The Contractor shall excavate by hand methods where necessary to insure that underground utilities or structures are not damaged. It shall be the Contractor's sole responsibility for any damages incurred during excavation operations. Any damages shall be repaired or replaced by the Contractor to the satisfaction of the Owner/Responsible Agency/Owner’s Representative at the Contractor's own expense.

The Contractor shall measure and record the size, configuration, exact horizontal and vertical location (elevation) of all utilities, pipes or other obstacles uncovered in the pits. Submit information in written or sketch form to the Department, Engineer, and Utility Companies and respective utility companies for review. Notify the Department, Engineer, and Utility Companies of any revealed conflicts which may require design revisions, relocations and/or adjustments as early as possible to avoid unnecessary delays. No work shall be started within areas of conflict until so authorized.

Protect each pit with steel plates, other coverings, fences, barriers or other appropriate materials as deemed necessary.

Do not backfill pits until authorized. Compact backfill materials to at least 95% of maximum density to the subgrade elevation or as otherwise directed.

The surface of test pit areas shall be restored to a condition equal or better than original as approved by the Engineer.

Method of Measurement: The quantity to be paid for under this item will be the number of completed test pits as directed by the Engineer.

Corrective work required repairing damage caused by the Contractor or its Subcontractors shall not be measured for payment.

Basis of Payment: This work will be paid for at the contract unit price each for "Test Pit" as directed by the Engineer. No direct payment will be made for furnishing and placing bituminous concrete pavement for patch or other surface repair, but the cost shall be included in the cost of the test pit item. Payment will include all materials, equipment, labor and tools necessary for or incidental to the satisfactory completion if this work.

Pay Item	**Pay Unit**
Test Pit	ea.

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 Section M.03 – Portland Cement Concrete, 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 #0219011A - SEDIMENT CONTROL SYSTEM AT CATCH BASIN

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

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

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

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

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

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

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

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

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

Pay Item	Pay Unit
Sediment Control System at Catch Basin	ea.

ITEM #0406180A - HOT-MIX ASPHALT SMOOTHNESS ADJUSTMENT (ESTIMATED COST)

Description: The Engineer will evaluate the final pavement surface for smoothness (rideability) to either pay a bonus or assess a penalty based on determination of smoothness of the surface lift. This item will apply to pavement construction included in the project requiring a minimum of two (2) lifts of bituminous concrete in which the combined total compacted depth of bituminous concrete placed is 2.5 inches or greater. All provisions and requirements of Section 4.06 Bituminous Concrete apply, unless specifically stated otherwise within this item.

Construction Methods:

Definitions:

Surface Lift: The uppermost lift of bituminous-concrete paving.

Roadway segment: A segment of highway designated to receive pavement rehabilitation that includes paving at least 2 lifts, the combined thickness of which is 2.5 inches or greater. A roadway segment contains 1 or 2 directions of travel, through lanes in each direction, and any additional shoulder area, paved median area, ramp(s), and/or auxiliary lanes designated to receive paving.

Lane: An area of pavement designated to carry traffic in a given direction.

Measured Lane: A lane subject to a hot-mix asphalt pavement smoothness adjustment as indicated in this item. Ramps, shoulders, and certain other features are excluded from the adjustment as described below.

Tenth Mile Segment: The subset of a measured lane that will be evaluated for smoothness and used as the basis for payment adjustments. Each measured lane shall be divided into tenth (0.1) mile segments. Some tenth mile segments may be less than a full tenth (0.1) mile because of a boundary such as the end of the lane or a bridge without an asphaltic plug joint. Payment adjustments shall be based on the smoothness and tonnage of the surface lift of each tenth (0.1) mile segment.

Lift Pay Thickness (inches): The thickness shown on the plans for the surface lift of the measured lane.

Tenth Mile Segment Pay Area (square yards): The area of the travelway of a tenth (0.1) mile segment as determined from the plans. If striping exists, measurement shall be the area bounded by the lane striping and beginning and ending termini of the tenth (0.1) mile segment. Where a segment's travelway width varies (for example, a low speed lane which narrows as it begins or terminates within the 0.1 mile), the Pay Area shall reflect the actual travelway area.

ARAN: Automatic Road Analyzer: A vehicle operated by the State that collects roadway profile data. It provides IRI data every 16.4 feet for both the right and left wheel paths.

IRI (inches/mile): International Roughness Index, developed by the World Bank to quantify roughness.

ProVAL: Free FHWA sponsored software that is used to analyze road roughness.

Average IRI (MRI) (inches/mile): The average of the right and left wheelpath IRIs for a tenth mile (528 foot) segment as computed by analyzing ARAN data with ProVAL software.

Hot-Mix Asphalt**:** Whenever reference is made to Hot-Mix Asphalt (HMA), the reference shall apply to HMA, PMA, and WMA.

This item will be applied separately to each roadway segment that is included in this Contract and designated to be measured for a Hot-Mix Asphalt smoothness adjustment as indicated in this item. The Engineer will calculate smoothness (as represented by ProVAL MRI) and cost adjustments separately for each tenth mile segment in each measured lane.

Evaluation Methods

Final evaluations for payment or penalty will measure all lanes of interest (as described below) in each direction of travel.

Data Collection and IRI Computation – The final pavement surface will be evaluated for smoothness using a State ARAN vehicle. The ARAN measures the IRI in each wheelpath (right and left) for each lane of travel over the Project. If a State ARAN vehicle is unavailable, the Engineer may substitute another suitable method of obtaining IRI values with a World Bank Class II profiler that allows calculation of smoothness adjustments as indicated in this item.

ProVAL will be used to calculate an MRI value for each tenth (0.1) mile segment.

The evaluation will be subject to the following:

1. Only mainline travel lanes will be evaluated. This will include climbing lanes, operational lanes, and turning roadways that are 0.4 miles (2,112 feet) or greater in length. For smoothness purposes, the length of a climbing lane includes where the lane is at least half of its full normal width. Likewise, the length of an acceleration lane is from the tip of the painted gore of the on ramp to where the lane width diminishes to half of its normal width. These climbing and acceleration lengths determine both whether a lane should be measured for smoothness and the section of the lane that will be measured for smoothness.

2. Data collection will start approximately 100 feet prior to, and end approximately 100 feet after the transverse construction joints at the Project limits. The pay area will be limited to the limits of the paving as defined by the transverse construction joints at the start and end of the Project.

3. Construction joints inside the Project will not be excluded from the area measured for smoothness.

4. Smoothness data and payment adjustments will not be computed for the following Project sections:

    - Ramps
    - Climbing lanes, operational lanes, acceleration lanes, deceleration lanes, and turning roadways less than 0.4 miles (2,112 feet) in length

- Shoulders and gore areas
- Pavement on horizontal curves which have a 900 foot or less centerline radius of curvature, and pavement within the super-elevation transition of these curves

5. Bridge decks will be included if they are paved as part of the Project, have 2 lifts totaling 2.5 inches of bituminous concrete, and have an asphaltic plug or similar product for bridge joints. Structures with exposed concrete, elastomeric concrete or steel joint systems will be excluded.

6. Transition sections of varying thickness of pavement (created by milling or paving) leading into or away from pavement changes such as bridge decks or underpasses or Project end points will be excluded if the deck or underpass is excluded. A length of 50 feet on either end of a transition will be excluded from measurement of IRI, but not from payment of an adjustment. The 50 foot length will have the same payment adjustment as the immediately adjacent tenth (0.1) mile section.

7. If a deck or underpass is excluded and there is no transition section adjoining it, then a length of 50 feet before and after the deck or underpass will be excluded for measurement, but included for payment similar to 6 above.

8. Data will be collected within 30 days of the completion of the entire surface lift of pavement, or within 30 days of the completion of any corrective work on the pavement. The Contractor, at its own expense, will be allowed to correct any areas prior to the collection of data. The Contractor shall notify the Engineer in writing of its intent to do so along with a proposed schedule for corrective work that includes an anticipated date that data collection can be performed. The completion of the entire final lift of pavement or any corrective work includes, but is not limited to, all associated work such as pavement markings, sawing and sealing of joints, and installation of bridge asphaltic plug joints.

   To minimize the number of times the ARAN van is needed, all final surface lift paving in both directions of travel must be completed before calling on the ARAN van to measure the smoothness. However, if final surface lift paving extends beyond a single paving season, then the ARAN van shall be used to measure the final surface lifts completed each paving season.

9. No testing will be conducted during rain or under other conditions deemed unacceptable by the Engineer. During testing, the roadway must be free of moisture and other deleterious materials which might affect the evaluation. Any work associated with preparing the roadway for the evaluation (for example, sweeping), will not be measured for payment.

10. The option on the State ARANs to apply the 250 mm (10 inch) filter, which represents the footprint length of a typical tire, will be NOT be selected, because a similar 12 inch filter is already pre-applied by the ARAN van when the data is collected.

11. Measurements and locations are understood to have an accuracy limited to what can be attained by reviewing data and photos collected by the ARAN van. The Department will not be required to conduct surveys in addition to the ARAN van measurements.

Method of Measurement: Rideability Adjustments (RA) for pavement smoothness will be applied to all bituminous concrete in the surface lift of all measured lanes in both directions, as specified herein. It will be computed and paid or a penalty will be assessed for each tenth (0.1) mile segment.

Tonnages for payment will be calculated based on the theoretical volume of bituminous concrete as determined by the typical sections and distances measured by the ARAN van and assuming a density of 0.0575 tons per SY per inch of bituminous concrete thickness. The quantity of bituminous concrete used to determine the RA for each tenth (0.1) mile segment will be calculated by using the equation below:

Segment Tons = HMA Lift Thickness x Tenth Mile Segment Pay Area x 0.0575
(tons) (inches) (s.y.) (tons/s.y.·inch)

Rideability Adjustment (RA) Percent (%) - The RA bonus or penalty and applicable pay factor percentage for each tenth (0.1) mile segment will be determined based on its MRI. Each tenth (0.1) mile segment MRI will be classified into one of the following MRI ranges shown in Table 1 and the applicable pay factor percentage for the segment derived.

Table 1: Rideability Pay Factor Schedule

MRI (inches per mile)	Pay Factor (%)	RA
Less than 50	+10	Bonus
50 to 60	+(60 – MRI)	Bonus
60 to 80	0	0
80 to 120	1.25 x (80 – MRI)	Penalty
over 120	- 50	Penalty

Basis of Payment: Bonuses or Penalties will be computed for each tenth (0.1) mile segment. For each segment, the HMA Pay Factor and tonnage of the surface lift will be determined as described above. The adjustment to the Estimated Cost will be determined by the following formula:

Smoothness Adjustment = Segment Tons x Pay Factor / 100 x HMA Unit Cost

For example, a 1.06 mile measured lane with surface lift thickness of 2 inches has 11 segments with lengths, average travelway widths, and MRI values as shown in Table 2 below. Assuming a unit cost bid price for HMA of $85 per ton, the smoothness adjustments for each segment would be as shown in Table 2. The unit cost used shall be the Contract bid price ($/ton) for the material used in the surface lift without Asphalt Adjustment Cost applied to it.

Table 2: HMA Smoothness Adjustment Example Calculations

Segment	Length (miles)	Average Width (ft)	Area (SY)	HMA Lift Thick-ness (inch)	HMA Computed Tons (Area x thickness x 0.0575)	MRI (in/ mile)	Pay Factor (%)	Adjust ($) (Tons x Pay Factor /100 x Unit cost)
1	0.1	4	235	2	26.99	72	0	0
2	0.1	9	528	2	60.72	50	10	516
3	0.1	12	704	2	80.96	40	10	688
4	0.1	12	704	2	80.96	90	-12.5	-860
5	0.1	12	704	2	80.96	100	-25	-1720
6	0.1	12	704	2	80.96	50	10	688
7	0.1	12	704	2	80.96	77	0	0
8	0.1	12	704	2	80.96	55	5	344
9	0.1	12	704	2	80.96	55	5	344
10	0.1	8	469	2	53.97	51	9	413
11	0.06	4	141	2	16.19	62	0	0
							Total:	413

For the surface lift in this measured lane, there would be a $413 bonus.

Adjustments for smoothness will not be made for areas the Engineer determines to be defective and require removal and replacement of the HMA.

Pay Item	Pay Unit
Hot Mix Asphalt Smoothness Adjustment (Estimated Cost)	est.

ITEM #0406192A - POLYMER MODIFIED ASPHALT EMULSION (TYPE 1)
ITEM #0406193A - ULTRA-THIN BONDED PMA PAVEMENT (TYPE B)
ITEM #0406600A - MATERIAL TRANSFER VEHICLE

Description: Work under these items shall include the production and placement of an ultra-thin polymer modified asphalt (PMA) mixture consisting of a warm polymer-modified asphalt emulsion tack coat followed immediately by an ultra-thin (0.625 inch) lift of PMA. Gradation "Type B" shall be used. "Polymer Modified Asphalt Emulsion (Type 1)" will be referred to herein as "polymer modified emulsion." "Ultra-Thin Bonded PMA Pavement (Type B)" will be referred to herein as "ultra-thin PMA" or "ultra-thin PMA, material/mixture." The abbreviation PMA (polymer modified asphalt) applies to the PMA mixture that specifies a polymer-modified binder with warm-mix technology incorporated. These items shall be constructed in conformance with the lines, grades, thicknesses, and typical cross sections shown on the plans or established by the Engineer.

Materials:

A. **Polymer Modified Emulsion:** This material shall meet the requirements of CRS-1P as shown in Table 1 - Polymer Modified Emulsion Material Properties, shall be tested by the supplier, and shall be submitted to the Engineer with a Certified Test Report. The polymer modifier shall be milled or blended into the asphalt emulsion base or the emulsifying agent prior to the emulsification process.

Table 1 – Polymer Modified Emulsion Material Properties

Emulsion Properties	Method	Minimum	Maximum
Polymer Content, % by Weight of Total Residue	AASHTO T 59	3.0	--
Viscosity, Saybolt Furol, 77ºF (25ºC), second	AASHTO T 59	20	100
Sieve Test, %	AASHTO T 59	--	0.10
Demulsibility, %	AASHTO T 59	40	--
Storage Stability Test, 1 Day (Difference in % Residue)	AASHTO T 59	--	1.0
Classification Test	AASHTO T 59	Passes	--
Particle Charge Test	AASHTO T 59	Positive(1)	--
Residue by Distillation, %(2)	AASHTO T 59	63	--
Oil Distillate, Volume of Total Emulsion, %	AASHTO T 59	--	3

Table 1 – Polymer Modified Emulsion Material Properties (continued)

Residue from Distillation Properties	Method	Minimum	Maximum
Penetration at 77ºF (25ºC), 100 g, 5 second	AASHTO T 49	60	150
Ductility at 77ºF (25ºC), 5 cm/minute (2 in./min), cm	AASHTO T 51	40	--
Solubility in Organic Solvent, %(3)	AASHTO T 44	97.0	--
Elastic Recovery at 50ºF (10ºC), %(4)	ASTM D6084	58	--
Ash Content, %	AASHTO T 111	--	1 max

Notes:

(1) If the Particle Charge Test result is inconclusive, material having a minimum pH value of 6.7 will be acceptable.

(2) Perform according to AASHTO T 59 except as follows:
   a. When the lower temperature reaches approximately 275ºF (135ºC) move the ring burner approximately level with the bottom of the still.
   b. Increase the temperature to a maximum 350ºF±11ºF (177ºC ± 5.5ºC), maintaining this temperature for 15 minutes.
   c. Use an ASTM 16c thermometer to monitor the temperature of the emulsion. Distillation on field samples shall show no more than trace amounts of oil.

(3) Any organic solvent used shall be demonstrated and proven to work under the above testing protocols. The type and brand of solvent used shall be recorded and submitted as part of the required testing information.

(4) Use ASTM D6084 Testing Procedure "A." Samples shall be tested at 50ºF (10ºC).

B. Ultra-Thin PMA: The materials for the ultra-thin PMA mixture, source(s) of supply, Job Mix Formula (JMF), mix tolerances, approval of JMF, and the control of the mixture shall meet the requirements of Section M.04. The JMF shall also meet the requirements in Table 2 - Ultra-Thin PMA Mixture Requirements (Type B), and must be submitted to the Engineer for approval at least 30 days before production. Any JMF change must be submitted to the Engineer for approval at least 24 hours in advance of manufacturing any ultra-thin PMA mixture using the new JMF.

Table 2 – Ultra-Thin PMA Mixture Requirements (Type B)

Sieve Sizes	Design Limits % Passing(1)	Production Tolerance %(1)
1/2 inch	100	
3/8 inch	85-100	+/- 5
No. 4	24-40	+/- 4
No. 8	21-32	+/- 4
No. 16	16-26	+/- 4
No. 30	12-20	+/- 3
No. 50	8-16	+/- 3
No. 100	5-10	+/- 2
No. 200	4.0-7.0	+/- 1.5
% PGB	4.8 – 5.4	
Moisture Sensitivity, AASHTO T 283(2)	80% minimum	
Film Thickness(3)	0.35 mils (9.0 µm (microns)) minimum	
Draindown, AASHTO T 305	0.1% maximum	

Notes:

(1) All aggregate percentages are based on total mass of aggregate.

(2) Specimens for AASHTO T 283 testing are to be compacted using the Superpave gyratory compactor. The mixtures shall be compacted using 100 gyrations to produce specimens approximately 3.7 inches in height. Use mixture and compaction temperatures recommended by the binder supplier. When necessary, an anti-stripping agent shall be added to provide resistance to stripping.

(3) Film thickness to be obtained using effective binder content. Surface area to be calculated according to Asphalt Institute MS-2 methodology.

1. **Asphalt Binder:** A PG 64E-22 binder shall be used meeting the requirements of Section M.04 in the Contract, with the following additional requirement: The binder shall incorporate warm-mix technology listed on the Northeast Asphalt User-Producer Group Qualified WMA technologies list at the time of bidding, under headings A (Organic (Waxes) Additives) or B (Chemical Additives) only, available online at http://www.neaupg.uconn.edu/?attachment_id=345. The PG 64E-22 binder with warm-mix technology shall be selected to meet the recommended mix application temperature of 300 - 350ºF and the compaction cessation temperature of 200ºF, as specified in Construction Methods, (C) Application and (E) Compaction. The dosage of warm-mix additive shall be as recommended by the binder supplier and shall be submitted to the Engineer for approval at least seven (7) days prior to commencing any ultra-thin PMA paving under this Contract.

2. **Coarse Aggregate:** Coarse aggregates that are from more than one source or of more than one type of material shall have all constituents proportioned and blended to provide a uniform mixture. Crushed stone from an approved source meeting the following requirements of (a) or (b) and Table 3 shall be used:
   (a) Sandstone, granite, chert, traprock, or other similar non-carbonate material.
   (b) Gravel, or a natural or manufactured blend of the following types of material: limestone, dolomite, gravel, sandstone, granite, chert, traprock or other similar materials meeting the following requirements:
   - 0.5 inch Nominal Maximum Size Aggregate Mixes
     - A minimum of 20% of plus 0.375 inch particles must be non-carbonate.
   - 0.375 inch Nominal Maximum Size Aggregate Mixes
     - A minimum of 20% of plus 0.1875 inch particles must be non-carbonate.

   Note: Non-carbonate particles are defined as having a minimum acid insoluble residue content of 80%.

Table 3 – Coarse Aggregate Properties

Property	Method	Requirement
LA Abrasion Coefficient, maximum % loss	AASHTO T 96	30
Maximum percent passing #200 sieve, %	AASHTO T 11, T 27	2
Soundness, maximum % loss	AASHTO T 104	10
Fractured particles, %	AASHTO T 335	100

Table 4 – Recommended Coarse Aggregate Gradation

Sieve Size	Type B (% Passing)
3/4 inch	100
1/2 inch	100
3/8 inch	85-100
1/4 inch	0-15
No. 4	0-3
No. 8	0

3. **Fine Aggregate:** Fine aggregate shall be 100% crushed stone having a minimum sand equivalent of 60%, as determined by AASHTO T 176, "Plastic fines in Graded Aggregates and Soils by Use of the Sand Equivalent Test." Table 5 shows the recommended fine aggregate gradation.

Table 5 – Fine Aggregate Gradation

Sieve Size	Percent Passing
No. 4	100
No. 8	90-100
No. 16	60-80
No. 30	45-60
No. 50	30-40
No. 100	20-30
No. 200	15-25

4. **Mineral Filler:** Mineral Filler shall meet the requirements of Article M.04.01.

Construction Methods:

A. Equipment:

1. **Paver:** The self-priming spray paver must be capable of spraying the polymer modified emulsion, applying the PMA overlay and smoothing the surface of the mat in one pass at a rate of at least 30 ft/min. The self-priming spray paver must be equipped with a receiving hopper, feed conveyor, emulsion storage tank, metered high-pressure emulsion spray bar(s) and a variable width, heated, extendable ironing-type screed. The spray bar system must be capable of applying the polymer modified emulsion across the entire width of the screed, including the full width of the variable width screed extensions.

   The paver shall be equipped with a microprocessor and controls which shall control the flow of the polymer modified emulsion and shall vary the application rate of the emulsion to ensure a uniform application rate of the polymer modified emulsion at the desired application rate, plus or minus 0.02 gallons/square yard based on speed and paving width. The paver must be able to apply the specified polymer modified emulsion rate at all speeds, including all stops and starts of the paver, uniformly across the full width of the mat being placed. The screed must have the ability to produce a crown at the center both positively and negatively and be vertically adjustable and shall have horizontal extensions to accommodate the desired pavement profile.

2. **Rollers:** All rollers shall be self-propelled, ten (10) ton double drum rollers designed for compaction of PMA. The Contractor shall furnish a minimum of two (2) rollers for each paving machine to properly seat the ultra-thin PMA. The rollers shall only operate in the static mode and additional rollers may be required to meet production needs.

3. **Infrared Thermometers:** The Contractor shall supply for the Engineer's use a minimum of two (2) new, unused handheld digital infrared laser sighted thermometers for the duration of each Project. The infrared thermometers supplied shall meet the certification requirements of EN61326-1, EN61010, and EN60825-1 maintained by the European

Committee for Electrotechnical Standardization (CENELEC). The thermometers shall have a minimum distance-to-spot ratio of 50:1 and shall have adjustable emissivity control. The thermometers shall have a minimum accuracy value of ± 1% of reading or ± 2ºF, whichever is greater. The thermometers shall be used in accordance with the manufacturer's written directions. All thermometers supplied must be in agreement within 5ºF of each other at all times at any temperature between 0ºF and 500ºF. If at any time any of the thermometers supplied are found to be in noncompliance with any of the above criteria, the Contractor shall dispose of them and provide the Engineer with a minimum of two (2) new unused thermometers meeting the above requirements. Immediately at the completion of the ultra-thin PMA work, the thermometers supplied by the Contractor shall become the property of the State and shall be delivered to the Engineer, with a signed letter of transmission acknowledging the formal transfer of ownership of the infrared thermometers to the Engineer.

4. **Material Transfer Vehicle (MTV):** An MTV shall be used when placing ultra-thin PMA material. 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 continuously remix the bituminous concrete mixture throughout the placement process. The use of a MTV will be subject to the requirements stated in Article 1.07.05 - Load Restrictions. The Engineer may limit the use of the vehicle if it is determined that the use of the MTV may damage highway components, utilities, or bridges. The Contractor shall submit to the Engineer at pre-construction the following information:
   (a) The make and model of the MTV to be used.
   (b) The individual axle weights and axle spacing for each separate piece of paving equipment (haul vehicle, MTV and paver).
   (c) A working drawing showing the axle spacing in combination with all three (3) pieces of equipment that will comprise the paving echelon.

5. **Power Broom/ Sweeper:** A motorized broom or sweeper shall be provided that is capable of cleaning the road surface prior to application of polymer modified emulsion.

B. Surface Preparation: The work to remove pavement markings, seal cracks and patch areas of distress shall have been completed (under other items) prior to application of polymer modified emulsion and ultra-thin PMA. Immediately prior to the application of polymer modified emulsion and ultra-thin PMA, the roadway surface shall be cleaned by the Contractor using a motorized sweeper and any other equipment or means necessary to remove all foreign debris and material (leaves, branches, dirt, sand, garbage, etc) from the pavement surface. All foreign debris and material shall be removed and disposed of by the Contractor.

The pavement surface shall be dry immediately prior to the application of the emulsion.

The Contractor shall protect all manhole covers, water boxes, catch basins and other utility structures with plastic or building felt, which shall be removed upon completion of the paving operation.

C. Temperature Determinations and Requirements: The infrared thermometers provided by the Contractor shall be used to determine all specified temperature requirements. Only one (1) thermometer shall be used to determine and record a temperature. If there is any question about the accuracy of any recorded temperature, an additional Contractor-supplied infrared thermometer shall be used to confirm the temperature. As long as two (2) or more thermometers are in agreement within 5ºF, the first temperature shall be officially recorded by the Engineer. This temperature will be used, as necessary, to enforce any and all specified temperature requirements, including rejection of materials and halting or shutdown of the work as stated herein.

Note: A probe type thermometer may be used only at the asphalt plant manufacturing facility to test the PMA during production and plant testing. If a probe type thermometer is used at an asphalt plant, it shall comply with the probe type thermometer requirements contained in Section 4.06 of the Contract. Probe type thermometers shall not be used in the field once the mix is delivered to the Site.

D. Application: The pavement surface temperature for application of the polymer modified emulsion and placement of the ultra-thin PMA shall be at least 50°F. The ambient temperature shall be at least 50ºF and rising. Artificial heating of the pavement surface is not allowed. The finished in-place ultra-thin PMA shall be a minimum thickness of 0.625 inches and a maximum thickness of 0.875 inches. If the ultra-thin PMA is placed creating a "drop-off" or vertical deviation exceeding 0.750 inches between pavement surfaces that are exposed to traffic, the transition requirements of Section 4.06.03-5 shall apply.

The application temperature of the polymer modified emulsion shall be 130°F – 190°F and a uniform application across the entire width to be overlaid shall be at a rate of 0.15 to 0.25 gal./s.y. The Contractor shall submit in writing the Project-specific rate(s) of application to the Engineer for approval prior to commencement of the work under this item. The submittal shall include backup details for the proposed polymer modified emulsion rates for each distinct surface type such as, but not limited to, milled vs. unmilled surfaces, new vs. aged or raveling pavement. A "distinct area" shall have a minimum length of 100 feet and minimum width of eight (8) feet. The Engineer may direct the Contractor to pre-apply additional emulsion to any area that requires a higher emulsion application rate within a paver pass so that the proper emulsion application rate for each surface texture type can be achieved in a single paving pass. The Contractor shall continuously monitor the spray rate.

The ultra-thin PMA material shall be placed on the polymer modified emulsion as soon as possible to ensure that the ultra-thin PMA is placed on the polymer modified emulsion before it breaks or migrates (runs) along the pavement surface. Prolonged stops of the paver are not allowed. If a prolonged stop results in improper application or breaking of the polymer modified emulsion, or the inability to meet the compaction requirements stated herein, the Engineer shall stop the operation until the Contractor can demonstrate that all emulsion application and mix compaction requirements can, and are, being met.

Note: The emulsion target application rate will depend on the macro texture of the surface on

which the emulsion will be placed. Projects where the emulsion will be placed on milled or high (open) texture existing pavements will require emulsion application rates toward the high end of the 0.15 to 0.25 gal./s.y. range, while applications over pavements with a particularly tight texture (small-aggregate leveling courses and/or polished, flushed, or bled pavement surfaces) will require application rates at the lower end of the specification range.

No equipment shall come in contact with the polymer modified emulsion before the ultra-thin PMA wearing course is applied.

The ultra-thin PMA wearing course shall be applied across the full width of the emulsion at a temperature of 300°F – 350°F. The mix delivery temperature will be checked for conformance using the infrared thermometers provided. The Engineer will check the mix delivery temperature at the back of the haul truck. The Engineer may also check the mix delivery temperature in the hopper of the paver or in the hopper of the material transfer vehicle machine if warranted. When checking the mix in the back of the haul truck, at least the top 6 inches of the surface of the load will be removed prior to checking the mix temperature. This will be accomplished by either using a shovel to remove at least the top 6 inches of the load or the load shall be allowed to "break" when beginning the dumping process, exposing PMA material that is at least 6 inches below the surface of the load. When checking mix in the hopper of the paver or the material transfer vehicle, the Engineer will use the infrared thermometer to record the temperature of the mix in several areas of the hopper and use a shovel, if necessary, to remove any mix from the surface to expose mix in the hopper that is representative of the overall temperature of the truck load. The Engineer will record the highest temperature found when multiple infrared temperature readings are taken in the hopper. Truckloads of PMA material not meeting the minimum temperature requirement will be rejected by the Engineer.

E. Testing of Materials: The Engineer will conduct acceptance sampling and testing of the ultra-thin PMA mixture at the PMA facility, in accordance with Section M.04, for gradation and binder content. The Engineer may allow the Contractor to conduct acceptance testing, following the sampling and testing procedures herein and shall retain a 2500-gram split sample for verification testing. Verification testing will be performed by the Engineer on the retained samples in accordance with the Department's current Quality Assurance (QA) Program for Materials, Acceptance and Assurance Testing. Should gradation or binder content exceed the specified tolerances, the Department will investigate to determine an assignable cause. Contractor test results for a subject sublot may be replaced with the Department's results. The split sample shall be stored in an appropriate container, sealed, and labeled with the Project number, PMA plant name, date, time obtained, sequential truckload number, sublot, and name of the person obtaining the sample. The sample will be stored and disposed of at the discretion of the Engineer following the completion of the Project.

Passing Test: Ultra-thin PMA material meeting all tolerances for gradation and binder content shown in Table 2 as determined by sampling and testing in accordance with these requirements is defined as a Passing Test.

Failing Test: A Failing Test is defined as ultra-thin PMA material exceeding one or more of

the tolerances in gradation and binder content shown in Table 2 as determined by sampling and testing in accordance with these requirements.

Lot: For ultra-thin PMA mixture sampling and testing purposes, a lot is defined as one planned production run or 24-hour period, whichever is shorter. An additional lot will be created every 24 hours of a multiple-day production run.

Each lot shall be subdivided into equal sublots based on planned quantity of PMA mixture for the production run as outlined in Table 6 so that each lot is represented by a minimum of two or three sublots.

Table 6 – Minimum Sampling and Testing Schedule at PMA Facility

Planned Production Run Quantity (tons)	Number of Sublots
1-400	1
401-800	2
801-1200	3
1201+	4

The Contractor shall submit to the Engineer the planned production quantity for a lot at least four (4) hours prior to commencement of production of the ultra-thin PMA mixture. The planned quantity of production for each sublot shall be converted to a sequential, ordinal number of truckloads (i.e. 1, 2, 3, etc.). For each lot, the first sublot shall be randomly selected from the first five (5) truckloads. A random-selection procedure will be used to sample the truckload of material representing each remaining sublot.

At any time, the Contractor may obtain additional samples for Quality Control (QC) purposes. The Contractor shall designate a sample as a QC sample prior to conducting its sampling. No QC samples will be included in the acceptance of the produced material.

F. Compaction: The compaction process used is meant to seat the PMA mixture into the sprayed polymer modified emulsion rather than to obtain density. Compaction shall start immediately after application of the wearing course and be completed before the mix falls below the compaction cessation temperature of 200°F. Compaction shall be obtained by use of the paver screed and by the use of two (2) double drum rollers in static mode. A minimum of two (2) static passes from each roller will be required to adequately seat the material. Therefore, a minimum of four (4) roller passes must be made over any given area prior to cooling of the ultra-thin PMA material below 200°F.

The ultra-thin PMA mixture shall be placed and rolled to provide a continuous and smooth surface with uniform texture. The roller(s) shall not be allowed to stop on the freshly placed wearing course. The wearing course shall be protected from traffic until the rolling operation is complete and the material has cooled sufficiently to resist damage.

A 10 foot straightedge shall be made available to the Engineer during all paving operations, inspection, and testing. If milling is specified as part of the work, or in any other areas where the ultra-thin PMA is required to be placed flush with adjacent pavement surfaces, structures, or other surrounding appurtenances, the pavement surface shall be tested with the straightedge to ensure that the pavement surface does not deviate by more than 1/4 inch in any direction. When matching irregular surfaces or structures, the Engineer will use discretion when enforcing this rule.

G. Corrective Work Procedures: Any portion of the completed pavement that the Engineer determines to not meet these specifications, or is determined to be defective or non-homogeneous in surface texture, shall be corrected at the Contractor's expense.

If at any time the Engineer determines that the polymer modified emulsion supplied does not meet any of these specifications, the Engineer will stop the entire paving operation until the Contractor demonstrates "re-conformance" with these specifications.

If the specified application rate of the polymer modified emulsion is determined by the Engineer to fall outside the allowable tolerances, the Engineer will stop the paving operation until such time the Contactor can demonstrate compliance with these specifications. In all cases, if the Contractor continues to place material unacceptable to the Engineer, the Engineer reserves the right to withhold payment for, or call for the removal and replacement of, all material placed in non-conformance with these specifications.

If any of the individual specified ultra-thin PMA material production tolerances are not met more than once in four tests, the production of the ultra-thin PMA material shall be stopped until the Contractor runs a trial test demonstrating compliance within the production tolerances listed herein. In such a case, the Engineer reserves the right to withhold payment for, or call for the removal and replacement of, all ultra-thin PMA material placed between the rendering of the first out of tolerance test and ceasing mix production operations due to the second out of tolerance test.

Any ultra-thin PMA material placed at less than 0.625 inches thick, or greater than 1.0 inch thick, shall be subject to removal as determined by the Engineer. In no case shall the permanent edge or limit of the ultra-thin PMA placed be allowed to form a "drop-off" greater than 1.0 inch. Any edge or "drop-off" formed showing a thickness of greater than 1.0 inch shall be removed immediately by the Contractor.

Any flushing of the polymer modified emulsion to the surface of the ultra-thin PMA material shall be considered and treated as a deviation in texture and shall be analyzed and treated according to the texture requirements herein.

If the Engineer determines that any full width travel lane area or full width shoulder area that is at least 100 feet long contains any change or deviation in texture occurring in 1.5% (or greater) of the surface, that area shall be replaced at the Contractor's expense.

Unless otherwise determined by the Engineer, all corrective work shall be done with the ultra-thin PMA material. Any corrective ultra-thin PMA placed shall be placed by the spray paver as specified herein and shall be placed at a minimum width equal to the width of the main screed of the paver for no less than 100 feet in length. Corrective work shall not be performed exclusively by hand with the ultra-thin PMA material. Small isolated areas or defects, with the permission of the Engineer, may be repaired with material other than the ultra-thin PMA material required to be placed with the spray paver specified herein.

Note: "Small isolated areas or defects" are defined as: One area of 25 square feet or less per full width lane or full width shoulder for any given continuous 200 foot lane or shoulder section that was placed by the spray paver.

If pavement placed by the Contractor is deemed unacceptable, and the Engineer requires its replacement or correction, the Contractor shall:

1. Propose a corrective procedure to the Engineer for review and approval prior to any corrective work commencing. The proposal shall include:
   - **(a)** Limits of pavement to be replaced or corrected, indicating stationing or other landmarks.
   - **(b)** Anticipated schedule.
   - **(c)** Construction method and sequence of operations.
   - **(d)** Methods of maintenance and protection of traffic.
   - **(e)** Material sources.
   - **(f)** Names and telephone numbers of supervising personnel.
2. Perform all corrective work in accordance with the Contract and the approved corrective procedure.

H. Material Documentation: All vendors producing ultra-thin PMA must have their truck-weighing scales, storage scales, and mixing plant automated to provide a detailed ticket. Delivery tickets must include the following information:

1. State of Connecticut printed on ticket.
2. Name of producer, identification of plant, and specific storage bin (silo) if used.
3. Date and time of day.
4. Net weight (tons) of material loaded into truck.
5. Gross weight or tare weight of truck.
6. Project number, purchase order number, name of contractor (if contractor other than producer).
7. Sequential Truck number for specific identification of truck. Sequential number shall use natural numbers and be ordered beginning with the first truck for a production lot on the basis of time truck is loaded (i.e. 1, 2, 3, etc.)
8. Individual aggregate and asphalt high/target/low weights shall be printed on batch plant tickets. (For drum plants and silo loadings, the plant printouts shall be maintained by the vendor for a period of three (3) years after the completion of the Project).

The Contractor must notify the Engineer immediately if, during the production day, there is a malfunction of the recording system in the automated plant or truck-weighing scales. Manually written tickets containing all required information will be allowed for one (1) 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 (48) hours, material 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 or weighing operations.

I. Cessation of Supply: The production plant providing ultra-thin PMA shall cease supplying materials to this Project under any of the following conditions:

1. If the supplied ultra-thin PMA material exceeds one or more of the tolerances shown in Table 2 on two (2) samples out of the latest consecutive three (3) samples tested for gradation or binder content, delivery of material to the Site shall not resume until a passing test is performed.

2. If the supplied polymer modified emulsion fails to meet any of the specified requirements. Supply of material to the Site may resume once the Contractor demonstrates, in writing to the Engineer, that the requirements herein are met.

3. If the resulting surface texture fails to meet any of the specified requirements. Supply of material to the Site shall not resume until the Contractor determines the cause of the deficient or non-homogeneous surface texture, proposes corrective measures in a submittal to the Engineer for acceptance or approval.

4. If the final compacted thickness requirements/tolerances stated herein are not met. Supply of the material shall not resume until the Contractor determines why the final compacted thickness placed specified herein was not met, proposes/demonstrates a change in the placement operations, and institutes said change to assure conformance with this specification.

5. If the compaction requirements stated herein are not met, Supply may not resume until the Contractor submits, in writing to the Engineer, the cause of the inability to meet the compaction requirements within this specification. In addition, the Contractor shall submit, in writing to the Engineer, proposed changes to address the identified cause of the problem and a proposed revised compaction plan to meet this specification.

Cessation of Supply shall occur as many times as necessary until the Contractor completes the work properly according to all the requirements within this specification.

All ultra-thin PMA material in non-conformance with this specification, as described above, which is not subject to non-payment or removal and replacement by the Engineer, shall be considered deficient material (DM).

Method of Measurement:

1. **Polymer Modified Asphalt Emulsion (Type 1):** The quantity of Polymer Modified Asphalt Emulsion (Type 1) will be measured for payment by the number of gallons furnished and applied on the Project and accepted by the Engineer.

2. **Ultra-Thin Bonded PMA Pavement (Type B):** The quantity of Ultra-Thin Bonded PMA Pavement (Type B) will be measured for payment by the documented area covered, measured in square yards, at the thickness shown on the plans and will be subject to the following adjustment:

   Material Deficiency Adjustment (MDA): Ten percent (10%) of the total quantity of material determined by the Engineer that exceeds one or more of the tolerances shown in Table 2 for Ultra-Thin PMA, Type B will be used for purposes of determining MDA.

   For deficient material due to failing tests of the PMA mixture at the plant, the entire quantity of produced PMA in each of the two (2) failing sublots leading to each instance of Cessation of Supply delivered to the Site will be included in the DW term of the MDA calculation.

   The adjustment in square yards will be calculated as follows:

   MDA in square yards (s.y.) = DM x 0.10

   Where:
   DM = square yards (s.y.) of deficient ultra-thin PMA, Type B material, calculated as follows:

   DM = TA x [DW / TW]

   Where:
   TA = Total documented area covered and measured in square yards (s.y.)
   DW = Total weight of deficient ultra-thin PMA, Type B material exceeding one or more of the tolerances shown in Table 2 for ultra-thin PMA, Type B, as determined by the Engineer from delivery tickets
   TW = Total weight of ultra-thin PMA, Type B material determined by the Engineer from the delivery tickets

3. **Material Transfer Vehicle:** The furnishing and use of a MTV will be measured for payment based on the actual number of tons of ultra-thin PMA Pavement (Type B) delivered to a paver using the MTV. The number of tons will be obtained from delivery tickets.

Basis of Payment:

1. **Polymer Modified Asphalt Emulsion (Type 1):** Material for asphalt emulsion will be paid at the Contract unit price per gallon for "Polymer Modified Asphalt Emulsion (Type 1)."

2. **Ultra-Thin Bonded PMA Pavement (Type B):** The furnishing and placing of the PMA mixture will be paid at the Contract unit price per square yard for "Ultra-Thin Bonded PMA Pavement (Type B)."

The cost for all equipment, tools, and work required to place and compact the polymer modified emulsion and the ultra-thin PMA shall be included in the respective unit prices. These prices shall also include cleaning the existing pavement surface prior to placement of the ultra-thin PMA material with rotary power sweeping and vacuuming equipment if required and the cost for providing lighting for the purpose of illuminating the work area and equipment during placement operations.

The work to remove pavement markings, seal cracks and patch areas of distress will be paid under other items.

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

4. **Adjustments:** Any adjustments will be incorporated by construction order for material deficiencies documented by the Engineer.

   Material Deficiency Adjustment (MDA): The quantity of MDA in square yards will be used to determine the adjustment value which will be deducted from the total Contract amount.

   MDA Adjustment = MDA (s.y.) X Contract price per square yard ($/s.y.)

No separate or additional payment will be made for any work related to the replacement or correction of defective pavement as determined by the Engineer. Related work includes, but is not limited to, items such as the removal and replacement of ultra-thin PMA, maintenance and protection of traffic, pavement repairs, replacement of bridge joints, pavement markings and any other work that is deemed necessary by the Engineer to provide and produce acceptable corrective or replacement work to the pavement.

Payment will be for the items completed and accepted by the Engineer, the price of which shall include all labor, materials and equipment incidentals thereto.

Pay Item	Pay Unit
Polymer Modified Asphalt Emulsion (Type 1)	gal.
Ultra-Thin Bonded PMA Pavement (Type B)	s.y.
Material Transfer Vehicle	ton

ITEM #0406195A - FILLING JOINTS AND CRACKS IN BITUMINOUS CONCRETE PAVEMENT

Description: This work consists of furnishing and applying a hot-applied mixture of Performance Graded (PG) asphalt binder and polyester fibers into bituminous concrete pavement joints and cracks. It shall be constructed in close conformity with the lines, grades, thicknesses, and typical cross sections shown on the plans or established by the Engineer. Filling Joints and Cracks in Bituminous Concrete Pavement may be used in conjunction with other repair treatments including, but not limited to, joint and crack sealing or patching, in which case the sequence of treatments will be provided in the Contract Documents or directed by the Engineer.

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

Materials: The hot-applied crack filling material shall be composed of a mixture of Performance Graded Asphalt Binder and polyester fibers blended to provide 3% ± 0.5% fibers by weight. No field mixing of the fibers is allowed. The crack filling material (with fibers) shall be prepackaged and arrive on Site ready to be placed in the melter applicator. The component materials shall meet the following requirements:

1. Polyester Fibers: A Materials Certificate shall be provided by the manufacturer for this material. The polyester fibers must meet the following requirements:

Property	Test Method	Requirement
Length	N/A	0.25 inch ± 2 mils (6.4mm ± 0.05mm)
Crimps	ASTM D3937	None
Tensile Strength*	ASTM D2256	69,600 psi (480 MPa), minimum
Denier*	ASTM D1577	3.0 – 6.0
Specific Gravity	N/A	1.32 – 1.40
Melting Temperature	N/A	473ºF (245ºC), minimum
Ignition Temperature	N/A	1000ºF (540ºC), minimum

* This data must be obtained prior to cutting the fibers.

2. Performance Graded (PG) Asphalt Binder: The Performance Graded (PG) Asphalt Binder shall be PG 64E-22 (PG 76-22) and 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 asphalt binder specific gravity at 77°F, rotational viscosity at 275°F and 329°F, and a mixing and compaction viscosity-temperature chart as if the asphalt binder were to be used as binder for the construction of hot mix asphalt. The blending of PG asphalt binder from different suppliers is strictly prohibited. Contractors who blend PG asphalt

binders will be classified as a "Supplier" and will be required to certify the asphalt binder in accordance with AASHTO R 26(M).

3. Optional Barrier Material - Clean, Dry Sand: Sand shall conform to the requirements of Standard Specification Article M.01.03, Fine Aggregates, except that the gradation requirements shall be replaced with the following:

Square Mesh Sieve	Percent Passing by Weight
No. 8	100
No. 50	10 – 40
No. 100	0 – 10
No. 200	0 – 3

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

Construction Methods: The crack filling operation shall proceed in accordance with the requirements of the "Maintenance and Protection of Traffic" and "Prosecution and Progress" specifications.

1. Equipment: The equipment used by the Contractor shall include, but not be limited to, the following:

    a. Melter Applicator: The unit shall consist of a boiler kettle equipped with pressure pump, hose, and applicator wand; the boiler kettle may be a combination melter and pressurized applicator of a double-boiler type with space between the inner and outer shells filled with heat transfer oil. Heat transfer oil shall have a flash point of not less than 600°F. The kettle shall include a temperature control indicator. The kettle shall be capable of maintaining the crack fill material at the manufacturer's specified application temperature range. The kettle shall include an insulated applicator hose and application wand. The hose shall be equipped with a shutoff control. The kettle shall include a mechanical fullsweep agitator to provide continuous blending. The unit shall be equipped with thermometers to monitor the material temperature and the heating oil temperature. The unit shall be equipped with thermostatic controls that allow the operator to regulate material temperature up to at least 425°F.

    b. Application Wand and Squeegee Applicator: The material shall be applied with a wand followed by a squeegee applicator. The squeegee applicator shall be of commercial/industrial quality designed with a "U" shaped configuration. It shall be of a size adequate to strike off, flush with the surrounding pavement surface and without overflow around the sides, all crack fill material placed. This tool shall be either attached to the applicator wand or used separately as its own long handled tool.

c. Hot Air Lance: The unit shall be designed for cleaning and drying the pavement surface cracks. Minimum compressed air capacity shall be 100 psi. The compressed air emitted from the tip of the lance shall be capable of achieving a temperature of at least 1500°F.

d. Vertically Mounted Power Driven Wire Brush: This tool shall be used to remove any dirt, debris, or vegetation to the depths specified that cannot be removed by the hot air lance. It shall be of adequate size and power to remove all material from cracks as specified.

2. Weather Requirements: Work shall not be performed unless the pavement is dry. No frost, snow, ice, or standing water may be present on the roadway surface or within the cracks. The ambient temperature must be 40°F and rising during field application operations for work to proceed.

3. Material Mixing Procedure: The prepackaged material shall be added to the melter applicator in the presence of the Engineer. It shall then be mixed and heated to the recommended application temperature. The crack fill material shall never exceed 400°F.

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

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

   All cracks from ¼ inch up to 1.5 inches wide shall be prepared and filled as stated below. Cracks that are between ¼ inch and 1.5 inches wide, but eventually taper in width below the minimum ¼ inch, shall also be prepared and filled as stated below. Only cracks that are less than ¼ inch wide throughout their entire length shall be excluded.

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

   All joints to be filled that are raveled (loss of the pavement surface material) shall be at least ½ inch in depth at the joint's deepest point. The minimum width of a raveled joint must be ½ inch. The maximum width of a raveled joint to be filled is 3 inches.

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

5. Crack Preparation: Cracks to be filled shall be treated with a hot air lance prior to application of the crack fill material. Two (2) passes minimum shall be made with the hot air lance. The hot air lance operation shall proceed at a rate no greater than 120 feet per minute. There shall

be no more than 10 minutes between the second hot air lance treatment and the material application. Should this time be exceeded, additional pass(es) shall be made with the hot air lance.

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

The hot air lance shall be used to blow all debris from cracks (not including raveled joints) to a depth of at least ¾ inch for cracks between ¼ inch and ¾ inch wide, and to a depth of 1.25 inches for cracks between ¾ inch and 2 inches wide. The hot air lance shall be used to blow all debris from raveled joints to a depth of 1 inch or the full depth of the joint, whichever is smaller.

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

In the event that cracks have depths greater than 2 inches below the pavement surface, the Contractor may place a barrier composed of clean, dry sand as specified herein. The barrier material shall be placed in a manner leaving 1.25 inches below the elevation of the pavement surface for crack filling material. A barrier will not be allowed for cracks wider than 1.5 inches or less than ½ inch wide.

6. Crack Filling: As soon as cracks have been prepared, they shall be filled to refusal along their entire length. The treatment material shall be maintained at the manufacturer's specified/recommended application temperature range at all times. The filling operation shall be suspended if the temperature of the crack filling material falls outside the specified temperature range and shall remain suspended until the crack filling material is brought within the specified temperature range. Filled cracks are to be squeegeed immediately following application of the crack filling material, striking excess filler flat to the adjacent

pavement surface. There shall be no build-up of treatment material above or adjacent to the crack at any time. If the initial application of crack fill material fails to fill the crack or shrinks upon cooling such that there is a depression formed of at least ¼ inch or greater, a second application of filler shall be placed over the first application.

7. Protection of Filled Cracks: Traffic shall not be permitted on the pavement until the crack fill material is set so that the material does not track and is not deformed or pulled out by tires. If the work under this item is being performed prior to placing a hot mix overlay or other surface treatment, a detackifier or blotting agent will not be allowed. If work under this item is not followed by placement of an overlay of any kind, a detackifier or blotting agent may be used. If a detackifier or blotting agent is used, it shall be one recommended by the supplier of the crack filling material and shall be used as recommended by the supplier, except that no paper, cotton, or other organic materials shall be allowed. Information on the type and usage of a detackifier or blotting agent shall be presented to the Engineer for their written acceptance prior to use.

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

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

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

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

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

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

Pay Item	Pay Unit
Filling Joints and Cracks in Bituminous Concrete Pavement	l.f.

ITEM #0406275A - FINE MILLING OF BITUMINOUS CONCRETE (0 TO 4 INCHES)

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

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

The bituminous concrete material shall be disposed of offsite by the Contractor at an approved disposal facility unless otherwise stated in the Contract.

Any milled surface, or portion thereof, that is exposed to traffic shall be paved within five (5) calendar days unless otherwise stated in the plans or Contract.

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

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

The machine shall be able to provide a 0 to 4 inch deep cut in one pass. The rotary drum of the machine shall use carbide or diamond tipped tools spaced not more than $^{5}/_{16}$ inch apart. The forward speed of the milling machine shall be limited to no more than 45 feet/minute. The tools on the revolving cutting drum must be continually maintained and shall be replaced as warranted to provide a uniform pavement texture.

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

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

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

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

Surface Tolerance: The milled surface shall provide a satisfactory riding surface with a uniform textured appearance. The milled surface shall be free from gouges, longitudinal grooves and ridges, oil film, and other imperfections that are a result of defective equipment, improper use of equipment, or poor workmanship. The Contractor, under the direction of the Inspector, shall perform random spot-checks with a Contractor supplied ten-foot straightedge to verify surface tolerances at a minimum of five (5) locations per day. The variation of the top of two ridges from the testing edge of the straightedge, between any two ridge contact points, shall not exceed ¼ inch. The variation of the top of any ridge to the bottom of the groove adjacent to that ridge shall not exceed ¼ inch. Any unsatisfactory surfaces produced are the responsibility of the Contractor and shall be corrected at the Contractor's expense and to the satisfaction of the Engineer.

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

Where a surface delamination between bituminous concrete layers or a surface delamination of bituminous concrete on Portland cement concrete causes a non-uniform texture to occur, the depth of milling shall be adjusted in small increments to a maximum of +/- ½ inch to eliminate the condition.

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

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

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

permanent limits of removal, a clean vertical face shall be established by saw cutting prior to paving.
Roadway structures shall not have a vertical face of greater than one (1) inch exposed to traffic as a result of milling. All structures within the roadway that are exposed to traffic and greater than one (1) inch above the milled surface shall receive a transition meeting the following requirements:

For roadways with a posted speed limit of 35 mph or less*:

1. Round structures with a vertical face of greater than 1 inch to 2.5 inches shall be transitioned with a hard rubber tapered protection ring of the appropriate inside diameter designed specifically to protect roadway structures.
2. Round structures with a vertical face greater than 2.5 inches shall receive a transition of bituminous concrete formed at a minimum 24 to 1 (24:1) taper in all directions.
3. All rectangular structures with a vertical face greater than 1 inch shall receive a transition of bituminous concrete formed at a minimum 24 to 1 (24:1) taper in all directions.

*Bituminous concrete tapers at a minimum 24 to 1 (24:1) taper in all directions may be substituted for the protection rings if approved by the Engineer.

For roadways with a posted speed limit of 40, 45 or 50 mph:

1. All structures shall receive a transition of bituminous concrete formed at a minimum 36 to 1 (36:1) taper in the direction of travel. Direction of travel includes both the leading and trailing side of a structure. The minimum taper shall be 24 to 1 (24:1) in all other directions.

For roadways with a posted speed limit of greater than 50 mph:

1. All structures shall receive a transition of bituminous concrete formed at a minimum 60 to 1 (60:1) taper in the direction of travel. Direction of travel includes both the leading and trailing side of a structure. The minimum taper shall be 24 to 1 (24:1) in all other directions.

All roadway structure edges and bituminous concrete tapers shall be clearly marked with fluorescent paint. The paint shall be maintained throughout the exposure to traffic.

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

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

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

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

Basis of Payment: This work will be paid for at the Contract unit price per square yard for "Fine Milling of Bituminous Concrete (0 to 4 Inches)." This price shall include all equipment, tools, labor, and materials incidental thereto.

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

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

Pay Item	Pay Unit
Fine Milling of Bituminous Concrete (0 to 4 Inches)	s.y.

ITEM #0406287A - RUMBLE STRIPS - AUTOMATED

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).

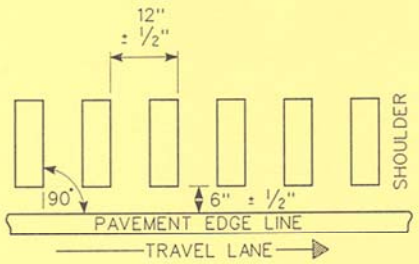
The work area shall be returned to a debris-free state prior to re-opening to traffic.

The Contractor shall provide all traffic control according to the Maintenance and Protection of Traffic Specification included elsewhere in the contract.

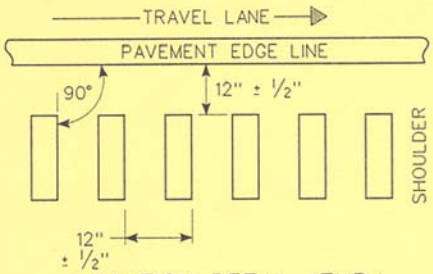
Method of Measurement:
This work will be measured for payment by the actual number of feet of shoulder where the rumble strips are placed and accepted. This distance shall be measured longitudinally along the edge of pavement with deductions for bridge decks, acceleration and deceleration lanes, drainage 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.

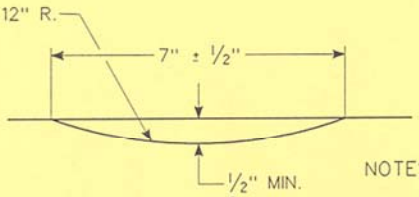
DETAILS AND SECTIONS OF RUMBLE STRIPS



LOCATION DETAIL (TYP.)
LEFT SHOULDER



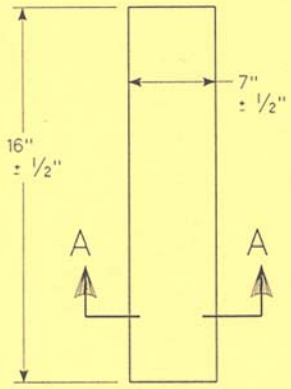
LOCATION DETAIL (TYP.)
RIGHT SHOULDER



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. Masiatka DATE 10-20-99
TRAFFIC SUPERVISING ENGR.

APPROVED _____ DATE 10-20-99
PRINCIPAL ENGINEER

SCALE - NONE

ITEM # 0406287A
ITEM # 0406288A

3 OF 4

TYPICAL TREATMENTS FOR INSTALLING RUMBLE STRIPS
RUMBLE STRIPS IN LEFT SHOULDER, IF APPLICABLE
DIRECTION OF TRAFFIC
RESUME RUMBLE STRIPS AT END OF TAPER OF ACCELERATION LANE
RESUME RUMBLE STRIPS AT BEGINNING OF PHYSICAL GORE AND END RUMBLE STRIPS AT END OF PHYSICAL GORE
END RUMBLE STRIPS AT BEGINNING OF TAPER OF DECELERATION LANE
TYPICAL TREATMENT FOR RAMPS
PAVEMENT EDGE LINE
1.5 Ft.
1.5 Ft.
RUMBLE STRIPS (TYP.)
RUMBLE STRIPS (TYP.)
1 FOR DISTANCES OF 3 Ft. OR MORE, CONTINUE RUMBLE STRIPS ALONG SHOULDER.
TYPICAL TREATMENT FOR OBSTRUCTIONS
(I.E. CATCH BASINS OR MANHOLES)
FILE: RUMBLE.MDS
CONNECTICUT
DEPARTMENT OF TRANSPORTATION
BUR. OF ENGINEERING & HWY. OPERATIONS
DIVISION OF TRAFFIC ENGINEERING
TYPICAL TREATMENTS FOR INSTALLATION OF RUMBLE STRIPS
ENGINEER Erika D. Smith DATE 10-18-99
SUBMITTED Stephen J. Power DATE 10-20-99
TRAFFIC SUPERVISING ENGR.
APPROVED DATE 10-20-99
PRINCIPAL ENGINEER
1.5 Ft. (TYP.)
TYPICAL TREATMENT FOR LOOP DETECTOR SAWCUT LOCATIONS
SCALE - NONE
3 Ft.
3 Ft.
EXPANSION JOINTS
3 Ft.
3 Ft.
TYPICAL TREATMENT FOR BRIDGES
NOTE: NARROW SHOULDERS APPROACHING BRIDGES MAY RESULT IN ENDING THE RUMBLE STRIPS AT THE GUIDE RAIL APPROACH
ITEM # 0406287A
ITEM # 0406288A
4 OF 4

ITEM #0406314A - 80 MIL PAVEMENT MARKING GROOVE 5” WIDE

ITEM #0406315A - 80 MIL PAVEMENT MARKING GROOVE 7” WIDE

ITEM #0406316A - 80 MIL PAVEMENT MARKING GROOVE 9” WIDE

ITEM #0406317A - 80 MIL PAVEMENT MARKING GROOVE 13” WIDE

Description:
Work under this item shall consist of grooving the pavement surface in a continuous or regularly spaced fashion for the placement of recessed pavement markings. Unless otherwise noted, the groove shall be 1 inch wider than the anticipated pavement marking. The groove for double-yellow centerline markings shall consist of two grooves, each 5 inches wide.

Groove Width: 5 inches wide for 4-inch markings
7 inches wide for 6-inch markings
9 inches wide for 8-inch markings
13 inches wide for 12-inch markings

Groove Depth: 0.080 inches ± 0.010 inches

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 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.

The grooving equipment shall be capable of installing a groove 6 inches away from any vertical or horizontal obstruction.

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 in a 10-foot length, 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 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 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 of groove installed in the pavement as ordered and accepted by the Engineer.

Basis of Payment:
This work will be paid for at the contract unit price per linear feet 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.

Pay Item	Pay Unit
80 Mil Pavement Marking Groove 5" Wide	l.f.
80 Mil Pavement Marking Groove 7" Wide	l.f.
80 Mil Pavement Marking Groove 9" Wide	l.f.
80 Mil Pavement Marking Groove 13" Wide	l.f.

ITEM #0406999A - ASPHALT ADJUSTMENT COST (ESTIMATED COST)

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

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

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

Construction Methods:

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

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

II. For Ultra-Thin Bonded HMA mixtures:
   a. The Ultra-Thin Bonded HMA mixture for which the adjustment would be applied is listed as a Contract item.
   b. The total quantity for Ultra-Thin Bonded HMA mixture in the Contract exceeds:
      i. 800 tons if the Ultra-Thin Bonded HMA item has a pay unit of tons.
      ii. 30,000 square yards if the Ultra-Thin Bonded HMA item has a pay unit of square yards.

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

III. Regardless of the binder used in all HMA or PMA mixtures, the Asphalt Adjustment Cost will be based on PG 64-22.

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

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

Method of Measurement:

Formula: **HMA x [PG%/100] x [(*Period Price - Base Price*)] = $ ____**

where

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

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

Basis of Payment: The "Asphalt Adjustment Cost" will be calculated using the 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 the adjustment will be made as described above. The estimated cost figure is not to be altered in any manner by the bidder. If the bidder should alter the amount shown, the altered figure will be disregarded and the original cost figure will be used to determine the amount of the bid for the Contract.

Pay Item	Pay Unit
Asphalt Adjustment Cost (Estimated Cost)	est.

ITEM #0503151A - REMOVAL OF SUPERSTRUCTURE (SITE NO. 1)

ITEM #0503152A - REMOVAL OF SUPERSTRUCTURE (SITE NO. 2)

ITEM #0503153A - REMOVAL OF SUPERSTRUCTURE (SITE NO. 3)

Work under this item shall conform to the requirements of Section 5.03 of the Standard Specifications, Form 817, with January 2019 Supplements amended as follows:

5.03.01 - Description: *Delete the entire article and replace with the following:*

This work shall consist of the removal and satisfactory disposal of the existing superstructure of Bridge Nos. 01743B, 01744, and 01745 as shown on the plans. The existing bridges consist of multi span steel girders composite with the concrete deck, concrete parapets and metal bridge railings. The superstructure is defined herein as all structural and auxiliary items generally located within the plan limits of the existing bridge, at or above bearing elevation, and includes, but is not limited to bearings, metal bridge railings, concrete parapets, median barriers, precast barriers, curbs, sidewalks, bituminous wearing surfaces, expansion joint assemblies, fill material, waterproofing membranes, concrete deck slabs, utility facilities, conduits, cables, structural steel, lateral bracing, cross frames, diaphragms, stringers, floor beams, girders, reinforced concrete slabs, beams, arches, rigid frames, bearings and any other items that may be attached thereto, as shown on the plans, or as directed by the Engineer.

Work under this item shall also consist of removing, containing, and collecting existing paint removed from all areas of steel superstructures where the Contractor will use flame cutting, arc gouging or welding for the superstructure demolition or partial removal, because of the possible presence of lead in the existing paint. The lead removal is required to comply with OSHA Regulation Nos. 1926.353, 1926.354, and 1926.62. Additional information on lead removal and definitions of the terms used within this special provision may be obtained from the latest edition of the "SSPC Guide 6 - Guide for Containing Debris Generated During Paint Removal Operations."

Plans are available for the existing bridge structure.

5.03.03 - Construction Methods:

Add the following:

5. Amount of Paint Removal: Prior to applying the heat of welding equipment to localized areas of steel superstructures, the existing paint shall be removed to a minimum of 6 inches from wherever the heat will be applied, and as directed by the Engineer.

6. Methods of Paint Removal: Where required, the existing paint shall be removed by chemical stripping, needle guns with vacuum attachments, or by any of the closed abrasive blast cleaning techniques described in SSPC Guide 6. Open abrasive blast cleaning will not be permitted. All of the debris resulting from the paint removal operations shall be contained, collected, and stored in leakproof storage containers placed on wooden pallets protected to the 500-year flood elevation. A test patch shall be done on the existing steel to demonstrate the Contractor's proposed methods of paint removal to the satisfaction of the Engineer.

   The Contractor is advised that chemical paint removers may require several days and multiple applications to completely remove the existing paint, especially in temperatures below 50° F.

   The Contractor is also advised that chemical paint strippers may not be effective in removing some paints.

7. Removal of Superstructure:

   a. Since lead paste may be present under the existing bearings, the use of flame-cutting equipment to cut swedge bolts is not allowed. The method of removal shall be by sawing of the bolts, unless another method is approved by the Engineer.

5.03.05 – Basis of Payment:
Add the following:

The lump sum price shall include the containment, removal, collection, and storage of paint debris as described herein.

The lump sum price shall include debris shielding and all costs associated with the protection of the area below the bridge from falling debris, including slurry from any saw cutting operations.

Disposal of lead based debris and chemical stripper residue shall be paid for under item “Lead Compliance for Miscellaneous Exterior Tasks.”

Pay Item	Pay Unit
Removal of Superstructure (Site No. 1)	l.s.
Removal of Superstructure (Site No. 2)	l.s.
Removal of Superstructure (Site No. 3)	l.s.

ITEM #0520032A - ELASTOMERIC CONCRETE HEADER

Description: Work under this item consists of furnishing and installing elastomeric concrete headers as shown on the plans. Work also includes saw-cutting and removal of bituminous concrete; disposal of removed materials and all debris from the header cut-out; abrasive blast cleaning; and, drilling, grouting, furnishing and installing reinforcing bars to anchor the headers to the concrete below.

Materials:

1. **Field-mixed bridge joint header elastomeric concrete material**. The elastomeric concrete material shall be field-mixed and shall consist of two-part polymer, kiln-dried pre-graded aggregate, and bonding agent with the material being supplied as a unit by the Manufacturer.

   A Materials Certificate will be required in accordance with the requirements of Article 1.06.07 certifying the conformance of the elastomeric concrete for bridge expansion joint header components to the requirements set forth in this specification.

   Each container of product furnished shall be delivered to the Site in the Manufacturer's original sealed container. Each container shall be labeled to include the name of the material, Manufacturer's name and contact information, expiration date, mixing instructions and the Manufacturer's lot/batch number. Material safety data sheets shall accompany each shipment. All materials must be stored in accordance with the Manufacturer's written recommendations and as approved by the Engineer. Materials whose shelf-life has expired shall not be used in the Project.

   Provide material that complies with the following minimum requirements at either 14 days or at the end of the specified curing time. In addition to the following requirements, the bridge elastomeric concrete header shall be resistant to water absorption, chemical, UV, ozone exposure and shall be capable of withstanding temperature extremes.

Elastomeric Concrete Properties at 24 hr. Cured Stage	Test Method	Requirement
Compressive Strength, Method B	ASTM C579	Min. 2000 psi
Bond Shear Strength	ASTM C882	Min. 700 psi
Abrasion Resistance Wear Index	ASTM C501	Max. 1
Resilience	ASTM D695	Min. 70%
Durometer Hardness	ASTM D2240	Min. 50
Bond Strength to Concrete	ASTM C882	Min. 450 psi

The following Elastomeric Concrete products are qualified for use under this item:

Manufacturer:	Qualified Product
Silicone Specialties Inc. 430 S. Rockford Tulsa, OK 74120 Phone: (918) 587-5567	Silspec 900 Polymer Nosing System
Watson Bowman Acme Corp. 95 Pineview Drive Amherst, NY 14228 Phone: (800) 677-4922	Wabo Crete II
R. J. Watson Inc. 11035 Walden Ave Alden, NY 14004 Phone: (716) 901-7020	Poly-Tron Elastomeric Concrete

2. **Reinforcing Bars**: Reinforcing bars shall be glass fiber-reinforced polymer (GFRP) meeting the requirements of ACI 440.6, "Specification for Carbon and Glass Fiber-Reinforced Polymer Bar Materials for Concrete Reinforcement." All GFRP reinforcement shall be deformed or sand-coated. When hooks or bends are shown on the plans, bars shall be fabricated as shown. Bending of bars in the field will not be allowed. A Materials Certificate will be required for the reinforcing bars in accordance with the requirements of Article 1.06.07.
3. **Chemical Anchor Material**: Chemical anchor material to secure the GRFP reinforcement in drilled holes within the header cut-out shall meet the requirements of M.03.07 Chemical Anchors.

Construction Methods:

Submittals:

The Contractor shall submit the following in accordance with the requirements of Article 1.05.02:

- Product data for the elastomeric concrete header, reinforcing bars and chemical anchor material
- Written installation instructions for the elastomeric concrete headers, including surface preparation, conditions that are unacceptable for installation of the headers, the materials and methods for forming the headers while allowing thermal movement of the bridge, finishing and curing requirements. The instructions shall also address, where applicable, the proper preparation of stage construction joints in the headers.
- Written installation instructions for the chemical anchor material. Include tools and equipment required for the installation, hole diameter and depth, and preparation of the hole before the chemical anchoring material is placed.

An experienced technical representative from the manufacturer, acceptable to the Engineer, shall be present during initial installations of the elastomeric concrete headers to provide the Contractor aid and independent instruction to obtain an installation satisfactory to the Engineer.

Block-outs shall be formed between elastomeric concrete headers as required to accept the subsequent installation of the preformed joint seal.

Work under this item shall consist of installing the bridge elastomeric concrete header at the locations shown on the plans and in stages in accordance with the traffic requirements in the special provisions "Maintenance and Protection of Traffic" and "Prosecution and Progress."

Elastomeric concrete is moisture-sensitive. Therefore, after properly curing new decks and deck ends that have been reconstructed or patched, the Contractor shall measure and document the moisture content of the concrete before installation of elastomeric concrete headers. The Contractor shall not install the elastomeric concrete against the concrete deck if the moisture content exceeds 6% (or lower, if required by the manufacturer's technical representative). Measurement of moisture content shall be conducted on the substrate by the Contractor using a "Sovereign Portable Electronic Moisture Master Meter," a "Tramex CMEXpertII Concrete Moisture Meter" or approved equal. One measurement shall be taken at the gutterline below each proposed header. The minimum frequency shall be one measurement every twelve feet along each proposed header. Additional measurements may be ordered by the Engineer.

Tools, equipment, and techniques used to prepare the bridge elastomeric concrete header shall be supplied by the Contractor and approved by the Engineer and the Manufacturer's technical representative prior to the start of construction.

The Contractor shall provide sufficient material in storage at the Site prior to beginning work on this item, to complete the entire bridge elastomeric concrete header as detailed on the plans or as directed by the Engineer.

The Contractor shall saw cut the overlay full depth in order to delineate the location of the elastomeric concrete headers. At the time of installation of the bridge elastomeric concrete header, all existing material shall be removed from the proposed bridge joint header, including all existing joint systems in the deck, sidewalk, parapet and median.

All surfaces in the bridge headers shall be cleaned of all pavement, membrane, dust, dirt, debris, and other loose materials as recommended by the Manufacturer and shall be free of frost or dew that could affect the bond of the header material to the concrete. Additionally, the concrete to which the header will be bonded shall be blast cleaned as recommended by the Manufacturer. When blast cleaning is performed under this specification the Contractor shall take adequate measures to ensure that the blast cleaning will not cause damage to adjacent traffic or other facilities. Following blast cleaning, the surfaces shall again be cleaned to remove any remaining dust.

Forms shall be used to keep the elastomeric concrete from entering the open joint between the concrete deck slabs. The completed headers shall be parallel and straight within 1/8 inch in 10 feet of length. **The joint gap between the headers may not be formed with polystyrene, polyurethane, polyisocyanurate or any other similar material.** The forms for each pair of headers shall be secured so each can move independently of the other, to allow for thermal movement of the deck. Forms shall be designed so that, upon completion of the headers, the forms

can be removed. Form, place and cast the elastomeric concrete headers to smoothly follow the surface of the finished roadway at the depth below the surface detailed on the plans.

The Contractor shall drill holes in the concrete and secure with chemical adhesive the hooked reinforcing bars as detailed on the plans. After cleaning any debris and dust from this operation, additional bars shall be placed along the header and secured to the hooked dowels as detailed on the plans.

No elastomeric concrete shall be installed below 45°F. The mixing and installation of the two-part bridge elastomeric concrete header shall be done in strict conformance with the Manufacturer's written recommendations including the use of static mixing devices if so indicated. The elastomeric concrete shall be placed to completely fill the forms, using a trowel to consolidate the material and prevent honeycombing and voids. Finish the surface to a moderately rough texture such as that produced by a wood float.

Traffic must not be allowed on the newly-placed bridge elastomeric concrete header until the material cures properly in accordance with the Manufacturer's specification. During curing time the elastomeric concrete header shall be protected from damage. If recommended by the manufacturer or technical representative, the elastomeric concrete shall be heat-cured with the use of external heat sources. Curing may require that heat be applied for approximately 2 to 3 hours. Traffic shall not be permitted over the joint until proper cooling of the material has occurred and the elastomeric concrete has developed adequate strength in accordance with the manufacturer's recommendations.

Method of Measurement: This work will be measured for payment by the number of cubic feet of elastomeric concrete header installed and accepted into the final work. The volume will be calculated using measured width, length and depth of header. No calculation will be made to deduct the block-out area above the shelf. The width of header will be measured perpendicular to the joint, from the end of the bridge deck, approach slab or face of backwall to the specified pavement sawcut. The length will be measured along the joint side of the header, from face of curb to face of curb. Measurements of header depth shall be taken at sufficient frequency to calculate the average depth of header over its entire length. Elastomeric concrete material in the parapet curb will not be measured for payment.

Basis of Payment:

This work will be paid for at the Contract unit price per cubic foot for "Elastomeric Concrete Header," complete, which price shall include all equipment, tools, labor, and materials, incidental thereto, including preparation of the surface and proper disposal of debris. The cost of the technical representative shall also be included in the cost of this item.

Work associated with the preformed joint seal to be installed in the deck joint gap will be paid for under a separate item.

Pay Item	Pay Unit
Elastomeric Concrete Header	c.f.

ITEM #0520041A - PREFORMED JOINT SEAL

Description: Work under this item consists of furnishing and installing a preformed joint seal as shown on the plans. Work also includes a pre-installation survey to measure the pavement depth at all locations where the joint meets the curb.

Materials: One of the following Preformed Joint Seals specified on the plans shall be supplied:

V-Shaped Silicone Seals:

1. Silicoflex:
   RJ Watson, Inc.
   11035 Walden Ave
   Alden, New York 14004
   Tel: (716) 901-7020
   Website: http://www.rjwatson.com

2. V-Seal:
   D.S. Brown Company
   300 East Cherry Street
   North Baltimore, Ohio 45872
   Tel: (419) 257-3561
   Website: http://www.dsbrown.com

Foam-Supported Silicone Seals:

3. Bridge Expansion Joint System (B.E.J.S.):
   EMSEAL Joint Systems Ltd.
   25 Bridle Lane,
   Westborough, MA 01581
   Tel: (508) 836-0280
   Website: http://www.emseal.com

4. Wabo FS Bridge Seal
   Watson Bowman Acme Corp.
   95 Pineview Drive
   Amherst, NY 14228
   Tel: (716) 691-9239
   Website: https://wbacorp.com/products/bridge-highway/joint-seals/wabofsbridge/

When foam-supported silicone joint seals are the only type allowed on the plans (such as at bridge joints that extend through sidewalks), the CTDOT will consider products from other foam-supported silicone joint manufacturers, if the products have been installed by another State Department of Transportation, are functioning successfully in a similar climate to Connecticut's for at least one year, and are deemed by the CTDOT to be suitable

for use in the specific application for which the Contractor is requesting. To be considered, the Contractor shall submit documentation indicating the product name, manufacturer, the contact information for a Department of Transportation official who can confirm the successful installation and continued success of the product, the date of installation and the nature of the installation, including thermal movement range and skew of the installed joint.

A Materials Certificate for all components of the selected preformed joint seal shall be submitted by the Contractor in accordance with the requirements of Article 1.06.07

Construction Methods: All work at each joint location shall be accomplished in accordance with "Maintenance and Protection of Traffic" and "Prosecution and Progress."

Submittals:
Prior to ordering preformed joint seals, and prior to forming block-outs for the preformed joint seals in the headers, the Contractor shall submit the following to the Engineer:

- The Manufacturer and product information of the selected joint system;
- Material safety data sheets (MSDS) and technical product information;
- Name and credentials of a qualified technical representative supplied by the manufacturer and acceptable to the Engineer. This person shall be available to provide assistance at the beginning of the work and be available to provide training and guidance throughout the project.
- A detailed, step-by-step installation procedure, including surface preparation, splicing of the preformed joint seal, and a list of the specific equipment to be used for the installation.

Installation: The technical representative of the accepted joint system shall be notified of the scheduled installation a minimum of 2 weeks in advance and be present to provide direction and assistance for the first joint installation and succeeding joint installations until the Contractor becomes proficient in the work and to the satisfaction of the Engineer.

The minimum ambient temperature for installing any of the qualified, preformed joint seals is 40°F and rising. When the manufacturer's requirement for minimum installation temperature is greater than 40°F, the manufacturer's requirement will govern.

All concrete surfaces to which sealing glands will be bonded shall be prepared in accordance with International Concrete Repair Institute (ICRI) concrete surface profile standards. The minimum acceptable surface profile is CSP2 (grinding), but CSP3 (light abrasive blast) is preferred. Any discontinuities or sharp projections into the plane of the joint shall be ground smooth prior to blasting. Whenever abrasive blast cleaning is performed, the Contractor shall take adequate measures to ensure that the abrasive blast cleaning will not cause damage to adjacent traffic or other facilities. Traffic will not be allowed to pass over the joint after blasting has occurred.

Following blasting, the joint surfaces shall be wiped down or blown clean as recommended by the manufacturer.

The joint surfaces shall be completely dry before installing any of the components of the selected joint seal. The selected joint seal shall not be installed immediately after precipitation or if precipitation is forecast. Joint preparation and installation of the selected preformed joint seal must be done during the same day.

The selected joint sealing system shall be installed continuously with no field splices in the preformed seal in the roadway section, unless field splices are allowed by the manufacturer of the selected preformed joint seal. In no case shall field splices of the preformed joint seal be allowed in a wheel path or within the roadway shoulder. When splices cannot be avoided due to traffic constraints, the splice shall be at a painted lane line.

After the joint seal has been installed, water shall not be able to penetrate the joint. Any joint seal that does not effectively seal against water shall be removed and replaced at the Contractor's expense.

Method of Measurement: This work will be measured for payment by the number of linear feet of preformed joint sealing system installed and accepted. The measurement will be made along the centerline of the joint at the top surface of header, curb, sidewalk and parapet.

Basis of Payment: This work will be paid for at the Contract unit price per linear foot for "Preformed Joint Seal," complete in place, including all materials, equipment, tools, and labor incidental thereto.

The Contract unit price shall include the cost of assistance from a technical representative of the selected joint system.

Pay Item	Pay Unit
Preformed Joint Seal	l.f.

ITEM #0521021A - STEEL-LAMINATED ELASTOMERIC BEARINGS

Description: Work under this item shall consist of furnishing and installing steel-laminated elastomeric bearings as shown on the plan, as directed by the Engineer and in accordance with these specifications.

Materials:

1. Elastomer: The elastomer shall be Grade 3 Virgin Neoprene (polychloroprene) with Shore "A" Durometer hardness as shown on the plans and conforming to the requirements of the AASHTO LRFD Bridge Construction Specifications (4th Edition). Elastomer shall have shear modulus between 0.095 ksi and 0.13 ksi when measured at 738 F using the apparatus and procedure described in Annex A of ASTM D4014.

2. Steel Laminae: The internal steel laminae shall be mild rolled steel conforming to ASTM A570, Grade 36 or 40, ASTM A611, Grade C or D, or an approved equal. Laminae shall be sandblasted and cleaned of all surface coatings, rust and mill scale before bonding and shall be free of sharp edges and burrs. Steel laminae shall develop minimum peel strength of 473 lb/ft when tested in accordance with ASTM D429 Method B.

3. External Load Plates (if indicated on the plans): The external load plates shall conform to AASHTO M270, Grade 50WT2 and to the requirements shown on the plans. Bonding surface of the external load plates shall be abrasive blast cleaned prior to being hot bonded to the bearing during vulcanization. Adhesive bonding of the load plate surface to the elastomer is not allowed.

4. Anchor Rods: The swedged anchor rods shall conform to ASTM F1554 Grade 105.

5. Nuts, Bolts, Flat Washers, and Beveled Washers: High strength bolts shall conform to the requirements of ASTM F3125 Grade A490 Type 3. Nuts shall conform to ASTM A563, grade DH3. Washers shall conform to ASTM F436.

6. Fabrication and Fabrication Tolerances: The fabrication and fabrication tolerances of elastomeric bearings shall conform to the requirements of the AASHTO LRFD Bridge Construction Specifications (4th Edition).

   If guide pins or other devices are used to control the side cover over the steel laminae, any exposed portions of the steel laminae shall be sealed by vulcanized patching.

7. Testing: The materials for the elastomeric bearing and the finished bearings themselves shall be subjected to testing. The testing shall conform to the requirements of the AASHTO LRFD Bridge Construction Specifications (4th Edition).

Test bearings, in addition to the bearings shown on the plans, shall be furnished for each type (size and thickness) of bearing for destructive testing. The test bearings shall be furnished without external load plates.

8. Marking: Each steel-laminated elastomeric bearing shall have marked on it, with indelible ink, the following: the manufacturer's identification code or symbol, and the month and year of manufacture, the orientation, order number, lot number, bearing identification number, and elastomer type and grade (Neoprene, Grade 3). The markings should be placed on a side of the bearing that is visible after installation.

9. Certification: The Contractor shall furnish a Certified Test Report, confirming that the elastomeric bearings satisfy the requirements of these specifications, in conformance with the requirements set forth in Article 1.06.07.

10. Adhesive: The adhesive, for bonding the shims, shall be a long lasting, high strength, cold applied, air cured, water and heat resistant material specifically formulated for bonding neoprene and shall meet the following requirements:

Property	Requirement	ASTM Test Procedure
Adhesion	30 lbf/in	D429, Method B
Hardness	50 $\pm$ 5 Shore A points	D2240
Tensile Strength, min	1800 psi	D412
Elongation before breaking, min.	750 %	D412

11. Paint: The steel loads plates shall be painted at the abutments. The paint system shall conform to the requirements of Section M.07.02, or as approved by the Engineer. The shop painted coating system shall be a three-coat system. The same coating material manufacturer shall furnish all materials for the complete coating system. Intermixing of materials within and between coating systems will not be permitted. Thinning of paint shall conform to manufacturer's written instructions.

    The final color of the paint system shall be Brown, Federal Standard 595 Color No. 20062.

Construction Methods:

Shop Drawings: Before fabricating any materials, the Contractor shall submit shop drawings to the Engineer, for review and approval, in accordance with Subarticle 1.05.02-3. These drawings shall include, but shall not be limited to the following information: manufacturer's name, complete details of the bearings, material designations, nominal hardness of the elastomer, the quantity of bearings required, including test bearings, and the location of the bearing identification.

In lieu of the low temperature crystallization test for each lot of bearings and shear modulus test for each batch of material, the manufacturer may provide certificates from tests performed on identical formulations within the preceding year.

Fabrication: The bearing shall be cast as a unit in a mold and shall be bonded and vulcanized under heat and pressure. The mold finish shall conform to standard shop practice.

Fabrication tolerances shall conform to AASHTO LRFD Bridge Construction Specifications (3rd Edition) with 2010 and 2011 Interim Revisions. Flash tolerance, finish and appearance shall meet the requirements of the latest edition of the Rubber Handbook, published by the Rubber Manufacturer's Association, Inc., RMA F3 and T.063.

Every bearing shall be visually inspected for compliance with dimensional tolerance and for overall quality of manufacture. Buffing, cutting, or other attempt to alter the size of the bearings, for the purpose of meeting the tolerances stated herein will not be permitted.

Adhesive bonding of the elastomeric bearings to steel and concrete surfaces is not permitted.

Each elastomeric bearing pad shall have embossed on it the following: the word "CONN", project number, manufacturer's identification code or symbol, and the month and year of manufacture. The bearing shall also have stenciled on it, with indelible ink, the lot number, bridge number, and the bearing number. The marking shall be placed on a side of the bearing that is visible after installation.

For structures requiring less than fifty pads, one test pad shall be furnished. For structures requiring more than fifty pads, one test pad shall be furnished for each additional fifty pads or part thereof. If there are two or more types of pads in one structure, and only one test pad is required, the pad will be furnished for the type of which there are the greater numbers. All test pads shall be furnished without charge.

The same firm shall manufacture all of the elastomeric bearing pads to be installed on this structure.

The manufacturer shall furnish facilities for the test and inspection for the completed bearing in its plant or at the independent test facility and the inspectors shall be allowed free access to the manufacturer's plant and test facility.

Short-Duration Compression Test: Each bearing shall be tested as follows for a Short-Duration Compression Test:

1. The Bearing shall be loaded in compression to 1.5 times the design load shown on the plans. The load shall be held constant for 5 minutes, removed and reapplied for another 5 minutes.
2. The bearing shall be carefully examined while under the second loading.

3. If the bulging pattern indicates lamina parallelism of layer thickness outside of specified tolerance, or poor lamina bond, the bearing shall be rejected. If there are three or more separate surface cracks greater than $^1/_{16}$" wide and $^1/_{16}$" deep, the bearing shall be rejected.

A Certified Test Report in accordance with Section 1.06.07 of the Standard Specifications shall be required for the specified test on the elastomer and for the specified short duration tests.

Installation: Bearing areas of the masonry upon which the elastomeric bearing pads are to be placed shall be cleaned of all debris. Bearing areas shall be carefully finished, by grinding if necessary, to a smooth, even, level surface of the required elevation, and shall show no variations from a true plane greater than $^1/_{16}$ inch over the entire area upon which the elastomeric bearing pads are to rest.

There shall be full contact and uniform bearing between the elastomeric bearing pad and the concrete seat after application of full dead load. Also after application of full dead load, there shall be uniform deflection of the elastomeric bearing pad.

The elastomeric bearings shall be installed as shown on the plans. The elastomeric bearings shall be installed when the ambient air temperature is between 408F to 808F and has been within this range for at least 2 hours.

Welding with the elastomeric bearings in place will not be permitted unless there is more than 1½ inches of steel between the weld and the elastomer. Welding shall conform to the requirements of Subarticle 6.03.03-4(e). In no case shall the elastomer or the vulcanized bond be subjected or exposed to temperatures greater than 4008F.

Assembly with high strength bolts shall conform to the requirements of Article 6.03.03-4(f).

Method of Measurement: This work will be measured by the volume of elastomeric bearings in cubic inches fabricated, furnished, installed and accepted. No allowance shall be made for test bearings.

Basis of Payment: This work will be paid for at the contract unit price per cubic inch of "Steel-Laminated Elastomeric Bearings," complete in place, which price shall include all vulcanized external load plates, high strength bolts, connection plates, cap screws, anchor rods, paint, silicone sealant, test bearings and all materials, testing, equipment, tools and labor incidental thereto.

Pay Item	Pay Unit
Steel-Laminated Elastomeric Bearings	C.I.

ITEM #0586300.10A - OFFSET CATCH BASIN – 0’ – 10’ DEEP

ITEM #0586300.20A - OFFSET CATCH BASIN – 0’ – 20’ DEEP

Offset catch basins shall be constructed in accordance with Section 5.86, supplemented as follows:

Section 5.86.01 is supplemented as follows:

Article 5.86.01 – Description: Add the following:

These items shall include furnishing and installing offset type “C-M” catch basins in the locations and to the dimensions, orientation and details shown on the plans or as ordered by the Engineer.

Article 5.86.02 – Materials: Add the following:

The Offset Catch Basins shall be constructed of either precast concrete or shall be constructed in place to accommodate the specific site location requirements and conditions.

ITEM #0601651A - RETAINING WALL (SITE NO. 1)

Description: This item will consist of designing, furnishing and constructing a 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 wall chosen shall be selected from the list shown on the contract drawings. The contract drawings may detail a cast-in-place reinforced concrete retaining wall. This type of retaining wall may also be used as an option. The Engineer will reject any proposed retaining wall that is not listed on the contract drawings.

The list on the contract drawings is for all proprietary retaining walls that are appropriate for each site. This list does not warrant that the walls can be designed to meet either the dimensional, structural, or geotechnical constraints at each site.

The following is a list of the Department's current approved proprietary retaining walls, no other proprietary retaining walls will be allowed:

NOTE: SEE THE CONTRACT DRAWINGS FOR THE SPECIFIC WALLS THAT ARE ACCEPTABLE FOR EACH SITE.

Prefabricated Modular Walls

1. Doublewal-Standard Module
Doublewal
173 Church Street
Yalesville, CT 06492
(203) 269-3119

2. T-Wall Retaining Wall System
The Neel Company
8328-D Traford Lane
Springfield, VA 22152
(703) 913-7858

Mechanically Stabilized Earth (MSE) Walls

1. Reinforced Earth Walls
The Reinforced Earth Company
133 Park Street
North Reading, MA 01864
(978) 664-2830

2. Retained Earth
The Reinforced Earth Company
1372 Oldbridge Road, Suite 101
Woodbridge, VA 22192
(703) 499-9818

Design: Design computations are not required for the cast-in-place wall detailed on the contract drawings except for any temporary earth retaining systems included in the lump sum item. The Contractor shall submit working drawings and design computations for temporary earth retaining systems in accordance with Article 7.16.03.

1 - Design Computations: If the Contractor chooses one of the proprietary wall options, he is fully responsible for the design, detailing and additional specifications required. The actual designer of the retaining wall shall be a qualified Professional Engineer licensed in the State of Connecticut. The designer must have designed at least three proprietary walls within the last three years.

2 - Designer's Liability Insurance: The Designer of the proprietary retaining wall shall secure and maintain at no direct cost to the Department, a Professional Liability Insurance Policy for errors and omissions in the minimum amount of Two Million Dollars ($2,000,000). The Designer may, at his election, obtain a policy containing a maximum Two Hundred Fifty Thousand Dollars ($250,000) 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 for Proprietary Retaining Walls: 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:

- PDF plan sheets shall be prepared as 22" x 34".
- 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 reinforcement and where any changes occur; modular component and facing details including reinforcing steel and reinforcement connections; joint material including geotextile filter location and horizontal joint compression material, etc.

- 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 parapet attachments where required along with any lighting and/or signing requirements.

- Details of Architectural Treatment where required.

- Details of Temporary Earth Retaining Systems 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.

- The design shall conform to the criteria listed below.

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 in accordance with Section 1.05 amended as follows:

a. 6 sets of each submission shall be supplied to the Department

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 each submission. No extensions in contract time will be allowed for the review of these submissions.

4 - Final Submissions for Proprietary Retaining Walls:

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 electronic copy in pdf format set (approximately 22" x 34") and six printed copies. The drawings shall be submitted on 22” x 34” sheets with an appropriate border.

The final submission shall be made within 14 days of acceptance by the Department. No work shall be performed on the retaining 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.

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 (if required) shall conform to the latest edition of the American Association of State Highway and Transportation Officials (AASHTO) Standard Specifications for Highway Bridges including the latest Interims published except as noted otherwise herein.

b. The wall design shall follow the dimensions of the wall envelope shown in the contract drawings.

For all proprietary walls, the top of the leveling pad or reinforced concrete toe footing shall be located at or below the bottom of the footing elevation shown on the contract drawings. If no footing elevation is shown, the minimum wall embedment shall be four feet as measured to the top of the leveling pad or toe footing.

If steps at the bottom of the wall are required, they shall be kept at or below the footing elevation shown on the contract drawings. Steps in addition to those shown on the contract drawings will be permitted at no additional cost to the Department.

c. 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.

d. The top of the wall shall be at the top of the wall elevations shown on the contract drawings. Where coping or barrier is utilized, the wall face panel shall extend up into the coping or barrier a minimum of two inches. The top of the face panels may be level or sloped to meet the top of the wall line noted.

e. Cast-in-place concrete will not be an acceptable replacement for areas noted by the wall envelope, except for minor grouting of pipe penetrations and leveling required for coping or traffic barrier.

f. The wall shall be designed for a minimum live load surcharge equal to two feet of soil at a unit weight of 125 pounds per cubic foot. If there are specific live load surcharges acting on the wall, they shall also be accounted for. The minimum equivalent fluid pressure used to design the wall shall be 33 pounds per cubic foot per linear foot of wall.

g. If stated on the contract drawings, the wall shall be designed for seismic forces according to the AASHTO Specifications.

h. If the wall is detailed with a concrete parapet, the top two courses of prefabricated modular walls units shall be designed to support a transverse railing load of 10 kips. The 10 kip load may be distributed over the length of the parapet section between joints, but not exceeding 20 feet. Computations that verify the stability of the top two courses of the modular units shall be submitted to the Engineer.

The detailing and reinforcement in the parapet section above the gutterline or finished grade, including any light standard attachments, shall be as shown on the contract drawings.

i. The wall shall be designed to accommodate all roadway drainage and drainage structures as shown on the contract drawings.

j. The maximum allowable bearing pressure of the soil shall be as shown on the contract drawings. The bearing pressure stated assumes a uniform pressure distribution. If additional soils information is required by the Contractor's designer, it must be obtained by the Contractor and will not be reimbursed by the Department.

k. Parapet and Moment slab Design:

- General requirement for parapet and moment slab design:

  The parapet and moment slab shall be designed in accordance the AASHTO Standard LRFD Bridge Design Specifications – 2007, including the latest interim specifications and errata, amended as follows:

  The parapet shall be designed and constructed of precast or cast-in-place concrete. The moment slab shall be designed and constructed of cast-in-place reinforced concrete.

  Above the finished grade, the parapet dimensions, concrete and reinforcement shall conform to the Department's retaining wall parapet details. Below the finished grade, the parapet shall be designed to resist the forces specified in Table A13.2-1 of the AASHTO LRFD Bridge Design Specifications for the parapet types indicated below:

Parapet Type	AASHTO LRFD Test Level
42" High Standard Parapet	TL-4
32" High Standard Parapet	TL-3
Sidewalk Parapet	TL-3

  The moment slab and its connection to the parapet shall be designed to resist, at a minimum, a transverse load equal to 133% of F_t. The length of the structural connection between parapet and moment slab assumed to resist transverse force F_t shall be the distance between parapet joints but not greater than 30 feet in any case. The length of the moment slab assumed to resist sliding and overturning may exceed

parapet joint spacing but shall be no greater than 30 feet in any case. The moments shall be summed about the front face of the wall facing. All resistance factors shall be taken as 1.0. The internal angle of friction for the soil shall be assumed to be 34 degrees unless otherwise shown on the contract plans.

Minimum concrete cover for reinforcing steel shall be 2 inches for top bars and 3 inches for bottom bars

- Precast Concrete Parapet Alternative:

  Precast parapet sections shall be no less than 8 feet in length.

  Parapets shall include details for shear transfer between adjacent units by either concrete shear keys or steel dowels as follows:

  - Shear keys when used shall be monolithically cast in each parapet section or joint location. Shear keys shall be located vertically within the top 32 inches of the parapet and shall be a minimum of 24 inches in length with a tapered width between 3 and 4 inches, and a minimum interlock depth of 2 inches.

  - Steel dowels when used shall be a minimum of 3 in number, smooth, 14 inches long minimum, and 1 inch diameter at each parapet interface. Steel dowels shall be located in each parapet joint and spaced approximately 1 foot apart vertically. Steel dowels shall be positioned to project equally into each adjoining parapet sections and shall be detailed to avoid impeding shrinkage and thermal movements. Bond breakers may be used with steel dowels for that purpose. Alternatively, pockets may be cast to receive steel dowels in adjacent parapet units. Pocket widths shall not exceed steel dowel diameters by more than ½ inch.

  Moment slabs for precast concrete parapets shall be structurally continuous throughout the overall wall length. Construction joints are permitted in moment slabs.

- Cast-in-Place Parapet Alternative:

  The minimum distance between parapet joints shall be 20 feet. Expansion and contraction joints shall be placed in accordance with Section 11.6 of the AASHTO LRFD Bridge Design specifications. Expansion and contraction joints shall be located a minimum of 10 feet from the nearest edge of a catch basin. Expansion and contraction joints shall be located a minimum of 6 feet from the centerline of light standard anchorages and junction boxes.

Preformed expansion joint filler, ½ inch thick, shall be installed at the expansion joints in the parapet.

Parapets shall include details for shear transfer between sections by way of concrete shear keys or steel dowels as follows:

- Shear keys when used shall be monolithically cast in each parapet section or joint location. Shear keys shall be located vertically within the top 32 inches of the parapet and shall be a minimum of 24 inches in length with a tapered width between 3 and 4 inches, and a minimum interlock depth of 2 inches.

- Steel dowels when used shall be a minimum of 3 in number, smooth, 14 inches long minimum, and 1 inch diameter at each parapet interface. Steel dowels shall be located in each parapet joint and spaced approximately 1 foot apart vertically. Steel dowels shall be positioned to project equally into each adjoining parapet sections and shall be detailed to avoid impeding shrinkage and thermal movements. A bond breaker shall be used with steel dowels for that purpose.

Moment slabs for cast-in-place parapets shall extend to the outside face of the retaining wall as shown on the plans. Moment slabs for cast-in-place parapets shall be structurally continuous throughout the overall wall length except at parapet contraction and expansion joint locations where longitudinal reinforcing within 2 feet of the wall face shall be discontinuous for the purpose of crack control. All remaining longitudinal reinforcing in moment slabs at parapet expansion and contraction joint locations shall be continuous. A vertical 1" deep chamfer on the exposed face of the moment should be provided in locations directly under parapet expansion and contraction joints. Construction joints are permitted in moment slabs for cast-in-place concrete.

6 - Design Requirements for Mechanically Stabilized Earth Walls: The design shall consider the internal stability of the wall mass as outlined below. The global stability of the structure, including slope stability, bearing capacity safety, and total and differential settlement is the responsibility of the Department.

a. Hydrostatic Forces: Unless specified otherwise, when a design high water surface is shown on the contract drawings at the face of the wall, the design stresses calculated from that elevation to the bottom of wall must include a three foot minimum differential head of saturated backfill. In addition, the buoyant weight of saturated soil shall be used in the calculation of pullout resistance.

b. Backfill: The friction angle of the pervious structure backfill used in the reinforced fill zone for the internal stability design of the wall shall be assumed to be 34 degrees unless shown otherwise on the contract drawings. The friction angle of the in-situ soils shall be assumed to be a maximum of 30 degrees unless otherwise shown on the Contract drawings.

c. Soil Reinforcement: The soil reinforcement shall be the same length from the bottom to the top of each wall section. The reinforcement length defining the width of the entire reinforced soil mass may vary with wall height along the length of wall. The minimum length of the soil reinforcement shall be seventy percent of the wall height, H, or eight feet, whichever is greater.

The soil reinforcement length shall be sufficient to satisfy the sliding, overturning and pullout factors of safety designated in AASHTO Specifications and the minimum lengths required for external stability as recommended by the Department. Calculation of stresses and pullout factors of safety shall be in accordance with the AASHTO Specifications for Highway Bridges.

Calculations for stresses and factors of safety shall be based on assumed conditions at the end of the design life. The design life shall be 75 years unless otherwise indicated on the contract drawings. The design of soil reinforcements shall account for section loss as outlined in the AASHTO Specifications. All soil reinforcement shall be hot dipped galvanized.

7 - Design Requirements for Prefabricated Modular Walls: The general design of the wall shall be according to the AASHTO Specifications. The design shall consider the stability at each level of modules. The global stability of the structure, including slope stability, bearing capacity safety, and total and differential settlement is the responsibility of the Department.

a. Hydrostatic Forces: Unless specified otherwise, when a design high water surface is shown on the contract drawings at the face of the wall, the design stresses calculated from that elevation to the bottom of wall must include a three foot minimum differential head of saturated backfill. In addition, the buoyant weight of saturated soil shall be used in the calculation of pullout resistance.

b. Backfill: The friction angle of the pervious structure backfill shall be assumed to be 34 degrees if sufficient amounts of pervious backfill are used. The friction angle of the in-situ soils shall be assumed to be a maximum of 30 degrees unless otherwise shown on the Contract drawings.

c. Infill: The maximum assumed unit weight of infill material used for determining the factor of safety for overturning shall be 100 pounds per cubic foot. If Doublewal modules are to be filled with crushed stone, the maximum assumed unit weight of the infill shall be 80 pounds per cubic foot.

d. Safety Factors: The minimum factors of safety shall be as specified in the AASHTO Specifications amended as follows. The factor of safety for T-Wall shall be 1.5 for

pullout of the concrete stem. Shear keys are not to be included in these computations. Only resisting forces developed beyond the theoretical failure plane may be used in these computations.

Materials:

1 - Cast-in Place Concrete Walls: The materials furnished and used in the work shall be those prescribed within the Standard Specifications for Roads, Bridges and Incidental Construction, including supplemental specifications and applicable special provisions.

2 - Prefabricated Modular and Mechanically Stabilized Earth Walls: 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.

a. Concrete: The concrete shall conform to the requirements of Section M.03 and as follows:

Concrete for all precast 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. The concrete utilized shall be a mix which will attain a minimum 28-day strength (f'_c) of 4,500 pounds per square inch. The mix design shall be furnished to the Engineer.

Concrete for footings or unreinforced leveling pads shall be conform to the requirements of Class "A" Concrete. Class "F" Concrete shall be used for cast-in-place concrete copings.

Concrete Finish: Unless otherwise indicated on the contract drawings or elsewhere in the specifications, the concrete surface for the exposed face shall have an ordinary steel form finish. All non-exposed surfaces shall have a unformed finish which shall be free of open pockets of aggregate and surface distortions in excess of 1/4 inch.

Acceptance Criteria for Precast Components: Precast components shall be accepted for use in wall construction provided the concrete strength meets or exceeds the minimum compressive strength requirement, the soil reinforcement connection devices and the panel or module dimensions are within the manufacture's allowable tolerances and any chipping, cracks, honeycomb or other defects are within acceptable standards for precast concrete or repaired as determined by the Engineer.

It is recognized that certain cracks and surface defects are not detrimental to the structural integrity of the precast components if properly repaired. The Engineer shall determine the need for and proper method of such repair. All repairs shall be approved by the Engineer prior to acceptance of the precast component for use in wall construction.

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.

b. Reinforcing Steel: Reinforcing steel shall conform to the requirements of ASTM A615, Grade 60.

c. Attachment Devices for Prefabricated Modular Walls: All 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.

d. Soil Reinforcing and Attachment Devices for MSE Walls:

Soil Reinforcement: All soil reinforcement and structural connectors shall be hot dipped galvanized according to the requirements of ASTM A123 (AASHTO M-111). The minimum thickness of the galvanizing shall be based on the service life requirements as previously stated.

Steel strip reinforcement shall be hot rolled to the required shape and dimensions. The steel shall conform to AASHTO M223 (ASTM A572) Grade 65 unless otherwise specified.

Welded wire fabric reinforcement shall be shop fabricated from cold-drawn wire of the sizes and spacings shown on the plans. The wire shall conform to the requirements of ASTM A82, fabricated fabric shall conform to the requirements of ASTM A185.

Connection Hardware: Connection hardware shall conform to the details on the plans and the requirements in the special provisions or the plans. All fasteners shall be galvanized according to the requirements of ASTM A-153 (AASHTO M-232). The minimum thickness of the galvanizing shall be based on the service life requirements as previously stated.

e. Joint Materials: All horizontal and vertical joints between panels shall be covered by a geotextile (separation-high survivability) conforming to the requirements of Article M.08.02-26. The minimum width and lap shall be twelve inches. Details of installation including connection of the geotextile to coping shall be provided.

f. Backfill: Backfill shall be pervious structure backfill conforming to the requirements of Articles M.02.05 and M.02.06.

In addition, the backfill for Mechanically Stabilized Earth Walls shall conform to all of the following requirements:

Electrochemical Requirements: The backfill material shall conform to the following electrochemical requirements:

PROPERTY	REQUIREMENT	TEST METHODS
Resistivity at 100% saturation	Minimum 3000 ohm-cm	ASTM G-57-78 AASHTO T-288-91I
pH	Acceptable Range 5-10	ASTM G-51-77 AASHTO T-289-91I
Chlorides	Maximum 100 ppm	ASTM D-512-88 AASHTO T-291-91I
Sulfates	Maximum 200 ppm	ASTM D-516-88 AASHTO T-290-91I

g. Smooth Steel dowels : Steel dowels used in parapets joints shall conform to the requirements of ASTM A36 and shall be galvanized in conformance with the requirements of ASTM A153.

Construction Methods:

1 - Cast-in-Place Concrete Walls: All construction methods for cast-in-place retaining walls shall be in accordance with the detailed requirements prescribed for the construction the appropriate items as specified in the Standard Specifications for Roads, Bridges, and Incidental Construction.

2 - Prefabricated Modular Walls: All construction methods for items not listed below shall be in accordance with the detailed requirements prescribed for the construction of the appropriate items as specified in the Standard Specifications for Roads, Bridges, and Incidental Construction.

a. Special Surface Treatment: If a special surface finish is proposed for the wall, before proceeding with production, a model modular unit shall be provided by the fabricator for the Engineer's approval to establish a guide and standard for the type of finish to be furnished on the exposed face. This model shall be kept at the fabricator's plant to be used for comparison purposes during production. Formed surfaces other than the exposed face shall not require a special finish.

b. Inspection and Rejection: The quality of materials, the process of manufacture, and the finished units shall be subject to inspection by the Engineer prior to shipment.

Modular units which have imperfect molding, honeycomb, open texture concrete, or broken corners shall be repaired to the satisfaction of the Engineer or shall be rejected. Insufficient compressive strength shall also be cause for rejection.

Modular units with special surface treatments shall be rejected if there are variations in the exposed face that deviate from the approved model as to color or texture in accordance with precast concrete industry standards.

c. Marking: The date of manufacture shall be clearly scribed on an inside surface of each modular unit.

d. 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. If there is no more than one wall on a project then this criteria will apply to construction of the initial wall only. The representative shall also be available on as needed basis, as requested by the Engineer.

e. Installation: The modular units shall be installed in accordance with manufacturer's recommendations. Special care shall be taken in setting the bottom course of units to true line and grade.

The vertical joint opening on the front face of the wall shall not exceed 3/4 inch. Vertical tolerances and horizontal alignment tolerances measured from the face line shown on the

contract drawings shall not exceed 3/4 inch when measured along an eight 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 contract drawings. A strip of geotextile shall be installed at all vertical joints.

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.

f. Backfilling:

Doublewal:

Infill for modular units shall be placed, one course at a time, in lifts not exceeding two feet in thickness. The dry density of each lift of pervious structure backfill placed inside the modular units, after compaction, shall not be less than 90 percent of the dry density for that material when tested in accordance with AASHTO T-180, Method D. Each lift shall be thoroughly compacted with a vibratory tamping device.

Placement of the pervious structure backfill behind the wall shall closely follow erection of successive courses of modular units. At no time shall the difference in backfill elevation between the interior and exterior of the wall exceed six feet.

The units may be backfilled with crushed stone, provided that the design of the wall was based on a density of 80 pounds per cubic foot.

All pervious structure backfill placed outside of the modular units shall be placed in accordance with the requirements of Article 2.16.03.

T-Wall:

Backfill placement shall closely follow erection of each course of modules. Backfill shall be placed in such a manner as to avoid any damage or disturbance to the wall materials or misalignment of the modules. 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 wall envelope 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 3/4 inch 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 ten inches. The Contractor shall decrease this lift thickness, if necessary, to obtain the specified density.

Compaction within three feet of the face of the modules 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 or damage to the module 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 - Mechanically Stabilized Earth Walls: All construction methods for items not listed below shall be in accordance with the detailed requirements prescribed for the construction of the appropriate items as specified in the Standard Specifications for Roads, Bridges, and Incidental Construction.

a. Special Surface Treatment: If a special surface finish is proposed for the wall, before proceeding with production, a model face panel shall be provided by the fabricator for the Engineer's approval to establish a guide and standard for the type of finish to be furnished on the exposed face. This model shall be kept at the fabricator's plant to be used for comparison purposes during production. Formed surfaces other than the exposed face shall not require a special finish.

b. Foundation Preparation: 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. Prior to wall construction, the foundation, if not in rock, shall be compacted. Any foundation soils found to be unsuitable shall be removed and replaced with granular fill.

At each panel foundation level, an un-reinforced concrete leveling pad shall be provided as shown on the plans. The leveling pad shall be cast to the design elevations as shown on the plans.

c. 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. If there is no more than one wall on a project then this criteria will apply to construction of the initial wall only. The representative shall also be available on as needed basis, as requested by the Engineer.

d. Wall Erection: Panels shall be placed in successive horizontal lifts in the sequence shown on the plans as backfill placement proceeds. As backfill material is placed behind the panels, the panels shall be maintained in a vertical position. Vertical tolerances (plumbness) and horizontal alignment tolerances shall not exceed 3/4 inch in eight feet. The allowable offset in any panel joint shall be 3/4 inch. The overall vertical tolerance of the wall (plumbness from top to bottom) shall not exceed 1/2 inch per eight feet, or one inch total, which ever is the lesser, measured from the face line shown on the plans.

e. Placement of Reinforcements: Bending of reinforcements in the horizontal plane that results in a permanent deformation in their alignment shall not be allowed. Gradual bending in the vertical direction that does not result in permanent deformations is allowable.

Connection of reinforcements to piles or bending of reinforcements around piles shall not be allowed. A structural connection (yoke) from the wall panel to the reinforcement shall be used whenever it is necessary to avoid cutting or excessive skewing of reinforcements due to pile or utility conflicts.

Soil reinforcements shall be placed normal to the face of the wall, unless otherwise shown on the plans.

f. Backfill Placement: 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 3/4 inch 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 ten 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.

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 "RETAINING WALL", complete in place, which price shall include all work shown within the pay limits shown on the contract drawings for the retaining wall including but not limited to the following:

1. Design and construction of the proprietary retaining wall.

2. Excavation required for the construction of the retaining wall.

3. Design and construction of temporary earth retaining systems to retain the existing facilities during construction.

4. The furnishing, placing and compacting of pervious structure backfill within the payment lines.

5. The furnishing and placing of backfill drainage systems for the wall.

6. The furnishing and placing of rigid metal conduit, junction boxes, light standard anchorages, and other electrical appurtenances located within the wall proper.

7. Services of the On-Site Representative.

8. Any other work and materials shown on the plans for the retaining wall.

The price shall also include all materials, equipment, tools and labor incidental thereto.

If bedrock or boulders in excess of one cubic yard are encountered in the excavation, it shall be paid for under the item "Structure Excavation - Rock".

ITEM #0602903A - DRILLING HOLES

Description:

Work under this item shall consist of drilling holes in concrete at the locations shown on the plans for Bridge 01746, in accordance with the plans, and as directed by the Engineer.

Construction Methods:

Holes for the dowels shall be located as shown on the plans. The holes shall clear the existing reinforcement and provide the minimum cover as shown on the plans. A pachometer shall be used to locate existing reinforcing steel. If existing reinforcing is encountered during the drilling operation, the holes shall be relocated, and the uncompleted holes shall be filled with chemical anchoring material and finished smooth and flush with the adjacent surface.

The depth and diameter of each hole shall be as shown on the plans.

Hole drilling methods shall not cause spalling, cracking, or other damage to the existing concrete. Those areas damaged by the Contractor shall be repaired by him in a manner suitable to the Engineer and at no expense to the State.

Prior to placing the galvanized threaded bars in the holes, the holes shall be cleaned of all dirt, moisture, concrete dust and other foreign material.

The Contractor, as directed by the Engineer, shall take adequate precautions to prevent any materials from dropping to the area below, which may result in damage to any existing construction or to adjoining property. Should any damage occur to the structure as a result of the Contractor's operations, the Contractor shall make repairs at his own expense. The repair work shall be approved in advance and shall be of a quality acceptable to the Engineer.

Methods of Measurements:

This work will be measured for payment by the actual number of drilled holes for galvanized threaded bars, completed and accepted.

Basis of Payment:

This work will be paid for at the contract unit price per each for “Drilling Holes,” which price shall include drilling and preparing holes. It shall also include all materials, except galvanized threaded bars, and all equipment, tools and labor incidental thereto.

Pay Item	Pay Unit
Drilling Holes	ea.

ITEM #0602910A - DRILLING HOLES AND GROUTING DOWELS

Description: Work under this item shall consist of drilling holes in concrete and chemically anchoring dowels at the locations shown on the plans, in accordance with the plans, the manufacturer's recommendations, and as directed by the Engineer.

For the purposes of this specification, a dowel may be a reinforcing bar, anchor bolt, or threaded rod.

Materials: Materials, Certified Test Reports, and Materials Certificates for chemical anchors shall conform to Article M.03.07.

Construction Methods: Before fabricating any materials, the Contractor shall submit manufacturer's specifications and installation for the chemical anchoring material to the Engineer for review in accordance with Article 1.05.02.

Holes for the dowels shall be located as shown on the plans. The holes shall clear the existing reinforcement and provide the minimum cover as shown on the plans. A pachometer shall be used to locate existing reinforcing steel. If existing reinforcing is encountered during the drilling operation, the holes shall be relocated, and the uncompleted holes shall be filled with the chemical anchoring material and finished smooth and flush with the adjacent surface.

The depth and diameter of each hole shall be as shown on the plans. If the diameter of a hole is not shown, the diameter of the hole shall conform to the manufacturer's recommendations for the diameter of the dowel being anchored. If the depth and diameter of a hole are not shown, the hole shall conform to the manufacturer's recommendations for the diameter of the dowel being anchored such that the grouted dowels will be able to develop in tension 100 percent of its specified yield strength.

Hole drilling methods shall not cause spalling, cracking, or other damage to the existing concrete. Those areas damaged by the Contractor shall be repaired by him in a manner suitable to the Engineer and at no expense to the State.

Prior to placing the chemical anchoring material in the holes, the holes shall be cleaned of all dirt, moisture, concrete dust and other foreign material. The dowel and the chemical anchoring material shall be installed in the holes in accordance with the chemical anchoring material manufacturer's recommendations.

The Contractor, as directed by the Engineer, shall take adequate precautions to prevent any materials from dropping to the area below, which may result in damage to any existing construction or to adjoining property. Should any damage occur to the structure as a result of the Contractor's operations, the Contractor shall make repairs at his own expense. The repair work shall be approved in advance and shall be of a quality acceptable to the Engineer.

Methods of Measurements: This work will be measured for payment by the actual number of dowels or anchor rods grouted into drill holes each, completed and accepted.

Basis of Payment: This work will be paid for at the contract unit price per each for "Drilling Holes and Grouting Dowels," which price shall include drilling and preparing holes, and installing the chemical anchoring material in the hole. It shall also include all materials, except dowels, and all equipment, tools and labor incidental thereto.

The costs of dowels are not included under this item and shall be paid for separately under the applicable items.

Pay Item	Pay Unit
Drilling Holes and Grouting Dowels	ea.

ITEM #0603061A - STRUCTURAL STEEL (SITE NO. 1)
ITEM #0603062A - STRUCTURAL STEEL (SITE NO. 2)
ITEM #0603063A - STRUCTURAL STEEL (SITE NO. 3)

Section 6.03 *is supplemented and amended as follows:*

6.03.01—Description: *After the third paragraph, add the following:*
" This special provision provides additional requirements for the surface preparation, shop painting, and field touch-up painting of new structural steel."

6.03.02—Materials: *After the second paragraph, add the following:*
" Painting materials for this work shall conform to the following:

- The Contractor shall select a three-coat system from the qualified product List A or B, issued by the Northeast Protective Coating Committee (NEPCOAT). The approved NEPCOAT listings may be found at the NEPCOAT website at http://www.nepcoat.org/
- The system chosen shall have a prime coat that has achieved a Class 'B' slip coefficient for faying surfaces. Top coat paint color shall be as noted on the plans.
- Both the shop painted and field touchup applied coating systems shall be of the same three-coat system. A compatible organic zinc rich primer shall be used for any necessary field touch up.
- The same coating material manufacturer shall furnish all materials for the complete coating system. Intermixing of materials within and between coating systems will not be permitted.
- Thinning of paint shall conform to the manufacturer's written instructions.

All components of the coating system and the mixed paint shall comply with the Emission Standards for Volatile Organic Compounds (VOC) Content Limits and Emission Standards stated in the Connecticut Department of Energy and Environmental Protection's Administration Regulation for the Abatement of Air Pollution, Sections 22a-174-41 through 41a and 22a-174-20(s), respectively."

6.03.03—Construction Methods: *Revise* Subarticle 4(f) "Field Erection - High Strength Bolted Connections" *as follows:*

Replace the first sentence of the fourth paragraph "Surface Conditions: At the time of assembly … other foreign material." *with the following:*
" Connection faying surfaces within portions of structural steel designated to be painted shall receive a single coat of primer in accordance with requirements stipulated elsewhere in this special provision."

Delete the fifth paragraph of Subarticle 4(f) *and the three bulleted paragraphs after it:* "Paint is permitted on … wire brushing is not permitted."

After the last paragraph of Article 6.03.03, *before* Tables A through C*, add the following:*

" The painting application shall be done in compliance with the following requirements:

Qualifications of Shop Painting Firm: All shop painting of structural steel must be performed by and in an enclosed shop that is certified by the SSPC Painting Contractor Certification Program QP-3, entitled "Standard Procedure for Evaluating Qualifications of Shop Painting Contractors" in the enclosed shop category or by a shop that holds an AISC Quality Certificate with a "Sophisticated Paint Endorsement" in the enclosed shop category. The firm shall be fully certified, including endorsements, for the duration of the surface preparation and coating application. A copy of the subject certification shall be provided to the Engineer prior to commencing any surface preparation or coating application.

The shop painting firm is required to have at least one (1) **Coating Application Specialist (CAS) (SSPC ACS/NACE No. 13)**-certified (Level II-Interim Status-Minimal) craft-worker. CAS-certified (Level II-Interim Status-Minimal) craft-worker(s) are required for all crews/craft-workers up to four (4) crew members. For each crew larger than four (4), an additional CAS-certified (Level II-Interim Status-Minimal) craft-worker shall be present on each painting/blasting crew during blast cleaning and spray application (Atmospheric and Immersion Service) operations. A crew-member is a person who is on the job performing hand-held nozzle blast cleaning and/or spray application of protective coatings on a steel structure. The certification(s) must be kept current for the duration of the Project work.

The complete coating system shall be applied in an enclosed shop except for field touch-up painting which shall be applied after all bolts are fully tensioned and deck formwork removed. The enclosed shop shall be a permanent facility with outside walls to grade and a roof where surface preparation and coating activities are normally conducted in an environment not subject to outdoor weather conditions or blowing dust.

Quality Control Inspection of Shop Painting: The firm performing shop painting of the structural steel shall have a written quality control (QC) program. A copy of the QC program and record keeping procedures shall be provided to the Engineer prior to commencing any surface preparation or coating application. The program shall contain, but not be limited to, the following:

1. Qualifications of QC staff.
2. Authority of QC staff. QC staff must have the authority to stop non-conforming work.
3. Procedure for QC staff to advise operation supervisor, in writing, of non-conforming work.
4. Sample copy of QC inspection reports that will document compliance with specifications.
5. Procedure for calibrating inspection equipment and recording calibration.
6. Procedure for repairing defective coating applications.

The Contractor or Shop shall provide at least one Quality Control Inspector for the duration of the shop application to provide Quality Control. The QC Inspector must be a National Association of Corrosion Engineers (NACE) Certified Coating Inspector Level 3 with Peer Review. The QC

Inspector shall verbally inform the Engineer on a daily basis, of the progress and any corrective actions performed on the coating work. The QC Inspector shall be present during all cleaning and coating operations.

The Contractor or Shop shall be responsible for purchasing and providing the latest version of the NACE Coating Inspector Log Book(s) and all necessary inspection tools. The Contractor's QC Inspector shall stamp the front page of each inspector's log book used during painting operations. The stamped book(s) shall indicate the inspector's NACE certification number, certification expiration date and shall also be signed. All daily coating activity shall be recorded in the Log Book. Copies of the log entries shall be provided on a daily basis to the Department's Quality Assurance (QA) shop representative. Upon completion of the coating, the log book(s) shall then be furnished to the Department's QA shop representative.

Technical Advisor: The Contractor or Shop shall obtain the services of a technical advisor who is employed by the coating manufacturer to assist the Engineer and shop painting firm during this work. The technical advisor shall be a qualified representative and shall be made available at the Shop upon request by the QC Inspector or the Engineer.

Surface Preparation: The following steps shall be performed prior to abrasive blast cleaning of steel members:

1. All corners and edges shall be rounded to a 1/16-inch radius or chamfered to a 1/16-inch chamfer.
2. All fins, slivers and tears shall be removed and ground smooth.
3. All rough surfaces shall be ground smooth.
4. Flame cut edges shall be ground over their entire surface such that any hardened surface layer is removed, and subsequent abrasive blast cleaning produces the specified surface profile depth.

Immediately before abrasive blast cleaning all steel members shall be solvent cleaned in accordance with SSPC-SP1 - "Solvent Cleaning."

Abrasive blast cleaning shall be performed in accordance with SSPC-SP 10 - "Near White Blast Cleaning" using a production line shot and grit blast machine or by air blast. The abrasive working mix shall be maintained such that the final **surface profile** is within the range described herein.

The QC Inspector shall test the abrasive for oil, grease or dirt contamination in accordance with the requirements of ASTM D7393 and document the test results. Contaminated abrasive shall not be used to blast clean steel surfaces. The blast machine shall be cleared of all contaminated abrasive and then solvent cleaned thoroughly in accordance with SSPC-SP 1 "Solvent Cleaning." New uncontaminated abrasive shall be added. Abrasive shall be tested for contaminants in accordance with the requirements of ASTM D7393 prior to the start of blast cleaning operations and at least every four hours during the blast cleaning operations.

All compressed air sources shall have properly sized and designed oil and moisture separators, attached and functional, to allow air at the nozzle, either for blast cleaning, blow-off, painting or

breathing, to be oil-free, and moisture-free. The equipment shall have sufficient pressure to accomplish the associated work efficiently and effectively.

The QC Inspector shall perform the blotter test and document the results at the start of each blasting shift and at least every four hours during the blasting operation to ensure that the compressed air is free of oil and moisture. The blotter test shall be performed in accordance with the procedure outlined in ASTM D4285. For contaminated air sources, the oil and moisture separators shall be drained and the air retested.

No surface preparation or coating shall be done when the relative humidity is at or above 80 percent or when the surface temperature of the steel is less than five (5) degrees Fahrenheit above the dewpoint temperature as determined by a surface thermometer and an electric or sling psychrometer.

Surface Profile: The steel surface profile shall be 1 to 3 mils. Each girder or beam shall have the surface profile measured at a minimum of three locations in accordance with the test requirements of ASTM D4417, Method C. Smaller pieces such as diaphragms shall have the surface profile measured at a minimum of three locations on one piece at the beginning of abrasive blast operations and at least every four hours and at the end of abrasive blast cleaning operations. This measurement shall be performed with both coarse (0.8-2.0 mils) and extra coarse (1.5-4.5 mils) replica tape. During this measurement, special attention shall be given to areas that may have been shielded from the blast wheels, such as the corners of stiffeners and connection plates. The impressed tapes shall be filed in the NACE Coating Inspector's Log Book.

Application Methods: The coating system shall be applied by spray equipment of a type and size capable of applying each coat within the required thickness range. The applicator shall strictly adhere to the manufacturer's written recommendations for application methods, cure times, temperature and humidity restrictions and recoat times for each individual coat of the specified system. However, in no case shall coatings be applied in ambient conditions that exceed the relative humidity and dewpoint temperature control limits specified herein. Brushes shall be used in areas where spray application will not achieve acceptable results. Brushing technique shall be performed in a manner that will provide a uniform, blended finish.

Conventional spray equipment with mechanical agitators shall be used for prime coat application.

All storage, mixing, thinning, application and curing techniques and methods shall be accomplished in strict accordance with the printed material data sheets and application instructions published by the respective coating material manufacturer.

Surfaces shall be painted with the specified prime coat material before the end of the same work shift that they were blast cleaned and before any visible rust back occurs. Applied coatings shall not have runs, sags, holidays, pinholes or discontinuities.

The dry film thickness shall be within the range specified in the manufacturer's printed literature for the specified coating system. Dry film thickness shall be measured in accordance with SSPC-PA 2. The prime, intermediate and top coats shall be of contrasting colors as determined by the Engineer.

There shall be no color variation in the topcoat as determined by comparison with Federal Standard 595.

Areas Requiring Special Treatment: All steel surfaces shall receive the three-coat shop applied system as specified except the following particular area types which shall be treated as follows:

1. Faying surfaces of connections shall receive a single application of primer. The dry film thickness shall be no greater than the thickness tested on the coating manufacturer's Certified Test Report for slip coefficient.
2. All steel surfaces within four (4) inches of field welds shall receive a single mist coating of primer at 0.5 - 1.5 mils dry film thickness.
3. Top surfaces of top flanges that will be in contact with concrete shall receive a single mist coating of primer at 0.5 - 1.5 mils dry film thickness.
4. Edges and shop welds shall be locally hand-striped with a brush in the longitudinal direction with an additional coat of an appropriate zinc-rich primer prior to application of the full intermediate coat. The application of the striping materials shall be in accordance with the coatings manufacturer's written instructions. The striping material shall be a contrasting color to distinguish it from the primer and intermediate coats.
5. The interior surfaces of box girders, including bracing, shall be prepared in accordance with these specifications then coated with the first two coats of the three-coat system. The intermediate coat in these areas shall be white and match Federal Standard 595 Color Number 27925.

Adhesion: Adhesion strength of the fully coated assemblies shall be the more restrictive of the manufacturer's specified adhesion strength or at least 600 psi for systems with organic zinc primers and at least 250 psi for systems with inorganic zinc rich primers measured as per ASTM D4541 using apparatus under Annex A4. All adhesion test locations shall be recoated in accordance with this specification at no additional cost. The QC Inspector shall perform adhesion strength tests every 500 sf and shall document the adhesion strength test results.

If adhesion test results are less than the specified value, but equal to or greater than 80% of the specified value, four (4) additional adhesion tests shall be taken within the 500 sf area of the failed test. If any of the additional adhesion tests are less than the specified value, the coating shall be removed from the entire piece and re-applied at the Contractor's expense. If any adhesion tests are less than 80% of the specified value, the entire coating system shall be removed from the piece and re-applied at the Contractor's expense.

Smaller pieces such as diaphragms shall be analyzed in lots that have an overall coated surface area of approximately 500 sf.

Protection of Coated Structural Steel: All fully coated and cured assemblies shall be protected from handling and shipping damage with the prudent use of padded slings, dunnage, separators and tie downs. Loading procedures and sequences shall be designed to protect all coated surfaces. Erection marks for field identification of members and weight marks shall be affixed in such a manner as to facilitate removal upon final assembly without damage to the coating system.

Field Touch-Up Painting of Shop Applied Coating: Field touch-up painting shall be undertaken by the Contractor for the purpose of completing coating applications of masked-off areas at splices, connections, and for the repair of coated surfaces damaged during shipment or construction, as directed by the Engineer. The Aesthetics of any field painting is very important. Every effort must be made to perform any field painting in a professional manner that does not affect the appearance or aesthetic value of the structural steel in any way. Significant color variations or texture changes between the shop painting and field painting will not be allowed. The Contractor will be required to perform any additional field painting work required to provide consistent color and texture throughout the structural steel. This is especially true for all Fascia surfaces and areas exposed to public view. The Engineer will be the sole judge on color variations and textures variations of the field painting.

The Painting Contractor shall submit for approval by the Engineer a complete coating application procedure for all touch-up painting and corrective work. .

The field applied coating for touch-up painting shall be the same system used in the shop applied application. The intermediate and topcoat material for field touch-up painting shall be from the same lot and batch used in the shop provided its shelf life has not expired. If the shelf life has expired, the same material of the same color from a different lot and batch shall be used.

Field application of coatings shall be in accordance with the manufacturer's written application guidelines and these specifications. All areas cleaned to bare metal must be coated with zinc-rich primer before any visible rusting occurs.

After all concrete is placed and the forms are removed, all rust, scale, dirt, grease, concrete splatter and other foreign material shall be completely removed from all painted surfaces. All surfaces to be field painted shall also be cleaned by solvent cleaning in accordance with SSPC-SP 1, hand tool cleaning SSPC-SP 2, and power tool cleaning SSPC-SP 3 and SSPC-SP 11. Areas cleaned to SSPC-SP 11 must have a 1-3 mil profile and must be primed prior to rusting. All debris generated from cleaning operations must be contained and properly disposed of by the Contractor.

Bolts, nuts, washers and surrounding areas shall receive brush applications of intermediate and topcoat after final tensioning. Careful attention shall be given to bolted connections to insure that all bolts, nuts and washers are fully coated and that no gaps are left unfilled and uncoated.

Damage to the coating system that extends to the steel surface (such as scratches, gouges or nicks), shall have the entire three-coat system locally reapplied after power tool cleaning to bare metal in **accordance with SSPC-SP 11. The coating system adjacent to the damage shall be feathered back to increase** the surface area for touch up painting. The area cleaned to SSPC-SP 11 shall be primed with a zinc-rich primer before rusting occurs.

Damage to the coating system that extends back only to the prime or intermediate coat, shall only have the topcoat applied. Application of the touch-up materials in these damaged areas shall be performed by brush only.

During any field painting the Contractor shall protect property, pedestrians, vehicular and other traffic upon, underneath, or in the vicinity of the bridge, and also all portions of the bridge superstructure and substructure against damage or disfigurement from errant coating materials.

Tarps shall be used to collect all surface preparation debris. The Contractor shall be responsible for disposing of all removed materials, including tarps.

Contractor – Subcontractor Qualifications: Contractors and subcontractors doing field touchup painting work are required to be certified by the SSPC Painting Contractor Certification Program (PCCP) to QP-1, entitled "Standard Procedure for Evaluating Qualifications of Painting Contractors (Field Application to Complex Structures)" at the time of field touchup coating application.

Contractors and subcontractors are required to have at least one (1) **Coating Application Specialist (CAS) (SSPC ACS/NACE No. 13)**-certified (Level II-Interim Status-Minimal) craft-worker. CAS-certified (Level II-Interim Status-Minimal) craft-worker(s) are required for all crews/craft-workers up to four (4) crew members. For each crew larger than four (4), an additional CAS-certified (Level II-Interim Status-Minimal) craft-worker shall be present on each painting/blasting crew during blast cleaning and spray application (Atmospheric and Immersion Service) operations. A crew member is a person who is on the job performing hand-held nozzle blast cleaning and/or spray application of protective coatings on a steel structure. The certification(s) must be full, not interim, and must be kept current for the duration of the Project work. If a Contractor's, subcontractor's or any craft-worker's certification expires, the firm will not be allowed to do any work on this item until the certification is reissued.

Requests for extension of time for any delay to the completion of the Project due to an inactive certification will not be considered and liquidated damages will apply. At the option of the Engineer, if such a delay will adversely impact the successful and timely completion of the Project, the Department may require the Contractor to engage another SSPC certified contractor to do the painting work at the prime contractor's expense.

Quality Control Inspection of Field Touchup Painting: The Contractor performing field touchup painting of the structural steel shall have a written quality control (QC) program. A copy of the QC program and record keeping procedures shall be provided to the Engineer prior to commencing any surface preparation or coating application. The program shall contain, but not be limited to, the following:

1. Qualifications of QC staff.
2. Authority of QC staff. QC staff must have the authority to stop non-conforming work.
3. Procedure for QC staff to advise operation supervisor, in writing, of non-conforming work.
4. Sample copy of QC inspection reports that will document compliance with specifications.
5. Procedure for calibrating inspection equipment and recording calibration.
6. Procedure for repairing defective coating applications.

The Contractor shall provide at least one (1) Coating Inspector who is a National Association of Corrosion Engineers (NACE) Certified Coating Inspector Level 3 with Peer Review for the duration of the field application to provide Quality Control. The QC Inspector shall verbally inform the Engineer on a daily basis, of the progress and any corrective actions performed on the coating work. The QC Inspector shall be present during all cleaning and coating operations.

The Contractor shall be responsible for purchasing and providing the latest version of the NACE Coating Inspector Log Book(s) and all necessary inspection tools. The Contractor's QC Inspector shall stamp the front page of each inspector's log book used during painting operations. The stamped book(s) shall indicate the inspector's NACE certification number, certification expiration date and shall also be signed. All daily coating activity shall be recorded in the Log Book. Copies of the log entries shall be provided on a daily basis to the Department's Quality Assurance (QA) field representative. Upon completion of the coating, the log book(s) shall then be furnished to the Department's QA field representative.

General: The word "PAINTED" followed by the month and year the painting of the structure is completed along with the ConnDOT Project Number and the manufacturer's abbreviations for each of the three coats, shall be stenciled on the inside of a fascia girder at mid-depth of the girder in three (3) inch high block letters located near the abutment, so as to be clearly visible from the ground below. Paint for stenciling information shall be of a contrasting color and be compatible with the topcoat."

6.03.05—Basis of Payment: *Add the following at the end of the second paragraph:*

"Payment for either method for new structural steel, complete in place, shall also include shop painting, all field touch-up painting and corrective or repair field painting, QC Inspector(s), QC Log Book(s) and testing equipment, technical advisor, "Painted" stencil, equipment, tools and labor incidental thereto."

ITEM #0603779A - TEMPORARY SUPPORT SYSTEM NO. 1

Description:

Work under this item shall consist of designing, fabricating, erecting, and removing a temporary means of support for the existing concrete pier during stage 1 construction for Bridge 01745. The Contractor shall determine the loads applied to the temporary support assembly and shall provide a means to support such forces. Temporary means of support shall be provided as shown on the plans and accordance with these specifications or as otherwise approved by the Engineer.

Temporary traffic barrier to protect the temporary support assembly, beyond what is included in the contract and indicated on the maintenance and protection of traffic plans, shall be considered incidental to the work and included in this item.

Excavation, backfilling and restoration of excavated areas necessary for the completion of this item is incidental to the work and is included in this item.

Support of excavation necessary for the completion of this item is incidental to the work and is included in this item.

Materials:

Any combination of materials may be used, provided that they are properly designed for the purpose intended. Proprietary systems shall conform to the manufacturer's specifications and project specifications. The parts list shall be furnished for the proprietary system and the Contractor shall provide the material certificates for the parts.

The materials used shall be of satisfactory quality, and capable of safely carrying the anticipated loads. All materials shall be approved by the Engineer prior to use.

Construction Methods:

Temporary support assembly shall be designed, constructed, and maintained as necessary for proper performance of the work. A periodic inspection of all temporary support assembly components shall be completed by the Contractor as directed by the Engineer. The Contractor shall correct any deficiencies noted or otherwise present as directed by the Engineer.

Unless otherwise ordered by the Engineer, all parts of the temporary support assembly shall be removed upon completion of the work.

The Contractor shall submit working drawings, design computations and catalog cuts for review in accordance with Article 1.05.02. Design computations shall be performed by a Professional Engineer licensed in the State of Connecticut. The Professional Engineer shall also be available for consultation interpreting their drawings and calculations, and in the resolution of any problem that may occur during the performance of the work.

The Contractor shall not commence with any modification or removal of any portions of the existing pier until the temporary support assembly working drawing submission has been approved by the Engineer.

The design of the temporary support assembly and its components shall conform to the AASHTO LRFD Bridge Design Specifications (8th Edition) with latest interim revisions, the CTDOT Bridge Design Manual, CTDOT Bridge Load Rating Manual, CTDOT Standard Specifications Form 817 and supplemental specifications.

The forces in existing bridge components that occur during use of the temporary support assembly shall not exceed those allowed by the AASHTO Manual for Bridge Evaluation for the existing structural elements.

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

1. Material designations and material lists.
2. Allowable loads or nominal capacities for all structural members and components.
3. Soil or pavement bearing capacities, if applicable.
4. Anticipated design loads and stresses on structural members and components.
5. References for all design equations.

The working drawings shall include, but not be limited to, the following:

1. General Notes.
2. Details of framing assembly such as bents, towers, distribution beams, foundations, etc.
3. A Plan showing the layout of the bracing and supporting members. All connections shall be detailed.
4. Details of proposed modifications to the existing structure.

The furnishing of calculations and working drawings shall not serve to relieve the Contractor of any responsibility for the safety of the work or the successful completion of the work.

The Contractor shall field verify all working drawing dimensions before fabricating any materials.

When no longer required, the Contractor shall promptly remove and dispose of the temporary support assembly. Excavated areas shall be restored to their original or proposed condition as applicable and to the satisfaction of the Engineer. Seeded areas shall be re-seeded and bare areas shall be restored with select granular fill, stone, or other material approved by the Engineer.

Prior to any construction, the Contractor is responsible for locating all the substructures and utilities within the working area. Place and limit construction equipment, construction loads and/or surcharges in the vicinity of the identified substructures and/or utilities such that the substructures and utilities are not damaged due to the construction activities. Monitor and control vibrations and potential movements caused by the any construction activities to avoid any damages to the adjacent substructures and utilities. Damages to any substructures and utilities shall be immediately brought to the attention of the Engineer and the Owner of the subsurface elements.

Method of Measurement:

This work is being paid as Lump Sum and will not be measured for payment.

Basis of Payment:

The work "Temporary Support System No. 1" will be paid for at the lump sum price for temporary support assembly, measured as noted above, which unit price shall include the cost of all material, equipment, labor, and incidental expenses required to satisfactorily complete the work in accordance with the contract documents. The unit price shall also include the cost of the calculations prepared by the licensed Professional Engineer, fabrication, erection, and removal of the temporary assembly. All materials, labor, equipment and incidental costs associated with temporary foundations for the support assembly shall also be included. Excavation, temporary support of excavation, backfill, and restoration of the site, at areas disturbed during installation, use, or removal of the temporary support assembly is included in this item.

The Contractor shall submit to the Department a Schedule of Values for review and acceptance prior to performance of the work.

Pay Item	Pay Unit
Temporary Support System No. 1	LS

ITEM #0651592A - HORIZONTAL DIRECTIONAL DRILLING 6” HDPE

DESCRIPTION:

This section specifies the acceptable methods and materials for installing casing pipes for fiber optic cables,copper communications/low voltage power cables and/or electric service cables under existing highways, ramps or other sensitive areas by the horizontal directional drilling (HDD) method, and the requirements for high density polyethylene (HDPE) pipe casing and innerducts to be installed as part of the HDD method, including standards for dimensionality, testing, quality, acceptable fusion practice, safe handling, and storage.

MATERIALS:

A. General:

1. The pipe casing supplied under this specification shall be high performance, high molecular weight, and high density polyethylene (HDPE) pipe. All piping system components shall be the products of one manufacturer and shall conform to the latest edition of ASTM D1248, ASTM D3350, and ASTM F714.
2. Pipe shall conform to the nominal diameters shown on the plans, with the standard dimension ratio of D/t, SDR, of 11 or less, and as required by the pipe manufacturer.
3. The pipe material shall be a Type III, Class C, Category 5, P34 material as described in ASTM D1248. The polyethylene resin shall meet or exceed the requirements of ASTM D3350 for PE 3408 material with a cell classification of 335434C, or better. The fittings and bends supplied under this specification shall be molded from a polyethylene compound having a cell classification equal to or exceeding the cell classification of the pipe supplied under this specification.
4. Physical properties of pipe and pipe compound:
    a. Density – The density shall be 0.941 – 0.957 gms/cm3 when tested in accordance with ASTM D1505.
    b. Melt Flow – Melt Flow shall be no greater than 0.11 gms/10 min. when tested in accordance with ASTM D1238 – Condition E.
    c. Flex Modulus – Flex Modulus shall be 110,000 psi to less than 160,000 psi when tested in accordance with ASTM D790.
    d. Tensile Strength at Yield – Tensile strength at yield shall be 3,200 psi to less than 3,500 psi when tested in accordance with ASTM D638.
    e. ESCR – Environmental Stress Crack Resistance shall be in excess of 5,000 hours with zero failures when tested in accordance with ASTM D1693 – Condition C.

f. Hydrostatic Design Basic shall be 1,600 psi at 73.4 degrees F when tested in accordance with ASTM D2837.

5. The polyethylene compound shall be suitably protected against degradation by ultraviolet light by means of carbon black, well dispersed by precompounding in a concentration of not less than 2 percent.

6. Pipe shall be homogeneous throughout and be free of visible cracks, holes, foreign material, blisters, or other visible deleterious faults.

7. The pipe manufacturer shall be listed with the Plastic Pipe Institute as meeting the recipe and mixing requirements of the resin manufacturer for the resin used to manufacture the pipe in this project.

B. HDPE Innerduct

1. HDPE innerduct shall meet or exceed the following properties:

ASTM TEST	DESCRIPTION	VALUE HDPE
D-1505	Density kg/m3	< 941
D-1238	Melt Index, kg/10 min Cond E	< .00055kg/10 min
D-638	Tensile strength at yield (Mpa)	20.7 min
D-638	% Ultimate Elongation Value	400% max
D-1693	Environmental Stress Crack Resistance Condition B, F20	96 hrs.
D-790	Flexural Modulus, Mpa (Mpa)	> 551.6 (Mpa)
D-746	Brittleness Temperature	-75 ° C Max.

2. HDPE innerduct shall be SDR 13.5 – ASTM F 2160 smooth wall. Couplings shall be manufactured for use with OD controlled (ASTM F 2176) smooth wall HDPE conduit.

3. Innerduct shall be mandrel tested. Mandrel shall be 95% of diameter of the tested innerduct. Contractor to submit mandrel dimensions for approval prior to testing. Mandrel length shall be a minimum of 4 inches on HDPE piping.

4. The number and size of HDPE innerducts shall be as shown on the plans.

5. The detectable pull tape shall consist of a single 24 AWG copper wire with polyethylene or PVC jacket woven into the polyester tape. The pull tape shall be NEPTCO Part No. DP1250P, or approved equal, for cable sizes of less than 97 fibers. NEPTCO Part No. DP1800P, or approved equal, shall be used for cable size of 97-288 fibers. The detectable pull tape shall have the following properties:

- 1250 lb (5.56 kN) tensile strength
- flat, not round, construction
- printed foot markings
- pre-lubricated for reduced pulling tension at start of cable pull
- low susceptibility to absorption of moisture; moisture resistant

6. The detectable pull tape shall be field installed within each innerduct for the purpose of attaching to, and pulling of, the fiber optic cable. The Detectable Pulling Tape shall be tied off to an expanding Neoprene Plug.

C. Fusion Joints

1. Unless otherwise specified, fusible polyethylene pipe lengths shall be assembled in the field with thermal butt-fused joints. The Contractor shall follow the pipe supplier's guidelines for this procedure. All fusion joints shall be completed as described in this specification.

D. Pipe Connections

1. Fusible Polyethylene Bends

   a. Fusible polyethylene bends shall conform to the same sizing convention, diameter, dimensional tolerances and pressure class of the pipe that they are joining together.

   b. Fusible polyethylene bends shall be manufactured from the same fusible polyethylene pipe being used for the installation, and shall have at least 2 feet of straight section on either end of the bend to allow for fusion of the bend to the pipe installation.

   c. Standard fusible polyethylene bend angles shall not be greater than 22.5 degrees, and shall be used in nominal diameters ranging from 4 inch through 16 inch.

2. Connection to Handholes/Pullboxes

   a. Fusible polyethylene pipe shall be connected to handholes or pullboxes to provide a leak-free environment.

   b. Connections to a new handhole or pullbox shall be as indicated in the construction documents.

   c. A flexible, watertight gasket per ASTM C 923 shall be cast integrally with riser section(s) for all precast handholes or pullboxes.

   d. Grout internal joint space with non-shrink grout

E. Backfill Grout

1. Backfill grout shall be a proportional mixture of Portland cement, fly-ash (Type F), and water. Water to cement ratio shall not exceed 8 gallons of water per sack (94 lbs.) of cement. Fly-ash may substitute up to 50% of cement content.

F. Drilling System Equipment

1. General

   The HDD equipment, as a minimum, shall consist of a directional drilling rig of sufficient capacity to perform the bore(s) and pull-back of the pipe(s), a drilling fluid mixing & delivery system of sufficient capacity to successfully complete the crossing, a guidance system to accurately guide boring operations, and trained and

competent personnel to operate the system. All equipment shall be in good, safe operating condition with sufficient supplies, materials and spare parts on hand to maintain the system in good working order for the duration of this project. All required equipment shall be included in the emergency and contingency plan as these specifications.

2. Drilling Rig
    a. The directional drilling machine shall consist of a hydraulically powered system to rotate, push and pull drill pipe while delivering a pressurized fluid mixture to a drill head. The machine shall be anchored to withstand the pulling, pushing and rotating forces required to complete the project.
    b. The drilling rig hydraulic system shall be of sufficient pressure and volume to power drilling operations. The hydraulic system shall be free from leaks.
    c. The drilling rig shall have a system to monitor pull-back hydraulic pressure during pull-back operations.
    d. Drill pipe shall be API steel drill pipe, Range 2, Premium Class or higher, Grade S-135 in a diameter sufficient for the torque and longitudinal loads and fluid capacities required for the work. Only drill pipe inspected under API's Recommended Practice Specification API RP 7G within 30 days prior to start and certified as double white band or better shall be used.
3. Drill Head
    a. The horizontal directional drilling equipment shall produce a stable fluid lined tunnel with the use of a steer-able drill head and any subsequent pre-reaming heads.
    b. The system must be able to control the depth and direction of the drilling operation.
    c. Drill head shall contain all necessary cutters and fluid jets for the operation, and shall be of the appropriate design for the ground medium being drilled.
4. Drilling Fluid System
    a. Drilling Fluid (Drilling Mud)
        i. Drilling fluid shall be composed of clean water and the appropriate bentonite clay and other additive(s) for the fluid to be used. Water shall be from a clean source and shall meet the mixing requirements of the mixture manufacturer(s). The fluid shall be inert.
        ii. The water and additives shall be mixed thoroughly to assure the absence of any clumps or clods. No hazardous additives may be used.

iii. Technical criteria for bentonite shall be as given in API Spec. 13A, Specification for Oil Well Drilling Fluids Material for fresh water drilling fluids. Any modification to the basic drilling fluid involving additives must describe the type of material to be used and be included in Contractor's drilling plan presented to the Engineer.

iv. Drilling fluid shall be maintained at a viscosity sufficient to suspend cuttings and maintain the integrity of bore wall(s).

v. Drilling fluid shall be disposed of off-site in accordance with local, state and federal requirements and/or permit conditions.

vi. No additional chemicals or polymer surfactants shall be allowed to be added to the drilling fluid unless they have been submitted per this specification.

b. Mixing System

i. A drilling fluid mixing system shall be of sufficient size to mix and deliver drilling fluid for the project.

ii. The mixing system shall be able to ensure thorough mixing of the drilling fluid. The drilling fluid reservoir tank shall be sized for adequate storage of the fluid.

iii. The mixing system shall continually agitate the drilling fluid during drilling operations.

c. Drilling Fluid Delivery and Recovery System

i. The drilling fluid pumping system shall have a minimum capacity to supply drilling fluid in accordance with the drilling equipment pull-back rating at a constant required pressure.

ii. The delivery system shall have filters or other appropriate in-line equipment to prevent solids from being pumped into the drill pipe.

iii. Used drilling fluid and drilling fluid spilled during drilling operations shall be contained and properly disposed of. The use of spill containment measures shall be maintained around drill rigs, drilling fluid mixing system, entry and exit pits and drilling fluid recycling system (if used) to prevent spills into the surrounding environment. Pumps, vacuum truck(s), and/or storage of sufficient size shall be in place to contain excess drilling fluid.

iv. All excavated pits used in the drilling operation shall be lined with heavy duty plastic sheeting with sealed joints to prevent the migration of drilling fluids and/or groundwater.

v. A closed-loop drilling fluid system and a drilling fluid cleaning system should be used to whatever extent practical, depending upon project size and conditions. Under no circumstances shall

drilling fluid that has escaped containment be reused in the drilling system.

5. Drilling Control System
    a. Calibration of the electronic detection and control system shall be verified prior to the start of the bore.
    b. The drilling head shall be remotely steer-able by means of an electronic or magnetic detection system. The drilling head location shall be monitored in three dimensions:

        Offset from the baseline,

        Distance along the baseline, and

        Depth of cover.

    c. Point of rotation of the head shall also be monitored.
    d. Guidance system:
        i. The directional drilling guidance system shall have the capability of measuring vertical and horizontal positions and roll with the following accuracy levels:

            Vertical position: 1 inch in either directions

            Horizontal position: 2 inches in either directions

            Roll: 0.1° over a range of 0° to 360°

        ii. Furnish manufacturer's certificate that the guidance system meets these requirements for the proposed depth of bores.
        iii. The Contractor shall demonstrate a viable method to eliminate accumulated error.
        iv. The guidance system shall be capable of generating a plot of the bore hole survey for the purpose of an as-built drawing.

G. Pipe Pull Heads
    1. Pipe pull heads shall be utilized that employ a positive through-bolt design assuring a smooth wall against the pipe cross-section at all times.
    2. Pipe pull heads shall be specifically designed for use with fusible polyethylene pipe, and shall be as recommended by the pipe supplier.

H. Pipe Rollers
    1. Pipe rollers, if required, shall be of sufficient size to fully support the weight of the pipe during handling and pullback operations.
    2. A sufficient quantity of rollers and spacing, per the pipe supplier's guidelines shall be used to assure adequate support and excessive sagging of the product pipe.

I. Quality Assurance

1. Qualifications

a. Directional drilling Contractor shall have actively engaged in the installation of pipe using guided boring for a minimum of five (5) years, with at least 5 projects in similar type ground and similar size and length crossings.

b. Field supervisory personnel employed by the directional drilling contractor shall have at least five (5) years' experience in the performance of the work.

c. All polyethylene pipes shall be cut, fabricated, and installed in strict conformance with the pipe manufacturer's recommendations. Joining, laying, and pulling of polyethylene pipe shall be accomplished by personnel experienced in working with polyethylene pipe. The pipe supplier shall certify in writing that the Contractor is qualified to join, lay, and pull the pipe or representative of the pipe manufacturer shall be on site to oversee the pipe joining. Expense for the representative shall be paid for by the Contractor.

2. Fusion Technician Requirements

a. Fusion Technician shall be fully qualified by the pipe supplier to install fusible high density polyethylene pipe of the type(s) and size(s) being used. Qualification shall be current as of the actual date of fusion performance on the project.

J. Warranty

1. The pipe shall be warranted for one year per the pipe supplier's standard terms.

2. In addition to the standard pipe warranty, the fusion services shall be warranted for one year per the fusion service provider's standard terms.

CONSTRUCTION METHODS:

A. Requirements

1. Contractor shall provide HDPE pipe casing and innerducts conforming to all standards and procedures, and meeting all testing and material properties as described in this specification for installation by HDD.

2. Contractor shall be responsible for all installation processes and procedures associated with the installation by HDD in accordance with this specification.

B. Site Conditions

1. The proposed installation locations are based on alignments to accommodate easements, to facilitate connections to the remaining fiber optic cables and copper communications/low voltage power cables installed by trenching and backfilling construction, to avoid known obstructions, and to properly maintain enough

horizontal and vertical clearances from the surface. The Contractor may request changes to the proposed vertical and horizontal alignment of the installation and the location of the entry and exit points. Proposed changes shall be submitted in writing to the Department for approval prior to the start of construction.

2. The Contractor shall be responsible for safe access to work sites, including temporary removal of guiderails as necessary. Drilling operations shall not interfere with, interrupt, or endanger traffic on nearby highways and ramps. Areas outside designated work areas shall not be disturbed. Removed guiderail shall be restored to its original condition after work is completed.
3. Water required for the drilling operations shall be provided by the Contractor. In some locations, hydrants may be available as a source of water. The Contractor is responsible for obtaining all required permits for tapping into the hydrants if he/she elects to use these as a source of water.
4. The Contractor shall be responsible for the safety and security of all staging areas, and must comply with all applicable jurisdictional codes and OSHA requirements.
5. Prior to mobilizing operations, the Contractor shall dig test pits at locations of HDD, one at each end of the crossing, for purposes of evaluating existing soil conditions. Conditions are assumed to consist of a mixture of sand and gravel soils, with some cobbles and boulders at various locations. The Contractor shall select a suitable drilling machine for his/her operations capable of boring through cobbles and boulders and any other materials identified from the test pit explorations.
6. In order to avoid damage to any subsurface structures, before the Contractor begins any work on horizontal directional drilling, the Contractor shall contact Call Before You Dig for each location prior to disturbing existing ground in any way. The Contractor shall also notify the appropriate municipalities and ConnDOT for underground lighting.

C. Submittals

1. At least 7 days prior to mobilizing equipment Contractor shall submit his qualifications and detailed installation plan to the Engineer. The plan shall include a detailed plan and profile of the bores and be plotted at a scale no smaller than 1 inch equals 20 feet horizontal and vertical.
2. The plan shall also include a listing of major equipment and supervisory personnel and a description of the methods to be used.
3. Submit bentonite drilling mud products information (MSDS), special precaution necessary, method of mixing and applications, and method of removing and disposal of the spoils.
4. The following PRODUCT DATA is required from the pipe supplier and/or fusion provider:
    a. Pipe Size

b. Dimensionality

c. Pressure Class per applicable standard

d. Color

e. Recommended Minimum Bending Radius

f. Recommended Maximum Safe Pull Force

g. Pipe and fusion services warranty information.

h. Written procedural documentation for piping products including proper handling and storage, installation, tapping, and testing.

i. Fusion technician qualification indicating conformance with this specification

5. Submit certified lab data or manufacturer's written certifications to verify the physical properties of the materials supplied under this specification.

6. The following Working Drawings and supporting information are required from the contractor and/or horizontal directional drilling Contractor. These Working Drawings shall also be supplied to the pipe supplier, should it be requested:

   a. Shoring and jacking pit plan for each installation shall be prepared by and bear the seal and signature of a Connecticut licensed Professional Engineer. Working Drawing shall include for each HDD installation any excavation locations and dimensions; shoring, bracing, struts, walers or sheet pile designs; size and type of casing; interfering utilities; bore dimensions and locations including bend radii used; and traffic control schematics for protection of vehicular and pedestrian traffic.

   b. Plan for insertion of the HDPE pipe into the opened bore hole. This plan shall include pullback procedure, ballasting, use of rollers, side booms and side rollers, coating protection, internal cleaning, internal gauging, hydrostatic tests, dewatering, and purging.

   c. A project safety and contingency plan which shall include but shall not be limited to drilling fluid containment and cleanup procedures, equipment and plan for compromised utility installations including electrical and power lines, water, wastewater and any other subsurface utility in the area.

   d. A drilling fluid plan which details types of drilling fluids, cleaning and recycling equipment, estimated flow rates, and procedures for minimizing drilling fluid escape.

   e. An HDD schedule identifying daily work hours and working dates for each installation.

D. Delivery and Off-Loading

1. Care shall be taken during transportation of the pipe to ensure that it is not cut, kinked, or otherwise damaged.

2. All pipes shall be bundled or packaged in such a manner as to provide adequate protection of the ends during transportation to the site. Any pipe damaged in shipment shall be replaced as directed by the Engineer.
3. Each pipe shipment shall be inspected prior to unloading to see if the load has shifted or otherwise been damaged. Notify Engineer immediately if more than immaterial damage is found. Each pipe shipment shall be checked for quantity and proper pipe size, color and type.
4. Pipe shall be loaded, off-loaded, and otherwise handled in accordance with all of the pipe supplier's guidelines.
5. Off-loading devices such as chains, wire rope, chokers, or other pipe handling implements that may scratch, nick, cut, or gouge the pipe are strictly prohibited.
6. During removal and handling, proper care shall be taken to ensure that the pipe does not strike anything. Significant impact could cause damage, particularly during cold weather.
7. If appropriate unloading equipment is not available, pipe may be unloaded by removing individual pieces. Care shall be taken to ensure that pipe is not dropped or damaged. Pipe shall be carefully lowered, not dropped, from trucks.

E. Handling and Storage

1. Any length of pipe showing a crack or which has received a blow that may have caused an incident fracture, even though no such fracture can be seen, shall be marked as rejected and removed at once from the work site. Damaged areas, or possible areas of damage may be removed by cutting out and removing the suspected incident fracture area. Limits of the acceptable length of pipe shall be determined by the Engineer.
2. Any scratch or gouge greater than 10% of the wall thickness will be considered significant and will be rejected unless determined acceptable by the Engineer.
3. Pipe lengths shall be stored and placed on level ground, preferably turf or sand, free of sharp objects which could damage the pipe. Pipe shall be stored at the job site in the unit packaging provided by the manufacturer. Caution shall be exercised to avoid compression, damage, or deformation to the ends of the pipe. Stacking of the polyethylene pipe shall be limited to a height that will not cause excessive deformation of the bottom layers of pipes under anticipated temperature condition. Where necessary due to ground conditions, the pipe shall be stored on wooden sleepers, spaced suitably and of such widths as not to allow deformation of the pipe at the point of contact with the sleeper or between supports.
4. The interior of the pipe, as well as all end surfaces, shall be kept free from dirt and foreign matter. The open ends of all sections of joined and/or installed pipe (not in service) shall be plugged at night to prevent animals or foreign material from entering the pipe line or pipe section. Waterproof nightcaps of approved design may be used but they shall also be so constructed that they will prevent the

entrance of any type of natural precipitation into the pipe and will be fastened to the pipe in such a manner that the wind cannot blow them loose. The practice of stuffing cloth or paper in the open ends of the pipe will be considered unacceptable.

5. Where possible, the pipe shall be raised and supported at a suitable distance back from the open end such that the open end will be below the level of the pipe at the point of support.
6. Pipe shall be handled and supported with the use of woven fiber pipe slings or approved equal. Care shall be exercised when handling the pipe to not cut, gouge, scratch or otherwise abrade the piping in any way. Two slings spread apart shall be used for lifting each length of pipe. Pipe or fittings shall not be dropped onto rocky or unprepared ground. Slings for handling the pipeline shall not be positioned at butt-fused joints.
7. If pipe is to be stored for periods of 1 year or longer, the pipe shall be shaded or otherwise shielded from direct sunlight. Covering of the pipe which allows for temperature build-up is strictly prohibited. Pipe should be covered with an opaque material while permitting adequate air circulation above and around the pipe as required to prevent excess heat accumulation.
8. Pipe shall be stored and stacked per the pipe supplier's guidelines.

F. Drilling Operations

1. General

   a. The Contractor shall install the HDPE casing pipeline for fiber optic cables and copper communications/low voltage power cables by means of horizontal directional drilling. The Contractor shall assemble, support, and pretest the pipeline prior to installation in the directional drill borehole.

   b. Horizontal directional drilling shall consist of the drilling of a small diameter pilot hole from one end of the alignment to the other, followed by enlarging the hole diameter for the pipeline insertion. The exact method and techniques for completing the directionally drilled installation will be determined by the Contractor, subject to the requirements of these specifications.

   c. Bore locations are as indicated in the contract documents. The path of the bore may be modified based on field and equipment conditions, as well as the entry and exit locations. Control-point elevations and minimum depths below the roadway or surface shall be maintained as indicated in the contract documents.

   d. Bend radii shown in the contract documents are minimum allowable radii and shall not be reduced.

e. The required piping shall be assembled in a manner that does not obstruct adjacent ramps and highways.

f. The Engineer must be notified a minimum of 48 hours in advance of starting work. The boring procedure shall not begin until the Engineer is present at the job site and agrees that the proper preparations for the operation have been made. The Engineer approval for beginning the installation shall in no way relieve the Contractor of the ultimate responsibility for the satisfactory completion of the work as authorized under the contract.

2. Location and Protection of Underground Utilities

a. Correct location of all underground utilities that may impact the HDD installation is the responsibility of the Contractor, regardless of any locations shown on the drawings or previous surveys completed.

b. The Contractor shall contact Call Before You Dig prior to the start of any construction. The Contractor shall be responsible for any necessary notification services; such contacts shall be done by the Contractor prior to the start of construction.

c. All existing lines and underground utilities shall be positively identified, including exposing those facilities that are located within an envelope of possible impact of HDD installation as determined for the project specific site conditions. It is the Contractor and HDD system operator's responsibility to determine this envelope of safe offset from existing utilities. This will include, but is not limited to, soil conditions and layering, utility proximity and material, HDD system and equipment, and foreign subsurface material.

d. The Contractor shall be responsible for identifying any drainage lines crossing within the limits of the proposed work. Adjustments to the profile of the HDD shall be made as necessary to avoid any conflicts with drainage system elements.

3. Site Location Preparation

a. Work sites as indicated on drawings shall be graded or filled to provide a level working area. No alterations beyond what is required for operations are to be made.

b. The general work areas on the entry and exit sides of the crossing shall be enclosed by a berm to contain unplanned spills or discharge. Equipment (graders, shovels, etc.) and materials (such as groundsheets, hay bales, booms, and absorbent pads) for cleanup and contingencies shall be provided in sufficient quantities by the Contractor and maintained at all sites for use in the event of inadvertent leaks, seeps or spills.

c. The Contractor shall place sedimentation fence between all drilling operations and any drainage, wetland, waterway or other sensitive areas designated for such protection by contract documents, state, federal, and

local regulations. Additional environmental protection necessary to contain any hydraulic or drilling fluid spills shall be put in place, including berms, liners, turbidity curtains and other measures. The Contractor shall adhere to all applicable environmental regulations.

d. Contractor shall confine all activities to designated work areas.

4. Drilling Layout and Tolerances

a. The drill path shall be accurately surveyed with entry and exit areas placed in the appropriate locations within the areas indicated on drawings. If using a magnetic guidance system, drill path shall be surveyed for any surface geomagnetic variations or anomalies.

b. Instrumentation shall be provided and maintained at all times that accurately locates the pilot hole, measures drill-string axial and torsional loads and measures drilling fluid discharge rate and pressure.

c. Entry and exit areas shall be drilled so as not to exceed the bending limitations of the pipe as recommended by the pipe supplier.

d. Pipe installed by the directional drilled method must be located in plan as shown on the Drawings, and must be no shallower than shown on the Drawings unless otherwise approved by the Engineer. The Contractor shall plot the actual horizontal and vertical alignment of the pilot bore at intervals not exceeding 15 feet. This “as built” plan and profile shall be updated as the pilot bore is advanced.

e. Line and grade deviations at the upstream end or entry point shall not exceed 12 inches and 6 inches, respectively.

f. Each exit point shall be located as shown with an over-length tolerance of 5 feet and an alignment tolerance of 5 feet left/right with due consideration of the right-of-way boundary and handhole/pullbox connection position to tie the HDPE crossing pipe to the remaining fiber optic cables and copper communications/low voltage power cable segments. The alignment of each pilot bore must be approved by the Engineer before pipe can be pulled. If the pilot bore fails to conform to the above tolerances, the Engineer may, at his option, require a new pilot boring to be made.

g. After the pipe is in place, cleaning pigs shall be used to remove residual water and debris. After the cleaning operation, the Contractor shall provide and run a sizing pig or mandrel to check for anomalies in the form of buckles, dents, excessive out-of-roundness, and any other deformations. The sizing pig run shall be considered acceptable if the survey results indicate that there are no sharp anomalies (e.g. dens, buckles, gouges, and internal obstructions) greater than 2 percent of the nominal pipe diameter, or excessive ovality greater than 5 percent of the nominal pipe diameter. Pipe ovality shall be measured as the percent difference between the maximum and minimum pipe diameters.

5. Pilot Hole Bore

    a. Pilot hole shall be drilled along bore path. In the event that the pilot bore does deviate from the bore path, it may require contractor to pull-back and re-drill from the location along bore path before the deviation.

    b. The Contractor shall limit curvature in any direction to reduce force on the pipe during pull-back. The minimum radius of curvature shall be no less than that specified by the pipe supplier and as indicated on the drawings.

6. Reaming

    a. After successfully completing the pilot hole, the bore hole shall be reamed to a diameter which meets the requirements of the pipe being installed. The following is offered as an estimated guide:

Nominal Pipe Diameter	Bore Hole Diameter
< 8 inches	Pipe Dia. + 4 inches
8 inches to 24 inches	Pipe Dia. X 1.5

    b. Multiple reaming passes shall be used at the discretion of the Contractor and shall conform to this specification.

    c. In the event of a drilling fluid fracture of formations at locations other than the entry and exit points, returns loss or other loss of drilling fluid, the Contractor shall be responsible for restoring any damaged facility to original condition and cleaning up the area in the vicinity of the damage or loss.

G. Pipe Pull-Back and Insertion

1. Pipe shall be fused prior to insertion, if the site and conditions allow, into one continuous length.

2. Contractor shall handle the pipe in a manner that will not over-stress the pipe prior to insertion. Vertical and horizontal curves shall be limited so that the pipe does not bend past the pipe supplier's minimum allowable bend radius, buckle, or otherwise become damaged. Damaged portions of the pipe shall be removed and replaced at the Contractor's expense.

3. The pipe entry area shall be graded as needed to provide support for the pipe and to allow free movement into the bore hole.

    a. The pipe shall be guided into the bore hole to avoid deformation of, or damage to, the pipe.

    b. The fusible polyethylene pipe may be continuously or partially supported on rollers or other friction decreasing implement approved by the Engineer during joining and insertion, as long as the pipe is not over-stressed or critically abraded prior to, or during installation.

    c. A swivel shall be used between the reaming head and the fusible polyethylene pipe to minimize torsion stress on the pipe assembly.

d. The lead end of the pipe shall be closed during the pull-back operation.

4. Buoyancy modification shall be at the sole discretion of the Contractor, and shall not exceed the pipe supplier's guidelines in regards to maximum pull force or minimum bend radius of the pipe. Damage caused by buoyancy modifications shall be the responsibility of the Contractor.
5. Once pull-back operations have commenced, the operation shall continue without interruption until the pipe is completely pulled through the bore hole.
6. The maximum allowable pull exerted on the HDPE pipelines shall be measured continuously and limited to the maximum allowed by the pipe manufacturer so that the pipe or joints are not over stressed.
7. After pipe installation, annular space around the pipe shall be backfill grouted.
8. The Contractor shall allow sufficient lengths of product pipe to extend past the termination point to allow connections to adjacent handholes/pullboxes. Pulled pipe shall be allowed 48 hours of stabilization prior to making tie-ins or backfill grouting of the pipe. The length of extra product pipe shall be at the Contractor's discretion.
9. Upon completion of the filling of the annual space, HDPE inner duct, of the quantity and size identified on the plans, shall be installed.
10. The pipe shall be installed in a manner that does not cause upheaval, settlement, cracking, or movement and distortion of surface pavements and features. Any damages caused by the Contractor's operations shall be corrected by the Contractor as directed by the Engineer. Such repairs and corrections shall be at the Contractor's expense.

H. Installation Cleanup

1. Following the installation, the project site shall be returned to a condition equal to or better than the pre-construction condition of the site. Drill pits shall be backfilled with pervious structure backfill as prescribed in Article 2.16.03 of the Standard Specifications. All excavations will be backfilled and compacted per the construction documents and jurisdictional standards. All pavement and hardscape shall be repaired per applicable jurisdictional standards, excess materials shall be removed from the site, and disturbed areas shall be restored with 4" of topsoil and seeded. All drilling fluid shall be properly disposed of per these specifications and all applicable jurisdictional laws.
2. Waste drilling mud and cuttings shall be dewatered, dried, and stock piled such that it can be loaded by a front end loader, transferred to a truck and hauled offsite to a suitable legal disposal site. The maximum allowed water content of these solids is 50% of weight. Water from the dewatering process shall be treated by the Contractor to meet permit requirements and disposed of locally.
3. Contractor shall verify that all utilities, structures, and surface features in the project area are sound. The Contractor shall be responsible for monitoring the

road crossings at the completion of the work for signs of roadway settlement. If evidence of settlement or other disturbance to the surface is identified, the Contractor shall notify the Engineer immediately for direction on how to remedy such conditions. The Contractor shall be solely responsible for the cost associated with any work necessary to address unsound conditions.

I. Pressure Testing

1. Unless otherwise approved, new pipe crossing systems shall be completely assembled and successfully tested prior to installation of HDPE inner duct and making connections into pull boxes or handholes.
2. At the Contractor's option, hydrostatic or air pressure testing of the pipe may be done each time after fusing several segments of the HDPE pipe together on the surface. This testing is intended to verify proper fusion of the pipe segments prior to pulling the pipe through the hole, but will not verify proper fusion of these segments to those previously pulled through the hole. The test shall be conducted at a minimum 25 psi.
3. Once the pipe is pulled through the hole, it shall be tested at a minimum pressure of 25 psi for 1 hour to verify that the pipe or pipe joints have no cracks as a result of the pullback.
4. Hydrostatic or air testing is acceptable.
5. Pipe not holding the specified pressure for the test duration shall be removed from the hole, repaired, and installed and tested again.

J. Post-Construction Submittals

1. The following AS-RECORDED DATA is required from the Contractor and/or fusion provider to the Department at the completion of work:
    a. Fusion report for each fusion joint performed on the project, including joints that were rejected. Specific requirements of the Fusion Technician's joint report shall include:
        i. Pipe Size and Thickness
        ii. Machine Size
        iii. Fusion Technician Identification
        iv. Job Identification
        v. Fusion Joint Number
        vi. Fusion, Heating, and Drag Pressure Settings
        vii. Heat Plate Temperature
        viii. Time Stamp

ix. Heating and Cool Down Time of Fusion

x. Ambient Temperature

b. As-recorded Information

i. The as-built survey of the pilot hole prior to pre-reaming, indicating conformance with the specified requirements.

ii. All fittings or other appurtenances will also be referenced and shown.

iii. A daily project log, along with tracking log sheets, should they be used, shall be provided. Tracking log sheet data, should it be employed, shall include any and all that apply, including inclination, depth, azimuth, and hydraulic pull-back and rotational force measured.

METHOD OF MEASUREMENT:

This item shall be measured for payment by the actual number of linear feet of HDPE pipe installed by Horizontal Directional Drilling methods and accepted by the Department. The measured length shall be from end to end of HDPE pipe along the centerline through all fittings.

BASIS OF PAYMENT:

This work shall be paid for at the contract unit price per linear foot for Horizontal Directional Drilling of the specified pipe diameter. Price shall include all submittals, materials and work required including HDPE pipe and HDPE innerduct, fittings, grout, exploratory test pits, horizontal directional drilling, pipe inspection and testing, excavating, backfilling, pervious structure backfill, topsoil, seeding, temporary removal and restoration of guiderail, shoring, environmental protection materials and installation, engineering, surveying, cleaning, mark-out, mobilization, and all equipment, tools, labor and work incidental thereto.

ITEM# 0653200A - CLEAN DRAINAGE DITCH

Description:

This work shall consist of cleaning existing drainage ditches so that adequate, unobstructed free flowing drainage is restored as required, as shown on the plans or as directed by the Engineer.

Construction Methods:

The cleaning of existing drainage ditches shall consist of rendering the ditches free of obstructions including the removal of earth, sod, brush and debris.

Materials removed from existing drainage ditches shall be disposed of in conformance with the provisions in section 2.02 Roadway Excavation, Formation of Embankment and Disposal of Surplus Material.

The Contractor shall exercise due care to protect all trees, fences, markers, culverts, underground structures, utilities and installations within and adjacent to the work area. Facilities damaged by the Contractors operation shall be replaced, in kind, at no expense to the State.

Method of Measurement:

This work shall be measured by the actual number of linear feet of ditch along which the above described work is performed. This work shall be measured for payment on actual number of linear feet.

Basis of Payment:

The work under the Item “Clean Drainage Ditch” shall be paid for at the contract unit price per linear foot, which price shall include all material, tools, equipment, labor, and work incidental thereto. All costs incidental to the disposal of sludge dirt, gravel, roots, grease, and other debris will be included in the price above.

Pay Item	Pay Unit
Clean Drainage Ditch	l.f.

ITEM #0653900A - CORRUGATED METAL PIPE INSPECTION

Description:

This work shall also consist of a condition survey of all existing corrugated metal pipes under the roadway as called for on the plans or as directed by the Engineer within the project limits. The condition survey shall consist of examining the existing drainage system by means of remote video inspection in order to confirm the size, type, location, material and condition of each pipe inspected.

Construction Methods:

Video Inspection:

The Contractor shall remove all debris from the conduits prior to being inspected. The Contractor shall perform a remote inspection by using a crawler mounted camera to record video. The crawler must be capable of inspecting conduits 12 to 42 inches in diameter, and must be all-wheel drive or track mounted with an adjustable camera height such that the camera can be centered in the conduit vertically and horizontally. The crawler does not obstruct the camera's view or interfere with proper recording of the conduit condition. Crawler speed is adjustable with an operating speed while recording not to exceed 30 feet per minute. The video camera must have a zoom ratio of at least 40:1, this can be achieved with a combination of optical and digital zoom; however, the optical zoom ratio must be at least 10:1. Camera should have a light source that allows all areas of concern to be readily observed. Finally, the camera must have the capability of 360 degree rotation as well as a pan and tilt to a 90-degree angle to the axis of the conduit. Provide a recording device that is capable of recording video with the conduit identification, location and type shown on the video. Furnish the video recording in MPEG2 format at a resolution of 720x480 on one of the following media types: DVD, CD, or other media type approved by the Engineer.

Method of Measurement:

This work will be measured for payment based on the actual number of linear feet of existing corrugated metal pipe inspected by video.

Basis of Payment:

This work will be paid for at the Contract unit price per linear foot for "Corrugated Metal Pipe Inspection" which shall include all materials, equipment, labor and work incidental to the condition survey.

Pay Item	Pay Unit
Corrugated Metal Pipe Inspection	l.f.

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

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

The completed membrane system shall be comprised of a primer coat followed by the membrane coating which is applied in one or two layers for a minimum total thickness of 80 mil, an additional 40 mil membrane layer with aggregate broadcast into the material while still wet, and a bond coat of bitumen-based adhesive material.

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

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

Construction Methods: At least ten days prior to installation of the membrane system, the Contractor shall submit to the Engineer, the manufacturer's recommended procedure for preparing the deck surface, pre-treatment or preparing at cracks and gaps, treatment at curbs, vertical surfaces or discontinuities, applying the primer and membrane, and placing of aggregated coat. Procedures shall also include recommended repairs of system non-compliant issues identified during application. The system shall be applied to the prepared area(s) as defined in the plans strictly in accordance with the Manufacturer's recommendations.

A technical representative, in the direct employ of the manufacturer, shall be present on-site immediately prior to and during application of the membrane. The representative shall inspect and approve the surface prior to priming, and provide guidance on the handling, mixing and addition of components and observe application of the primer and membrane. The representative shall perform all required quality-control testing and remain on the Project site until the membrane has fully cured.
All quality-control testing, including verbal direction or observations on the day of the installation, shall be recorded and submitted to the Engineer for inclusion in the Project's records. A submittal of the quality-control testing data shall be received by project personnel prior to any paving over the finished membrane or within 24 hours following completion of any staged portion of the work.

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

2. Job Conditions:

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

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

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

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

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

3. Delivery, Storage and Handling:

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

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

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

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

4. Surface Preparation:

   (a) Protection: The Applicator shall be responsible for the protection of equipment and adjacent areas from over spray or other contamination. Parapets and bridge joints shall be masked prior to application of the materials.

   (b) Surface Preparation: Sharp peaks and discontinuities shall be ground smooth. The surface profile of the prepared substrate is not to exceed 1/4 inch (peak to valley) and areas of minor surface deterioration of 1/2 inch and greater in depth shall also be repaired. The extent and location of the surface patches require the approval of the Engineer before the membrane system is applied.

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

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

   Voids, honeycombed areas, and blow holes on vertical surfaces shall be repaired in the same manner.

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

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

   (a) Random tests for deck moisture content shall be conducted on the substrate by the Applicator at the job site using a "Sovereign Portable Electronic Moisture Master Meter," a "Tramex CMEXpertII Concrete Moisture Meter" or approved equal. The minimum frequency shall be one test per 1000 s.f. but not less than three tests per day per bridge. Additional tests may be required if atmospheric conditions change and retest of the substrate moisture content is warranted.

   The membrane system shall not be installed on substrate with a moisture content greater than that recommended by the system's manufacturer, but shall not be greater than 6%, whichever is less.

   (b) Random tests for adequate tensile bond strength shall be conducted on the substrate using an adhesion tester in accordance with the requirements of ASTM D4541. The minimum frequency shall be one test per 5,000 s.f. but not less than three adhesion tests per bridge.

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

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

(c) Cracks and grouted joints shall be treated in accordance with the Manufacturer's recommendations, as approved or directed by the Engineer.

6. Application:

(a) The System shall be applied in four distinct steps as follows:
1) Substrate preparation and gap/joint bridging preparation
2) Priming
3) Membrane application
4) Membrane with aggregate

(b) Immediately prior to the application of any components of the System, the surface shall be dry (see Section 5a of this specification) and any remaining dust or loose particles shall be removed using clean, dry oil-free compressed air or industrial vacuum.

(c) Where the area to be treated is bound by a vertical surface (e.g. curb or wall), the membrane system may be continued up the vertical, as shown on the plans or as directed by the Engineer.

(d) The handling, mixing and addition of components shall be performed in a safe manner to achieve the desired results, in accordance with the Manufacturer's recommendations or as approved or directed by the Engineer.

(e) A neat finish with well defined boundaries and straight edges shall be provided by the Applicator.

(f) Primer: The primer shall consist of one coat with an overall coverage rate of 125 to 175 s.f./gal unless otherwise recommended in the manufacturer's written instructions.

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

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

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

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

(g) Membrane: The waterproofing membrane shall consist of one or two coats for a total dry film thickness of 80 mils. If applied in two coats, the second coat shall be of a contrasting color to aid in quality assurance and inspection.

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

The substrate shall be coated in a methodical manner.

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

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

Spark Testing: Following application of the membrane, test for pin holes in the cured membrane system over the entire application area in accordance with ASTM D4787- "Continuity Verification of Liquid or Sheet Linings Applied to Concrete Substrates." Conduct the test at voltages recommended by the manufacturer to prevent damage to the membrane.

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

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

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

(i) Aggregated Finish:
1) Apply an additional 40 mil thick layer of the membrane material immediately followed by an aggregate coating, before the membrane cures, at a rate to fully cover the exposed area. The membrane and aggregate shall be fully integrated after the aggregate has been applied and the membrane cured.
2) Localized areas not fully coated shall be touched-up with additional membrane and aggregate as needed.
3) Remove loose and excess aggregate from the surface to the satisfaction of the Engineer and dispose of properly after application prior to allowing traffic onto finished surface or application of tack coat.

(j) Bond Coat:
Prior to application of a bituminous concrete overlay, the aggregated finish shall be coated with a bonding material. The bonding material shall be per the membrane waterproofing manufacturer's recommendations.

7. Final Review: The Engineer and the Applicator shall jointly review the area(s) over which the completed System has been installed. Any irregularities or other items that do not meet the requirements of the Engineer shall be addressed at this time.

Method of Measurement: The quantity to be paid for under this item shall be the number of square yards of waterproofed surface completed and accepted.

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

Pay Item	Pay Unit
Membrane Waterproofing (Cold Liquid Elastomeric)	s.y.

ITEM #0712021A - GRS ABUTMENT AND WINGWALL
ITEM #0712022A - ABUTMENT AND WINGWALL CMU WALL FACE
ITEM #0712023A - REINFORCED SOIL FOUNDATION (RSF)
ITEM #0712024A - REINFORCED INTEGRATED APPROACH

Description:

This work consists of furnishing materials and constructing geosynthetic reinforced soil-integrated bridge system (GRS-IBS) abutments and wingwalls at the locations, grades, and to the dimensions and details shown on the plans, and in accordance with these Specifications.

Where called for on the plans or as ordered by the Engineer, this work shall also include furnishing and constructing a geosynthetic reinforced soil foundation (RSF).

The following are definitions of key elements in the GRS-IBS specification and details:

CMU: Concrete Masonry Units as defined in this specification and as shown on the plans.

CMU Height: The vertical dimension of the CMU measured from the bottom of the block to the top of the block.

CMU Width: The horizontal dimension of the CMU measured along the face of the wall or abutment. For CMU with irregular side surfaces or interlocking surfaces, the width is the center to center horizontal spacing measured parallel to the face of the wall.

CMU Thickness: The horizontal dimension measured perpendicular from the front face of the wall to the rear face of the CMU. For CMUs with irregular rear surfaces, the thickness is the distance to the furthermost surface of the front side of the block.

CMU Abutment and Wingwall Wall Face: The portion of the system that comprises the CMU wall face elements.

Bridge Seat: The portion of the system to which the steel girders are set on.

Beam Seat Zone: The portion of the system that is directly below the beam seat that does not contain a concrete distribution slab. Beam Seat Zones are not required for bridges with distribution slabs cast on top of the GRS Abutment.

Bearing Bed Reinforcement Zone: The portion of the system that is directly below the Bridge Seat.

Reinforced Integrated Approach: The portion of the system that is placed under the roadway approach pavement behind the rear face of the superstructure.

GRS Abutment and Wingwall: The portion of the system that makes up the reinforced soil mass, including the No. 8 gradation crushed stone and geotextile reinforcement.

GRS Foundation: The portion of the system that is below the reinforced soil mass of the GRS Abutment. It is used to properly seat the system on the substrate.

Materials:

1. **Concrete Masonry Units (CMU)**: CMU shall be precast-wet cast concrete blocks. Dry cast CMU will not be permitted. The CMU shall have facing texture and color(s) as specified on the plans. The CMU shall meet the requirements of Article M.03 of the Standard Specifications. The CMU shall have a minimum compressive strength of 4,000 psi (measured at 28 days). All CMU shall be air-entrained, composed of Portland cement, fine and coarse aggregates, admixtures, and water. The air-entraining feature may be obtained using either air-entraining Portland cement or an approved air-entraining admixture. The entrained-air content shall be between 4% and 7%.

   The CMU's shall conform to the dimensions as shown on the plans and the following:

   a. The height of each individual block shall be as specified on the plans. The height dimensions shown on the plans are considered nominal. Minor variations due to the manufacturing process are acceptable provided that the Contractor account for these variations in the construction.

   b. The thickness and length of each individual block shall be as shown on the plans. Minor variations due to the manufacturing process are acceptable provided that the Contractor account for these variations in the construction.

2. **Reinforced Soil Foundation (RSF) Backfill**: The material used in the Reinforced Soil Foundation (RSF) backfill shall meet the requirements of Article M.01.01, No. 8 Gradation.

3. **GRS Abutment and Wingwall Backfill**: The material used in the Abutment Backfill shall meet the requirements of Article M.01.01 of the Standard Specifications, No. 8 Gradation.

4. **Reinforced Integrated Approach Backfill**: The material used for the Integrated Approach Backfill shall meet the requirements of Article M.05.01, Processed Aggregate Base.

5. **Geotextile**: The material shall be a biaxial, polypropylene geotextile. The Geotextile is required to have a minimum ultimate tensile strength of 4,800 lbs/ft and the reinforcement strength at 2% strain shall be greater than 1,000 lbs/ft in both the machine direction and cross-machine direction, in accordance with ASTM D4595 or ASTM D6637/D6637M.

   The geosynthetic reinforcement Manufacturer is responsible for establishing and maintaining a quality control (QC) program to ensure compliance with the requirements of these Specifications.

   Conformance testing shall be performed as part of the manufacturing process and may vary for each type of product. Sampling and conformance testing shall be in accordance with ASTM D4354, with conformance testing procedures established as noted in the specification. Geotextile product acceptance shall be based on ASTM D4759.

   The quality control certificate shall include roll number and identification, sampling procedures, and results of control test (including a description of test methods used).

6. **Portland Cement Concrete**: Concrete shall conform to the plans and meet the requirements of Section M.03 for Class PCC04460 Concrete.

7. **Reinforcing**: Reinforcing shall be glass fiber reinforced polymer (GFRP) conforming to ACI 440.6, "Specification for Carbon and Glass Fiber-Reinforced Polymer Bar Materials for Concrete Reinforcement." All GFRP reinforcement shall be deformed or sand coated.

   Reinforcing Steel: Reinforcing steel shall conform to the plans and meet the requirements of Article M.06.01.

8. **Fine Aggregate**: Fine Aggregate shall meet the requirements of Article M.03.01

9. **Mortar**: Mortar shall meet the requirements of Article M.11.04

10. **Grout**: Grout shall meet the requirements of Article M.03.05

Shop Drawings:

Preliminary Submissions: Prior to the start of fabrication or construction, the Contractor shall submit to the Engineer a construction package, which shall include, but not be limited to the following:

a. Plan sheets shall be 22" x 34".

b. Full plan view of each GRS abutment and wingwall drawn to scale. The plan view must illustrate the reinforcement lengths the Contractor plans on using for each lift height in accordance with the minimum lengths provided on the plans. Beginning and ending stations/offsets of each GRS abutment and wingwall, all utilities, signs, fence posts, etc. that are within the footprint of the reinforcement layers.

c. Full elevation view of the GRS abutment and wingwall CMU wall face drawn to scale. Elevation views shall indicate the elevation at the top and bottom of the GRS abutments and wingwalls including the top of the cast-in-place copings, horizontal and vertical control joints, and the location of finished grade.

d. Typical cross sections drawn to scale including all appurtenances. Detailed cross sections shall be provided at significant reinforcement transitions.

e. Material designations for all materials to be used.

f. Detailed construction methods including a quality control plan, which shall cover the following:

    i. Methods of delivery and placement of backfill materials including the proposed equipment. Accommodation of limited vertical and horizontal clearances and their impact on the equipment shall be addressed.

    ii. Methods to control horizontal line and batter of the front face of the wall including methods to adjust the line and batter as the wall layers are set. The methods shall account for the possibility of minor shifting of the CMUs during compaction of the backfill.

    iii. Methods for making final grade adjustments at the top of the CMU wall face caused by the buildup of tolerances. (e.g. cast-in-place copings)

    iv. Methods of accommodating stage construction joints. This may require the use of temporary wall sections that are left in place in the backfill material.

g. Details of sloping top of GRS abutments and wingwalls, where required.

h. Details of corner treatments, where required.
i. Details of cast-in-place copings, where called for on the plans, including finished elevations, construction/contraction joints, reinforcement, and method of casting concrete against architectural treatments, where required.

j. Details of Temporary Earth Retaining Systems, where required.

k. Details of wall treatment where the wall abuts other structures.

The preliminary submission shall be treated as a shop drawing in accordance with Section 1.05 amended as follows:

a. 4 sets of each submission shall be supplied to the Department along with an electronic pdf copy.

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 each submission. No extensions in contract time will be allowed for the review of these submissions.

Final Submissions:

a. Once a construction package has been reviewed and accepted by the Department, the Contractor shall submit the final plans electronically in .pdf form.

b. The final submission shall also include two sets of full size (22" x 34") plans and four sets of half size (11” x 17”) plans. The final submission shall be made within 14 days of acceptance by the Department. No work shall be performed on the GRS-IBS until the final submission has been received and accepted.

c. Acceptance of the final design shall not relieve the Contractor of his responsibility under the contract for the successful completion of the work.

Construction Methods:

1. **Pre-Installation Field Meeting**: A pre-installation field meeting will be scheduled by the Engineer and held prior to the start of any GRS-IBS and Geotechnical Instrumentation construction. The Engineer, Contractor, and all Subcontractors involved in the construction of the GRS-IBS shall attend the meeting. The pre-installation field meeting will be conducted to clarify the construction requirements for the work, to coordinate the construction schedule and activities, to identify contractual relationships, and to delineate responsibilities amongst the Engineer, the Contractor and the various Subcontractors. The

meeting will be held, after approval of the shop drawings, on a date to be determined by the Engineer.

2. **Excavation**: Excavation shall be accomplished and maintained in accordance with Article 2.03. Any backfilling of the excavation outside the limits of the GRS-IBS Abutment/Wingwalls and RSF shall be in accordance with Section 2.02.

3. **GRS Foundation**: The GRS Foundation shall consist of No. 8 Stone conforming to the requirements of Section M.01.01 or as called for on the plans.

   The base shall be graded level plus 1-foot on all sides or to the limits shown on the plans. The first foot lift of backfill should be placed directly on the base and compacted without a geotextile reinforcement layer. The remainder of the RSF should be fully encapsulated in geotextile reinforcement as shown on the plans. The reinforced portion of the RSF shall be constructed with backfill placed from the face of wall to the back, in order to roll folds or wrinkles to the free end of the reinforcement layer. It shall be compacted in nominal 6-inch lifts, and it shall be graded, leveled and compacted before encapsulating the RSF. A minimum of 4 passes of the compaction equipment will be required per lift. The Engineer will visually inspect the RSF to confirm proper placement and compaction. The RSF shall be encapsulated in the geotextile reinforcement and placed perpendicular to the abutment face to protect it from possible erosion. The geotextile shall be large enough to fully enclose the RSF on the face and wingwall sides. The wrapped corners of the RSF shall be tight and without exposed soil within the RSF to complete the encapsulation. Further, 'Section 7.4 RSF' of the *"Geosynthetic Reinforced Soil Integrated Bridge System, Interim Implementation Guide",* FHWA-HRT-11-026, June 2012, may be referenced for construction methods of the RSF only.

4. **GRS Abutment and Wingwalls**: The GRS Abutment and Wingwalls shall be constructed using compacted lifts with lift heights equal to the vertical spacing of reinforcement, as shown on the plans, or a nominal 6-8 inches, whichever is less. Compaction shall be performed using vibratory roller compaction equipment or other similar methods. A minimum of 4 passes will be required per lift. Within 3 feet of the front of the wall face, hand operated equipment such as lightweight mechanical tampers, plates or rollers shall be used to avoid damage or displacement of facing elements. The Engineer will visually inspect the lifts to confirm proper placement and compaction. All compaction equipment shall be selected to perform the appropriate compaction effort.

   Geotextile reinforcement shall be installed in accordance with the manufacturer's recommendations and these Specifications and to the extent shown on the plans or as directed by the Engineer. The Geotextile shall be placed so that the strongest direction is perpendicular to the abutment facing and coverage shall be 100% of the embedment area unless otherwise shown on the plans. Adjacent sections of the Geotextile shall not be overlapped, except when exposed in the wrap-around facing system.

The Geotextile shall be laid so that it is taut and free of wrinkles prior to backfilling, and it shall extend between the layers of the CMU. The Geotextile shall cover a minimum of 85% of the top surface of the CMU. The Geotextile shall not extend out beyond any portion of the front face of the CMU. Any excess Geotextile shall be removed prior to placement of the next level of CMU. Overlaps of adjacent geosynthetic shall be trimmed where they are in contact with the surface of the CMU to avoid varying geosynthetic thicknesses between the CMU. Any seams in the geosynthetic shall be staggered with each successive layer of the GRS abutment. All seams between adjacent sheets of geosynthetic located in the area beneath the footprint of the bridge seat shall be perpendicular to the abutment wall face.

No equipment shall be placed on the geotextile until at least 6-inches of material has been placed, and tracked equipment shall use caution while turning on the backfill to avoid damaging the Geotextile.

5. **CMU Abutment and Wingwall Wall Face**: The first course of the CMU shall be set level and to grade. A thin leveling layer of Fine Aggregate, not more than 0.5 inches may be used on top of the prepared subgrade to facilitate construction of the first course of the CMU. If the leveling layer required exceeds 0.5 inches, a mortar or grout shall be place in the gap between the prepared subgrade and the first CMU course. CMU construction shall begin at the lowest portion of the face with each layer placed horizontally, with the CMU placed tightly against the adjoining CMU without any gaps. The vertical GRS wall batter shall be checked at least every other layer, and any deviations from the plans shall be corrected. Before placement of the backfill, every other row of CMU alignment shall be checked with a string line referenced off the back of the facing CMU from wall corner to corner. Each layer of CMUs shall be completely constructed and brushed cleaned of any debris and fill material prior to placing the next layer of reinforcement and CMU. CMU out of required alignment during construction shall be carefully moved back into position by methods that will not cause damage to other CMU or other work. Any damaged CMU shall be replaced to retain the new wall integrity.

   Detail facing to account for wall batter and corners. Facing wall and wing wall courses shall be staggered to form a tight interlocking stable corner. Corner details shall be submitted to accommodate corners other than right angles. All cuts shall be performed to maintain the standard running or stretcher bond between the rows of the dry-stacked CMU, with the vertical joints of each course midway between those of adjoining courses. When the plans show a super elevation for the bridge, the top courses of CMU beneath the superstructure shall be trimmed to match the elevation difference and clear space across the abutment. A cast-in-place concrete coping, where called for, shall be formed and placed on the top course of the CMU wall facing.

6. **Bearing Bed Reinforcement**: The Bearing Bed Reinforcement zone shall be compacted with a minimum of 6 passes per lift, with lift height equal to the vertical spacing of reinforcement, as shown on the plans, or 4 inches, whichever is less. Hand operated equipment such as lightweight mechanical tampers, plates or rollers shall be used within 3

feet of the wall face to avoid damage or displacement of facing elements. The Engineer will visually inspect the work to confirm proper placement and compaction.

7. **Superstructure Placement**: A crane used for placement of the superstructure can be positioned on the GRS abutment provided the outrigger pads are positioned within the capacity of the GRS mass. The outrigger pads shall be sized for 4,000 psf near the abutment face with greater loads able to be supported with increasing distance from the abutment face.

   If the structure is set without a distribution slab, the structure shall be placed without dragging it across the beam seat surface to prevent an uneven bearing area or voids under the structure and uneven stresses.

8. **Reinforced Integrated Approach**: After placement of the superstructure, the Reinforced Integrated Approach shall be constructed. The Reinforced Integrated Approach shall consist of reinforced Processed Aggregate Base, placed and compacted per Section 3.04, with the exception of the lift dimensions.

   The wrapped Geotextile reinforcement spacing shall be 12 inches. The Processed Aggregate Base shall be placed and compacted in 6-inch lifts. The top wrap fold shall increase in length with each successive wrapped layer until the fill is 2 inches below the bridge grade. The top layer of Geotextile reinforcement shall be kept approximately 2 inches below the bituminous pavement.

9. **Site Drainage**: The GRS-IBS construction area shall be protected from surface runoff during the Project. The Site shall be graded at the end of the work shift in anticipation of precipitation to avoid saturation of soil. An alternative to grading by placing diversion trenches around the perimeter to divert water would be acceptable. Any loose soil placed to construct the GRS shall be graded and compacted before stoppage of work for the day. Onsite stockpiles of fill material containing fines shall be protected from excess precipitation.
10. **Miscellaneous**: Where fencing, wood post or metal beam rail is called for within the limits of the reinforced soil mass, the posts shall be installed mechanically using a metal driving cap to puncture the layers of geotextile cleanly prior to post installation. Pre-formed concrete fence post foundations may be installed as the GRS-IBS is constructed. Wood posts shall not be driven through the geotextile to avoid negative effects to the reinforced soil mass. No holes shall be drilled through the geotextile at any stage of construction.

    Where plantings are called for, they shall be installed outside the limits of the GRS-IBS soil mass to avoid root growth through the reinforced soil mass.

Method of Measurement:

1. **GRS Abutment and Wingwall**: The GRS Abutment and Wingwall structures, including geotextile fabric, will be measured for payment by the cubic yards of No.8 Crushed Stone, including the Bearing Bed Reinforcement Zone, measured in place after compaction within the payment lines as shown on the plans or as specified by the Engineer. The measurement shall not include the volume of the CMU wall face elements as defined by the CMU length, width and thickness in this Specification. The Geotextile reinforcement is considered to be part of the GRS Abutment and Wingwall structures and will not be measured for payment.

2. **Abutment and Wingwall CMU Wall Face**: The CMU will be measured for payment by the number of square feet of wall face completed and accepted within the limits shown on the plans, measured by the actual horizontal and vertical dimensions of the wall face.

3. **Reinforced Soil Foundation (RSF)**: The Reinforced Soil Foundation, including geotextile fabric, will be measured for payment by the cubic yards of No. 8 crushed stone measured in place after compaction within the payment lines as shown on the plans or as specified by the Engineer. The Geotextile reinforcement is considered to be part of the Reinforced Soil Foundation and will not be measured for payment.

4. **Reinforced Integrated Approach**: The Reinforced Integrated Approach including geotextile fabric will be measured for payment by the cubic yards of Processed Aggregate Base measured in place after compaction within the payment lines as shown on the plans or as specified by the Engineer. The Geotextile reinforcement is considered to be part of the Reinforced Integrated Approach and will not be measured for payment.

Basis of Payment:

1. **GRS Abutment and Wingwall**: "GRS Abutment and Wingwall" will be paid at the Contract unit price per cubic yard. Such payment shall include the cost of furnishing and installing No. 8 Crushed Stone and Geotextile used within the backfill behind the CMU wall face and within the Bearing Bed Reinforcement Zone. Such payment also includes all labor, materials and equipment necessary to complete the work in an acceptable fashion.

2. **Abutment and Wingwall CMU Wall Face**: "Abutment and Wingwall CMU Wall Face" will be paid for at the Contract unit price per square foot. Such payment shall include the cost of furnishing and placing all CMUs, concrete used for the cast-in-place coping and filling the top three block courses, GFRP reinforcing, Reinforcing Steel, any Fine Aggregate, Mortar or Grout used to facilitate construction of the first course of the CMUs, all labor, materials, equipment, and incidentals necessary to complete the Abutment and Wingwall CMU Wall Face.

3. **Reinforced Soil Foundation (RSF)**: "Reinforced Soil Foundation (RSF)" will be paid at the Contract unit price per cubic yard. Such payment shall include the cost of furnishing and installing No. 8 Crushed Stone, Geotextile within the RSF, and all labor, materials and equipment necessary to complete the work in acceptable fashion.

4. **Reinforced Integrated Approach**: "Reinforced Integrated Approach" will be paid at the Contract unit price per cubic yard. Such payment shall include the cost of furnishing and installing Processed Aggregate, Geotextile within the reinforced integrated approach, and all labor, materials and equipment necessary to complete the work in an acceptable fashion.

Pay Item	Pay Unit
GRS Abutment and Wingwall	c.y.
Abutment and Wingwall CMU Wall Face	s.f.
Reinforced Soil Foundation (RSF)	c.y.
Reinforced Integrated Approach	c.y.

ITEM #0714100A - TEMPORARY LATERAL SUPPORT

Work under this item shall conform to the requirements of Section 7.14 supplemented and amended as follows:

Replace the words "Temporary Sheet Piling" with "Temporary Lateral Support" in all Articles.

Article 7.14.01 – Description:

Replace the last sentence with the following:

For purposes of this specification, temporary lateral support shall be any type of adequately designed and constructed lateral support system that the Contractor elects to build to satisfy, and which does satisfy, the condition that proposed facilities be properly retained during and after placement of embankment. Temporary lateral support shall be left in place in the permanent embankment, except where the plans or this specification require full removal of the support system or portions thereof.

The Contractor shall propose the type of temporary lateral support to use at the various plan locations requiring temporary lateral support of fills. Welded wire walls, mechanically stabilized earth (MSE) walls, steel sheet piling with tie backs, or alternate methods of support may be proposed for approval by the Engineer.

Article 7.14.02 – Materials:

Add the following:

All materials shall be in accordance with the manufacturer's specifications for proprietary lateral support systems or in accordance with the design requirements for lateral support systems designed by the Contractor.

Article 7.14.03 – Construction Methods:

Replace the first paragraph with the following:

Temporary lateral support systems shall be safely designed for proper performance of the work in accordance with the latest edition of the AASHTO LRFD Bridge Design Specifications, unless otherwise noted on the plans. The support system shall provide an approximately plumb face at the plan location and grades, and shall retain the proposed embankment section and support all loads imposed by the embankment including hydrostatic forces as applicable, live load surcharge from vehicular traffic, and lateral forces TL-4 from highway railing systems located on the supported embankment. The support system shall be designed and detailed to

interface with substructure units as required to retain the embankment material. The design and details of the temporary lateral support system shall be compatible with all construction staging requirements including highway railing systems and shall not be detailed to interfere with the staged construction of approach slabs.

Where temporary lateral support systems intersect structural underdrains, the lateral support system shall be designed and detailed to allow for the underdrain to pass through the support and to be continued in the subsequent construction stages.

Replace the third paragraph with the following:

Temporary lateral support systems that retain partially constructed roadway embankments during staged construction shall be left in place, with the following exceptions, where removal is required: portions of the temporary lateral support system above the top of the subbase elevation; or where ordered by the Engineer. Temporary lateral support systems, or portions thereof, may be removed at the option of the Contractor, if so permitted by the Engineer, provided the Contractor can demonstrate that the removal can be performed without adversely affecting the permanent work.

Article 7.14.04 – Method of Measurement:

*Replace with the following***:**

Temporary Lateral Support will be measured for payment by the number of square feet of temporary lateral support completed and accepted, as computed from the horizontal and vertical payment lines shown on the plans or as ordered by the Engineer. If no payment limits are shown on the plans, the payment limits will be the actual horizontal limit of temporary lateral support installed and accepted, and the vertical limit as measured from the bottom of the exposed face of the support system to the top of the retained earth or pavement behind the lateral support system.

The measurement of temporary lateral support systems used as a common wall for staged construction will be based on the horizontal payment limit shown on the plans and the greater vertical dimension of the common wall face. No measurement will be made of end extensions or returns necessary for the safety of the retained facility.

Article 7.14.05- Basis of Payment:

*Replace the last sentence with the following***:**

The contractor may elect to leave material in place at no additional cost to the state.

The cost of any required backfill material shall not be included under this item. It shall be paid under the applicable earthwork items.

Pay Item	Pay Unit
Temporary Lateral Support	s.f.

ITEM #0716000A - TEMPORARY EARTH RETAINING SYSTEM

Work under this item shall conform to the requirements of Section 7.16 supplemented and amended as follows:

Article 7.16.02 – Construction Methods:

Delete the first sentence of the first paragraph and replace with the following:

Temporary earth retaining system shall be safely designed and carried to adequate depths and braced as necessary for proper performance of the work. The design shall be in accordance with the latest edition of the applicable AASHTO design specifications. The support system shall provide an approximately plumb face at the plan location and grades and shall support all loads imposed by the embankment including hydrostatic forces as applicable; live load surcharge from vehicular traffic and construction equipment; and lateral forces (traffic impact) from temporary or permanent highway railing systems located on supported earthen sections. The support system shall be designed and detailed to interface with substructure units as required to retain the earthen material. The design and details of the temporary earth retaining system shall be compatible with all construction staging requirements including highway railing systems and shall be detailed to not interfere with the staged construction of approach slabs.

Article 7.16.03 – Method of Measurement:

After the first paragraph, add the following:

The Contractor may propose earth retaining system limits beyond the payment limits shown on the plans, subject to the approval of the Engineer. At locations where such expanded limits are approved by the Engineer, the payment limit will not be increased beyond the maximum limit shown on the plans. No additional payment will be made to the Contractor for the area of earth retaining system beyond the stated payment limits.

Article 7.16.05 – Basis of Payment:

Add the following:

At locations where the Contractor proposes and is allowed to leave all or parts of the earth retaining system in place, no additional payment will be made to the Contractor when such material left in place is encountered in subsequent construction activities including, but not limited to trench excavation in areas of soil nail walls.

ITEM #0817006A - 6” X 10” GRANITE STONE CURBING FOR BRIDGES

Description: This curbing shall consist of approved granite stone, furnished in accordance with the dimensions and details shown on the plans, or as ordered, and installed to the lines and grades given and in conformity with these specifications.

Materials: The materials for this work shall conform to the requirements of Section M.12.08.

Construction Methods: Granite stone curbing shall be constructed in the location and to the dimensions shown on the plans. The stone curbing shall be accurately set, straight and true to the line and grade as required. The stone curbing shall be set in a full mortar bed and full mortar end joints. As the stone curbing is being set, the anchors shall be grouted into the holes in the curbing by a method as approved by the Engineer. The concrete backing shall not be placed until the curbing and anchors have been properly placed. Care must be taken to prevent any movements of the stone curbing already in place while placing and compacting concrete backing. When required by the Engineer, the stone curbing shall be supported by such bracing and form work as may be necessary to prevent movement. Where vertical contraction joints or vertical expansion joints, or both, exist in the backing, the vertical joint of the curb shall coincide with the contraction or expansion joint.

All mortar joints shall be finished smooth and flush. These joints shall be carefully filled with cement mortar and shall be neatly pointed on the top and exposed front portions. After pointing, stone curbing shall be cleaned of all excess mortar to the satisfaction of the Engineer.

Where required and indicated on the plans, joint seal shall be placed in accordance with the provisions of Subarticle 4.01.03-B.6(f) insofar as it may apply.

Where indicated on the plans, or directed, drainage openings shall be made through the curbing at the elevations and of the size required.

All fines shall be cleaned from the face of stones after all work on the parapets has been completed.

Method of Measurement: This work will be measured for payment by the actual number of feet of “6” x 10” Granite Stone Curbing for Bridges”, installed and accepted. Measurement shall be made along the top arris line of the face of the curb.

Basis of Payment: Payment for this work will be made at the contract unit price per linear foot for "6” x 10” Granite Stone Curbing for Bridges", complete in place, which price shall include all materials including anchors, equipment, tools and labor incidental thereto.

There will be no direct payment for the cost of drilling holes in stone curbing for anchors, beveling or rounding the ends of the stone curbing and pointing the joints with mortar, and sealing the longitudinal joint; but the cost of this work shall be considered as included in the general cost of the work.

Pay Item	Pay Unit
6” x 10” Granite Stone Curbing for Bridges	l.f.

ITEM #0819002A - PENETRATING SEALER PROTECTIVE COMPOUND

Description: Work under this item shall consist of cleaning concrete surfaces of dirt, dust and debris, and furnishing and applying a clear, penetrating sealer where shown on the plans, to provide a hydrophobic barrier against the intrusion of moisture. This work also includes furnishing, installing and removing platforms, scaffolding, ladders and other means of access as well as shields, as required, to protect adjacent areas from overspray. Penetrating sealer shall not be applied to concrete surfaces that have been previously treated with coatings or curing compounds that would hinder penetration of the sealer into the concrete.

Materials: The penetrating sealer shall be a single component, 100% silane or silane siloxane from the list of materials below. The material shall be selected in anticipation of the expected ambient and surface temperature at the time of installation.

The following products may be used when ambient and surface temperatures are 40°F and above:

SIL-ACT ATS-100 (Silane)
Advanced Chemical Technologies, Inc.
9608 North Robinson Ave.
Oklahoma City, OK 73114
405-843-2585
www.advchemtech.com

Armor SX 5000 EXT-100 or SX 5000 WB (Silane Siloxane)
Foundation Armor, LLC.
472 Amherst St. STE 14
Nashua, NH 03063
866-306-0246
www.foundationarmor.com

Aquinil Plus 100 (Silane)
ChemMasters
300 Edwards Street
Madison, OH 44057
440-428-2105, 800-486-7866
www.chemmasters.net/Aquanil100.php

The following product may be used when ambient and surface temperatures are 20°F and above:

Certi-Vex Penseal 244 100% (Silane)
Vexcon Chemicals
7240 State Road
Philadelphia, PA 19135
888-839-2661
www.Vexcon.com

Construction Methods:

Submittals: The Contractor shall submit to the Engineer Safety Data Sheets (SDS) and product literature for the selected product. The literature shall include written instructions how to apply the product to vertical and horizontal surfaces, and where required, overhead surfaces.

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

The Contractor shall inspect the surfaces to be sealed to identify surface cleaning needs before submitting the procedures. The Contractor shall identify conditions that need repair or surfaces that may require special attention or cleaning procedures. Such observations shall be addressed in the written procedures.

Surface Preparation: Concrete surfaces to which penetrating sealer will be applied shall be dry, clean and free of grease, oil and other surface contaminants. New concrete and newly placed repair concrete shall be allowed to reach the 28 day design strength before applying sealer. After rain or water cleaning, allow existing concrete surfaces to dry for at least 8 hours before applying sealer. Dry surfaces may be cleaned by sweeping with brushes or brooms, and blowing clean with oil-free, compressed air. The Contractor shall take care not to damage the concrete surface finish during cleaning operations. Care shall be taken so that cleaning methods do not damage joint sealant or other components of the structure.

Application: Application of the sealer can only begin after the Engineer evaluates the concrete surfaces for cleanliness and moisture, and determines that conditions are appropriate for application.

The sealer shall saturate the concrete surface with a rate of application of 200 square feet per gallon of sealer. The dispersion shall run six to eight inches down a vertical surface from the spray pattern. The maximum run-down is 12 inches. The Contractor shall monitor and record the number of square feet per gallon of sealer used to verify that the required application rate is being met. Additional sealer may be needed if surfaces are porous, rough or textured.

The Engineer will inspect the concrete surface during application and after the sealer has had adequate time to penetrate. As a test, water sprayed from a bottle on the sealed surface shall bead up and not be absorbed. Should water be absorbed into the concrete at a test area, additional areas shall be tested to determine which areas should receive additional application of sealer. The

Contractor shall apply additional sealer to the identified areas until absorption of water is prevented.

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

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

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

ITEM #0821127A - REMOVAL OF PRECAST CONCRETE BARRIER CURB

Description: Work under this item shall consist of the removal and disposal of existing concrete barrier curb where indicated on the plans or as directed by the Engineer.

Construction Methods: The Contractor shall remove concrete barrier curb where indicated on the plans or as directed by the Engineer. All concrete barrier curb removed under this item shall become the property of the Contractor and shall be removed from the project site.

All areas of concrete barrier curb removal are to be reconstructed as shown on the Contract Plans.

Any concrete barrier curb not intended for removal or other items that may become damaged by the Contractor during this operation shall be repaired or replaced to the satisfaction of the Engineer at no additional cost to the State.

Method of Measurement: This work will be measured for payment by the actual number of linear feet of precast concrete barrier curb removed, complete and accepted. Measurement shall be made by measuring once along the axis of the barrier curb for the length of barrier curb to be removed.

Basis of Payment: This work shall be paid for at the contract unit price per linear foot for "Removal of Precast Concrete Barrier Curb," which price shall include all equipment, tools and labor incidental to the removal of the material and the disposal thereof as directed by the Engineer.

Pay Item	Pay Unit
Removal of Precast Concrete Barrier Curb	l.f.

ITEM #0822005A - TEMPORARY PRECAST CONCRETE BARRIER CURB (STRUCTURE)

ITEM #0822006A - RELOCATED TEMPORARY PRECAST CONCRETE BARRIER CURB (STRUCTURE)

Description:

Work under this item shall consist of furnishing, installing, and removing temporary concrete barrier for use on structures as shown on the plans.

If called for on the plans, the temporary concrete barrier shall also be relocated as necessary to accommodate stage construction conditions.

Materials:

1. The barrier shall be precast concrete conforming to Article 8.21.02-1.

2. Manufacturer identification and casting date shall be permanently marked on each barrier unit by means of a non-corrosive metal or plastic tag in the location shown on the plan. When used barrier is furnished, the Contractor shall provide documentation stating from where the material came, what project it will be used on, the casting dates, and certification that the barrier conforms to all State requirements.

3. Reinforcing steel shall conform to the requirements of ASTM A615M, Grade 60.

4. Lifting hooks. Keys, bolts, devices and attachments shall be of the size indicated on the plans or of a design satisfactory for the purpose intended as approved by the Engineer.

5. Anchor bolts shall conform to ASTM A307. Heavy hex nuts shall conform to AASHTO M291. The plate washers shall conform to AASHTO M232M, Grade 50. The anchor bolts, nuts, and plate washers shall be hot-dipped galvanized in accordance with AASHTO M232 and M111 as applicable.

6. Loop bars shall be bent from smooth bar steel conforming to AISI 1018 (hot rolled). Ends shall be hot-dipped galvanized in accordance with AASHTO M111.

7. Threaded connection rods shall be steel conforming to AASHTO M314 (ASTM F1554) Grade 55 except that threads and nominal diameters shall conform to ANSI B1.13M for Class 6g threads. The rod shall be threaded for a minimum of 4 inch at each end. Plain steel washers shall be manufactured in accordance with ANSI B18.22M. Heavy hex nuts shall conform to AASHTO M 291M for Class 10S and shall conform to the geometry defined in ANSI B18.2.4.6M. The threaded connection rods, washers, and nuts shall be

hot-dipped galvanized after fabrication in accordance with the requirements of Class C of AASHTO M232.

8. The chemical anchor material shall be a resin compound specially formulated to secure bolts in concrete against tension pullout. The Contractor shall select the chemical anchor material in accordance with M.03.07.

9. Non-shrink grout shall conform to M.03.05.

10. Barrier shall be accepted on the basis of the manufacturer's certification, as defined on Article M.08.02-4.

11. Sealant for patching holes in bituminous overlays shall be a cold-applied bituminous sealer conforming to M.08.01-15.

12. Anchor Bolts/Threaded Connection Rods-Certified Test Reports: The Contractor shall submit a Certified Test Report and a Materials Certificate in conformance with Article 1.06.07 and a sample of all anchor bolts, threaded connection rods, nuts, and washers for testing prior to their installation. The Contractor shall not install any anchor bolts or threaded connection rods, prior to receipt of the approved test results and approval by the Engineer.

13. Delineators shall conform to Article 8.22.02.

Construction Methods:

1. Fabrication: The barrier shall be precast concrete in conformance with the pertinent requirements of Article 8.21.03 and the plans, except that penetrating sealer protective compound is not required.

2. Installation: The barrier shall be placed as shown on the plans or as directed by the Engineer.

   The barriers shall be anchored to the concrete deck slab in accordance with the plans and the following:

   a. Prestressed Deck Units: Threaded inserts with matching anchor bolts shall be used for securing the barrier to prestressed deck units. The threaded inserts shall be cast into the deck units during fabrication as necessary to accommodate stage construction.

   b. Chemical Anchoring: This consists of drilling holes in concrete deck slabs, placing anchor bolts in the holes, and securing the bolts with a pre-approved chemical anchor material.

The Contractor shall submit the following to the Engineer for approval type of drill, diameter of bit, method of cleaning. holes, and method of placement of chemical anchor material. Specifications and recommendations for the aforementioned may be obtained from the manufacturer of the chemical anchor material.

Drilling methods shall not cause spalling, cracking, or other damage to the concrete. Areas that were damaged during the drilling operation shall be repaired by the Contractor in a manner suitable to the Engineer and shall be at no expense to the State.

Care shall be taken not to drill holes into or through structural steel.

The Contractor shall take the necessary precautions to prevent materials from falling onto the roadway below.

When reinforcing steel is encountered during the drilling of the holes, the Contractor shall attempt to angle the hole to by-pass the bar.

The anchor bolts shall extend to the bottom of the holes and be hammer taped to insure full penetration. The chemical anchor material shall be installed in accordance with the written directions supplied by manufacturer of the chemical anchor material.

The barrier shall be anchored down by torquing the bolts "snug tight", which is defined as the tightness attained after several impacts from an impact wrench. No part of the bolt head shall project above the outer surface of the barrier.

c. Through-Bolting: This consists of drilling completely through the deck slab and securing anchor bolts on the underside with plate washers and nuts. Through bolting is not permitted on new construction or prestressed concrete. Measures shall be taken to insure that no damage occurs to property below the bridge.

Care shall be taken not to drill holes into or through structural steel.

The barrier shall be anchored down by torquing the bolts 'snug tight", which is defined as the tightness attained after several impacts from an impact wrench. No part of the bolt head shall project above the outer surface of the barrier.

3. Connection of Barrier Units: The barrier shall be joined together with threaded connection rods, and heavy hex nuts in accordance with the plans.

4. Cutting of Anchor Bolts: Where ordered by the Engineer, protruding anchor bolts shall be cut off flush with the surface of the concrete deck. The bolts shall then be ground down below the surface of the deck and the space filled in with non-shrink grout.

5. Patching with Non-Shrink Grout: After removal of the barrier, holes in newly constructed concrete decks and threaded inserts shall be blown clean with an air jet and filled in with non-shrink grout. The non-shrink grout shall be mixed and placed in strict accordance with the manufacturer's directions. The non-shrink grout shall be finished flush with the deck surface. Allow grout to cure a minimum of 24 hours before placing sealant in any remaining hole in the bituminous wearing surface.

6. Delineators: Delineators shall be installed on top of the barrier in accordance with Article 8.22.03-3 and the plans.

7. General: The barrier shall be kept in good condition at all times by the Contractor during all stages of construction. Any damaged material shall be replaced by the Contractor at his expense.

   When the barrier is no longer required, it shall be removed from the work site and become the property of the Contractor.

8. Relocation of Barrier: If called for on the plans, the Contractor shall relocate the barrier and its appurtenances to locations within the project limits as shown on the plans or as ordered by the Engineer.

Method of Measurement:

Temporary structure barrier will be measured for payment along the centerline at the top of the barrier and will be the actual number of feet of temporary structure barrier furnished, installed, and accepted.

Relocated temporary structure barrier will be measured for payment along the centerline at the top of the barrier each time the barrier has been satisfactorily relocated and anchored as indicated on the plans. Storage of the temporary structure barrier will not be measured for payment.

Basis of Payment:

This work will be paid for at the contract unit price per foot for "Temporary Precast Concrete Barrier Curb (Structure)", complete in place, which price shall include all furnishing, transportation, initial installation, final removal, storage, materials, reinforcing steel, connection rods, and all equipment, tools, and labor incidental thereto. The cost of furnishing, installing, and cutting of anchor bolts shall also be included for payment under this item. Each temporary structure barrier will be paid for once regardless of the number of times it is used on the project. Any barrier units that become lost, damaged or defaced shall be replaced by the Contractor at no cost to the State.

The relocation of the temporary structure barrier will be paid for at the contract unit price per linear foot for "Relocated Temporary Precast Concrete Barrier Curb (Structure)", which price shall include removing, transporting and re-anchoring the barrier units, and all other materials, equipment, tools, and labor incidental thereto.

Delineators will be paid for in accordance with Article 12.05.05.

Pay Item	Pay Unit
Temporary Precast Concrete Barrier Curb (Structure)	l.f.
Relocated Temporary Precast Concrete barrier Curb (Structure)	l.f.

ITEM #0822072A - TEMPORARY PRECAST CONCRETE BARRIER CURB (PINNED)

ITEM #0822073A - RELOCATED TEMPORARY PRECAST CONCRETE BARRIER CURB (PINNED)

Description: Work under this item shall consist of furnishing, installing, relocating, and removing pinned temporary concrete barrier for use on roadways to separate traffic from opposing traffic or work areas. Pinned barriers shall be used at roadway locations where construction phase conditions warrant a barrier system with greater resistance to lateral dynamic deflection than provided by a non-pinned barrier system, with the locations or warrants identified in the plans.

Materials:

1. The barrier shall be precast concrete conforming to Article 8.21.02.

2. Pins and plate washers shall be ASTM F152, Grade 36 and shall be hot dip galvanized after fabrication, in accordance with ASTM A153. All materials shall conform to the requirements of Article M.06.02.

3. Loop bars shall conform to Article 8.22.02.

4. Threaded connection rods shall conform to Article 8.22.02

5. Non-shrink grout shall conform to Subarticle M.03.05.

6. Barrier shall be accepted on the basis of the manufacturer's certification, as defined in Article M.08.02.

7. Anchor pins and plate washers -Certified Test Reports: The Contractor shall submit a Certified Test Report and a Materials Certificate in conformance with Article 1.06.07 and a sample of all anchor pins and plate washers for testing prior to their installation. The Contractor shall not install any anchor pins prior to receipt of the approved test results and approval by the Engineer.

8. Delineators shall conform to Article M.18.09.

Construction Methods:

1. Fabrication: The barrier shall be precast concrete in conformance with the pertinent requirements of Article 8.21.03 and the plans, except that penetrating sealer protective compound is not required. Welding for the anchor pins shall conform to the requirements of Article 6.03.03.

2. Installation: The barrier shall be placed as shown on the plans or as directed by the Engineer.

The barriers shall be pinned thru the flexible pavement in accordance with the plans and the following:

The Contractor shall drill or core through the bituminous pavement with a hole diameter equal to the diameter of the anchor pin. The pin shall be driven through the drilled hole and into the underlying subbase material until the plate washer is tight to the concrete barrier. No portion of the pin or washer shall protrude beyond the limits of the anchor pocket.

The Contractor shall identify any underground utilities in areas of pinned barrier and shall not install any pins that may damage utilities including drainage systems. If pinned barriers are required at a location with such underground utility present, the Contractor shall notify the Engineer of the potential conflict for a determination on the appropriate installation of the pinned barrier.

3. Connection of Barrier Units: The barrier shall be joined together with threaded connection rods, washers, and heavy hex nuts in accordance with the plans.

4. Removal of Anchor Pins: All anchor pins shall be removed prior to the removal or relocation of barrier sections. Pins shall be pulled with the applied force in a direction aligned with the axis of the pin to minimize damage to the surrounding pavement. Pins damaged during the removal operation shall not be reused by the Contractor unless any damage is repaired in a manner acceptable to the Engineer.

5. Patching Anchor Holes: After removal of the barrier, holes in flexible pavement shall be filled in with non-shrink grout or other suitable material approved by the Engineer. Non- shrink grout shall be mixed and placed in accordance with the manufacturer's directions. The fill material shall be finished flush with the roadway surface.

6. Delineators: Delineators shall be installed on top of the barrier in accordance with Article 8.22.03-3 and the plans.

7. General: The barrier shall be kept in good condition at all times by the Contractor during all stages of construction. Any damaged material shall be replaced by the Contractor at his expense.

   When the barrier is no longer required, it shall be removed from the work site and become the property of the Contractor.

8. Relocation of Barrier: If called for on the plans, the Contractor shall relocate the barrier and its appurtenances to locations within the project limits as shown on the plans or as ordered by the Engineer.

Method of Measurement:

Temporary pinned barrier shall be measured for payment along the centerline at the top of the barrier and will be the actual number of meters of temporary pinned barrier furnished, installed, and accepted.

Relocated temporary pinned barrier shall be measured for payment along the centerline at the top of the barrier each time the barrier has been satisfactorily relocated and anchored as indicated on the plans, including to and from the storage area. Storage of the temporary structure barrier will not be measured for payment.

Basis of Payment:

This work shall be paid for at the contract unit price per meter for "Temporary Precast Concrete Barrier Curb (Pinned)", complete in place, which price shall include all furnishing, transportation, storage, materials, reinforcing steel, connection rods, anchor pins, initial installation, and final removal; and all equipment, tools, and labor incidental thereto. The cost of patching anchor holes shall also be included for payment under this item. Each temporary pinned barrier will be paid for once regardless of the number of times it is used on the project. Any temporary barrier units that become lost, damaged or defaced shall be replaced by the Contractor at no cost to the State.

The relocation of the temporary pinned barrier will be paid for at the contract unit price per meter for "Relocated Temporary Precast Concrete Barrier Curb (Pinned)", which price shall include removing, transporting and re-anchoring the barrier units, and all other materials, equipment, tools, and labor incidental thereto. The cost of furnishing additional anchor pins, and for patching anchor holes shall also be included for payment under this item.

Delineators will be paid for in accordance with Article 12.05.05.

Pay Item	Pay Unit
Temporary Precast Concrete Barrier Curb (Pinned)	l.f.
Relocated Temporary Precast Concrete Barrier Curb (Pinned)	l.f.

ITEM #0916111A - NOISE BARRIER WALL (STRUCTURE)

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 a Noise Barrier Wall (Structure) to be supported by an appurtenant structure at the locations shown on the Contract Drawings, in this specification, or as directed by the Engineer.

Noise Barrier Wall (Structure) shall have a reinforced normal-weight concrete core and by virtue of its overall construction and composition, is impervious to the passage of light and has the ability to absorb noise. The maximum unit weight of the panels shall be 50 lbs/sf.

The structural support system of the Noise Barrier Wall (Structure) may be attached, to either an existing structure or new construction, as indicated in the Contract Drawings. This specialized construction of a noise barrier wall shall be fully designed, detailed and manufactured taking into account its structural adequacy and integrity with the supporting structure. The maximum post spacing shall be 5'-6" on the structure.

Specific types of walls are indicated on the Contract Drawings and in this specification that are acceptable by the Connecticut Department of Transportation (Department) to be constructed on specific locations based on their conformance with the requirements in the project. The Contractor shall select the appropriate wall type from a list in the Contract Drawings and in this specification.

The Contractor is directed to verify at the site, all dimensions and information pertaining to the existing construction that are needed in the design, preparation of Working Drawings and in the overall execution of this project.

The Contract Drawings prepared by the Department for this project contain only conceptual and schematic interpretations for the general approach of design. The Contractor shall prepare its structural design calculations and Working Drawings based on the concept and scheme as presented in the Contract Drawings, and in conformance with this specification. **The structural design calculations and Working Drawings prepared by the Contractor shall be reviewed and approved by the Engineer prior to the start of fabrication of any element of the Noise Barrier Wall (Structure).**

Within seven (7) days after the bid opening, the Contractor shall identify by type, name and manufacturer, the specific type of noise barrier wall for each location upon which its bid is based. All noise barrier wall segments or panels selected for each location shall be furnished from the same manufacturer and shall be of the same type, pattern and color.

The Contractor is explicitly notified that no other types of Noise Barrier Wall (Structure) shall be approved to be constructed at each specific site other than the types shown in the

Contract Drawings.

Materials:

The materials to be used for the various components of the Noise Barrier Wall (Structure), including all appurtenant support systems, shall be as specified in this specification.

All materials for the noise barrier walls shall comply with the FTA's Buy America requirements in 49 USC & & 5323(j) and 49 CFR Part 661.

The Noise Barrier Wall (Structure) chosen shall be selected from a list of manufacturers provided in this Specification. This list identifies various manufactured types of noise barrier wall systems that are considered appropriate and acceptable for each specific location in the project but does not guarantee that all the listed proprietary noise barrier wall systems can be designed to meet all the dimensional, structural, or geotechnical constraints at each site. **The Contractor shall not commence with the production of its proposed system of Noise Barrier Wall (Structure) without the Engineer's review and written approval.**

The General List shown in this Specification and on the Contract Drawings identifies the acceptable manufactured systems of Noise Barrier Wall (Structure) of the absorptive type, and their manufacturers, for use in all Connecticut Department of Transportation's projects:

1. **NB15**
   Durisol
   8270 Greensboro Drive,
   Suite 810
   McLean, VA 22102
   (302) 299-6821
   www.durisol.com

2. **Whisper Wall**
   Concrete Innovation Services
   4212 Lafayette Center Drive Suite 1-
   A Chantilly, VA 20151
   (703) 222-9702
   www.whisper-wall.com

3. **Soundsorb**
   Concrete Solutions, Inc.
   3300 Bee Cave Road, Suite 650
   Austin, TX 78746
   (512)327-8481
   www.soundsorb.com

Not all of the above-listed walls are suited for use at specific locations due to structural requirements and concerns or, that the environment or locality warrants a certain type or style of wall to be used.

The materials used for the types of noise barrier walls shall be durable, and not be prone to developing openings, cracks or gaps from loading, warping, splitting, shrinkage, expansion, delamination, weathering and other weather-related and climactic-induced deterioration. The noise barrier wall panels shall be U.V.-resistant, flame-retardant, and could resist degradation from ozone, hydrocarbons and freeze-thaw cycling.

The Noise Barrier Wall (Structure) 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. The sound- absorbing portions of the wall shall be durable and resistant against deterioration of material and damage from moderate scratch and abrasion and shall have a minimum of 20-year life cycle free from peeling, rotting or visible deterioration.

The Noise Barrier Wall (Structure) shall have a textured surface pattern on both sides. Specific textured surface patterns have been approved for use by the Department. The selected pattern for each wall location shall be as shown or noted on the Contract Drawings, and other patterns will not be acceptable. If both sides of the Noise Barrier Wall (Structure) contain a textured surface pattern, the side of the panels covered with the sound-absorbing material shall consistently face the roadway throughout the project. The sound-absorbing material shall be installed on the entire wall face that is exposed to the roadway. Post covers or other devices supplied by the manufacturer and approved by the Engineer should be used.

The color of the Noise Barrier Wall (Structure) exposed to traffic will be indicated on the Contract Plans, conforming to Federal Standard 595 Colors except if specified otherwise on the 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 34230	Green
FS 30215	Brown
FS 36622	Gray

The Noise Barrier Wall (Structure) panels shall be integrally-pigmented to a significant depth into its cross-section in conformance with the requirements of ASTM C979, in order 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. Field-staining or painting to achieve a uniform overall color is not allowed.

Individualized design panels may vary from standard wall colors, textures, and patterns, as

depicted in the Contract Drawings.

The Noise Barrier Wall (Structure) shall have a suitable surface for repainting, staining, sandblasting or other acceptable method of returning the panels to their original color and texture should they become damaged after construction. Touching-up, re-staining, repainting, or sandblasting portions of the panels shall not result in visible color variation.

The manufacturer of the Noise Barrier Wall (Structure) shall provide to the Department, an Aesthetic Coating Warranty of its product that covers a minimum of ten (10) years.

The Contractor shall also supply the Department with two (2) full-panel sections of Noise Barrier Wall (Structure) measuring 4 feet high of similar length and width as the panels to be constructed. These panels of noise barrier walls shall be of the same color and pattern as the Noise Barrier Wall (Structure) to be constructed. These noise barrier wall panels shall be delivered and unloaded at a recommended D.O.T. Maintenance Facility that will be ultimately responsible for the maintenance of the Noise Barrier Walls.

Other:

All other materials shall conform to the requirements as indicated on the approved Working Drawings of the specific system of Noise Barrier Wall (Structure) selected for the project.

Construction Methods:

Design:

The Noise Barrier Wall (Structure), including all structural supports such as but not limited to, reinforced concrete parapets, barrier curbs, columns, piles, caissons and footings, anchor bolts, and structural steel columns, beams, bolts and plates for the framing and support of the noise barrier wall, shall be designed for the most severe combination of gravity and lateral loads in accordance with the AASHTO LRFD Bridge Design Specifications, 7th edition with interim revisions up to and including 2016 and the Standard Specifications for Highway Bridges (AASHTO – 2002 with Interim Specifications up to and including 2003).

At the specific locations shown on the Contract Drawings containing the concrete-type Noise Barrier Wall (Structure), the entire length of the wall must be fully supported along the bottom panel, with a structural steel beam that spans between steel columns. The steel beam on either side of the column must frame onto the column so as to impose a stabilizing dead load on the assembly against overturning from lateral loads. All steel components of the structural system supporting the Noise Barrier Wall (Structure), including but not limited to beams, columns, base plates and anchor bolts shall be galvanized after fabrication.

The visible sections of the Noise Barrier Wall (Structure) shall have the same color, pattern, texture and height of individual panels as that of the adjacent sections of Noise Barrier Wall in the Highway portions of the project, unless otherwise specified in the Contract Drawings or this

Specification. Post covers or other devices supplied by the manufacturer and approved by the Engineer shall be installed on both sides of the noise barrier wall (structure) in accordance with manufacturer's requirements over all noise barrier wall (structure) posts the full visible length of the noise barrier wall (structure) system.

At a minimum, the top of the Noise Barrier Wall (Structure) shall be at the Top of the Wall Elevations shown on the Contract Drawings.

The bottom panel of the Noise Barrier Wall (Structure) shall have a minimum height of 4 feet.

The Noise Barrier Wall (Structure) shall also be designed in accordance with the manufacturer's requirements, details and specifications for the type of wall chosen if proved that such design parameters are consistent with, or more adequate and stringent than the design requirements established in this Specification or in the Contract Drawings, and if reviewed and approved by the Engineer.

The concrete Noise Barrier Wall (Structure) shall have an integral cap with a minimum height of 6" on the top panels. The caps shall be cast with a sound-absorptive material.

The horizontal joint lines between panels in Noise Barrier Wall (Structure) shall match for a minimum distance of 60 feet. If steps-up are required in cases of significant changes in grade, the elevation difference between the horizontal joints of adjacent panels shall not be less than 3" or greater than 12". These requirements shall also apply to the top elevations of the walls. Strict adherence to these requirements may be waived at angle breaks greater than 30 degrees or as approved by the Engineer.

When a particular type of noise barrier wall transitions into a different type, or when a segment of noise barrier wall transitions onto an adjacent segment as necessitated by geometric offset on plan and/or elevation or by the differences in the support structures, or as indicated in the Contract Drawings, the Contractor shall be responsible for the design of the transition and connection components of the noise barrier wall systems.

All longitudinal gaps between the noise barrier wall panels and the top of parapets must be provided with auxiliary members to close such gaps and prevent the escape of noise. The system or mechanism to prevent the escape of noise through these gaps must be designed by the manufacturers of Noise Barrier Wall (Structure), and be clearly detailed in the Contractor's Working Drawings. The design and detail drawings must take into account the relative movements between the noise barrier wall panels and parapets.
The minimum distance from centerline of post to an expansion or construction joint shall be no less than 24". Post covers shall be installed on both sides of the noise barrier wall (structure).

The structural design of Noise Barrier Wall (Structure) shall take into account any expansion and contraction movements of the various framing components and supporting structures due to changes in temperature, most especially at locations in proximity with expansion joints at the

bridge deck and parapets. A thermal expansion and contraction of not less than 1 ½ inches of the bridge deck, bridge parapets and wingwall parapets at all existing expansion joints must be accounted for in the design. Provisions to account for the localized and global effects of these temperature-induced movements in the design of the various framing components and supporting structures must be explicitly detailed in the Contractor's Working Drawings.

Submittals:

The Contractor shall be fully responsible for the structural design, preparation of drawings and conformance to all additional specifications required for the selected Noise Barrier Wall (Structure). The Designer or Responsible Engineer shall have at least Five (5) years of professional experience in the structural design of the afore-mentioned types of noise barrier walls. All drawings to be submitted by the Contractor shall conform to Section 1.05.02 regarding Working Drawings with the following additions:

Preliminary Submissions for Proprietary Noise Barrier Wall (Structure): Prior to the start of fabrication or the construction of the Noise Barrier Wall (Structure), the Contractor shall submit to the Engineer a design package, which shall include six (6) sets of Working Drawings and four (4) sets of Structural Design Calculations for review and approval by the Engineer in accordance with Article 1.05.02 The design package shall include, but not be limited to the following:

Working Drawings and Structural Design Calculations:

1. Plans shall be submitted in a PDF format.

2. All Plans and Computations to be submitted to the Engineer 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 issues that may occur during the performance of his work.

3. Full Plan View, drawn to scale, of the Noise Barrier Wall. This view shall show:

    a. Beginning and end of the wall, as well as any angle points;
    b. Posts shall be identified, numbered and located with the proposed coordinates;
    c. Roadway baseline with 100-ft stations labeled;
    d. Location of existing and/or proposed cantilever and truss sign supports, if any;
    e. Location of existing and/or proposed utilities. (Any existing utilities which are shown on the plans should be verified in the field.)

4. Full Elevation View (Roadway side), drawn to scale, of the Noise Barrier Wall, and including:
    a. Elevations of the finished top and bottom of the Noise Barrier Wall panels at all locations;
    b. Panel sizes;

c. Location of horizontal angle points;
d. Post lengths.
e. Transitions between different wall styles or types;
f. The approximate locations of 100-ft. baseline stations (perpendicular);
g. Location of access for fire hoses or other appurtenances as applicable.

5. Drawings shall include Plans, Details and Sections for the following:
   a. Representative wall panels showing the pattern, color, and texture of the proposed Noise Barrier Wall
   b. Any individualized design panel depicting pattern, dimensions, depth of pattern, textures, and colors
   c. Footings for all expected soil conditions (soil, rock, partial soil/rock)
   d. Attachment and anchorage of the Noise Barrier Wall gravity and lateral loads resisting systems onto the parapets of the existing bridge and wingwalls or onto new concrete columns, considering:
      i. Anchor bolts in sustained tension loading must not be installed in a chemical anchoring material.
      ii. Show arrangement of anchor bolts on plan and section.
      iii. Consideration of tolerances for the locations of Noise Barrier Wall posts relative to locations of expansion joints in the parapets.
      iv. Details and methods for eliminating gaps between the parapet top and side with the Noise Barrier Wall panels.
      v. Allowable installation tolerances for posts including allowable variations of horizontal spacing and from plumb.
   e. New columns and footings supporting the Noise Barrier Wall gravity and lateral loads resisting systems
   f. Transition between different wall styles or types
   g. Transition between walls at geometric offset on plan and elevation
   h. Transition between walls on different supporting structures
   i. Provisions for temperature expansion and contraction in the wall support systems.
   j. Methods of protection of any existing utilities, facilities and sub- structures during the construction of the Noise Barrier Wall
   k. Any false-work required to temporarily support the components during construction.
   l. Construction and installation procedures
   m. Allowable fabrication tolerances for wall panels and posts
   n. Details for covering noise barrier wall posts with manufacturer supplied post covers or other approved devices.

6. Calculations shall include:
   a. Computations shall clearly comply with and reference applicable AASTHO provisions.
   b. Structural design for the footings/foundations for the Noise Barrier Wall, modeling all expected soil conditions (soil, rock, and partial soil/rock).

c. Structural design for the support and framing systems of the Noise Barrier Wall for the combination of gravity and lateral loads (wind and seismic).
d. Structural design for the attachment and anchorage of the support and framing systems of the Noise Barrier Wall for the combination of gravity and lateral loads (wind and seismic).
e. Structural design for the gravity and lateral (wind and seismic) load resisting systems of the Noise Barrier Wall.
f. Documentation of computer programs utilized, including all design parameters.

Final Submissions of Noise Barrier Wall (Structure) Drawings:

Once the Working Drawings for the Noise Barrier Wall (Structure) 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 walls 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.

Construction Specifications:

1. Construction tolerances, methods and material specifications specific to the noise barrier walls chosen shall be provided to the Department. Submittal requirements for materials such as certification, quality, and acceptance/rejection criteria should be included.

2. Any requirements from the Manufacturer specific to the noise barrier wall that are 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:
2. Posts $\leq$ 16' long = $\pm$1/8"
   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$1/8" per 10' of wall height

Panels

Panel Dimension Tolerances:

1. Panel Length and Height = ±1/4”
2. Panel Structural Thickness = ±1/4”
3. Panel Absorptive Material Thickness = ±1/4”
4. Panel Horizontal Sweep = ±1/8”
5. Panel Vertical Sweep = ±1/8”

Position of Lifting Inserts:

1. Along Panel Length = ±1”
2. Along Panel Thickness = ±1/4”

Reinforcing Steel Tolerances:

1. Splice = +1” from Standard Lap Splice Requirement
2. Concrete Cover = +2

Other

There shall be no 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. The textured surface finish shall be similar and consistent in material and construction with that of the Highway portion of Noise Barrier Wall in the project.

If the proposed noise barrier wall is being used to replace an existing noise barrier wall, the top of the proposed noise barrier wall shall be constructed to no lower than the top elevation of the existing wall or as shown on the Contract Plans, or unless specifically noted otherwise.

Unexpected Obstructions:

If during construction, the avoidance of unexpected or unforeseen obstructions requires the revision of portions of the original design, the Contractor shall provide a revised design of the affected portions for review and written approval by the Engineer.

The Contractor shall schedule its construction operations such that access to the areas behind the walls would not be required in the performance of the remainder of the work once access has been rendered difficult or inexpedient. The Contractor, having caused its own access to be restricted or limited, as a result of prioritizing to finish grades, stabilize slopes or establish turf ahead of the other work, shall not be permitted to use any of these circumstances as a reason to not perform or finish the required work. Should the Contractor need access to these areas, the additional work to re-establish grades, re-establish slopes, re-establish turf or any work to restore the ground to a finished condition as shown in the Contract Drawings, shall be performed at the sole expense of the Contractor.

The Contractor shall restore all ground beyond the established Limits of Disturbance, if disturbed

by the construction of the noise barrier walls. The ground restoration shall be in accordance with the proposed finished condition shown in the Contract Drawings. The Contractor shall remove all excess materials from the site.

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 its own cost.

On-Site Representative:

A qualified and experienced representative from the manufacturer of noise barrier wall shall be present at the site during the start of construction to assist the Contractor and the Engineer. The representative shall also be available for consultation on an as- needed basis, if requested by the Contractor or the Engineer.

Installation:

All panel units shall be installed in accordance with the Manufacturer's recommendations by an Installer who is duly qualified, approved and certified by the Manufacturer to perform the work, and who exhibits reasonable familiarity and experience for the type of work involved in the installation of Noise Barrier Wall (Structure) described in this Specification and Contract Drawings.

Special care shall be taken to properly set the bottom panel units true-to-line and grade. All bottom panel units shall have a minimum height of 4 feet.

The 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 the exposed face deviates from the look of the approved model as to color or texture as determined by the Engineer.

Acceptance Criteria for Sound Barrier Wall (Structure):

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 wall system free of discoloration, cracks or objectionable marks which may adversely affect the barriers performance, aesthetics, or serviceability as determined by the Engineer. All panels that exhibit any form of structural damage, as determined by the Engineer, will be rejected without any cost to the Department, either at the fabrication shop or at the construction site, even after installation, but prior to acceptance of the job.

Panels with textured surface treatments shall be rejected if the color and texture on the exposed faces deviate, or show variations from the approved model, as determined by the Engineer.

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 re-installing panels to enable access to the panel to be replaced. Any panels that are damaged during panel replacement shall also be replaced or repaired per the direction of the Engineer. Any work to stabilize areas adjacent to the wall required due to replacement of cracked or damaged panels shall be done at the Contractor's own cost.

Method of Measurement:

Noise Barrier Wall (Structure) shall be measured for payment by the number of square feet of Noise Barrier Wall (Structure) completed and accepted within the limits indicated on the plans or as ordered by the Engineer and shall be measured from center to center distance between vertical columns supporting each wall panel. The vertical pay limit shall be measured from the bottom to the top of the barrier panel section. Each span between columns shall be measured for payment separately, as stepping may be required.

The two (2) full panel sections of Noise Barrier Wall (Structure) delivered to the D.O.T. Maintenance Facility shall be measured and paid for as Noise Barrier Wall (Structure) (sq ft)

Basis of Payment:

Payment for this work will be made at the Contract unit price per square foot for Noise Barrier Wall (Structure) complete in place, which price shall include engineering and design, on-call and on-site services of the representative from the wall manufacturers, all work and materials used for the fabrication, complete installation and construction of the walls, 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 cost for all materials and labor for the construction of concrete columns and footings as designed by the Contractor and the retrofit of the existing retaining wall if found structurally inadequate for the addition of new loads as designed by the Contractor.

Payment shall also include the pigmentation and coatings of the walls.

No payment shall be made for survey, field-verification work and the preparation of working drawings.

No additional payment will be made for the delivery of the additional panels to the DOT Maintenance Facility but the cost thereof shall be included in the unit cost for this item.

PAY ITEM	PAY UNIT
Noise Barrier Wall (Structure)	s.f.

ITEM #0916126A - NOISE BARRIER WALL

ITEM #0916127A - NOISE BARRIER WALL (EARTH RETAINING PANELS)

ITEM #0916219A - ROCK IN POLE EXCAVATION

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 the list provided in this specification. This 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 this specification.

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.

All materials for the noise barrier walls shall comply with the FTA's Buy America requirements in 49 USC & & 5323(j) and 49 CFR Part 661.

The General List shown in this Specification identifies the acceptable manufactured systems of Noise Barrier Wall of the absorptive type, and their manufacturers, for use in all Connecticut Department of Transportation's projects:

1. Durisol - NB15
Durisol
8270 Greensboro Drive, Suite 810
McLean, VA 22102
(302) 299-6821
www.durisol.com

2. Whisper Wall
Concrete Innovation Services
4212 Lafayette Center Drive Suite 1-A Chantilly, VA 20151
703-222-9702
www.whisper-wall.com

3. Soundsorb
Concrete Solutions, Inc.
3300 Bee Cave Road, Suite 650
Austin, TX 78746
512-327-8481
www.soundsorb.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.

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 textured surface patterns shall match the textured surface pattern used on surrounding noise barrier walls. Other patterns will not be acceptable.

The noise barrier wall shall have a textured absorptive surface pattern on both sides if not noted otherwise in the contract drawings. The selected patterns shall be submitted to the Engineer for approval. Post covers, panel caps, bottom panel or other devices shall be supplied by the manufacturer and approved by the Engineer. They (bottom panel visible portions only) shall have the same color, textured surface pattern, and absorptive properties as the rest of the noise barrier wall panels.

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 (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 4 feet.

Noise barrier wall (earth retaining panels) shall have the same color, pattern, and textured absorptive surface pattern 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:

Rock in so far as it applies to "Rock in Pole Excavation" shall be defined as rock in definite ledge formation, boulders or portions of boulders, cement masonry structures, concrete structures, old noise wall footings or portland cement concrete pavement having a cross-sectional area that exceeds 50% of the cross-sectional area of the designed noise barrier wall upright support hole.

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 LRFD Bridge Design Specifications, 8th edition dated 2018

The noise barrier wall shall also be designed in accordance with the manufacturer's requirements, details and specifications for the noise barrier chosen.

Post covers or other devices supplied by the manufacturer and approved by the Engineer shall be installed on both sides in accordance with manufacturer's requirements over all noise barrier wall posts the full length of the noise barrier wall system.

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.

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 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 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 by PDF.

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:
   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.
l. Details for covering noise barrier wall posts with manufacturer supplied post covers or other approved devices.

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 5-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.

v. Earth retained noise barrier wall sections backfill material shall not contain any material which passes a No. 200 sieve. Backfill shall be placed in accordance with Section 2.02.

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 = +1/2” Post Vertical Sweep:
2. Posts < 16’ long = +1/8” 2. Posts > 16’ long = +1/4”

Post Installation:

1. In horizontal plane from plan location = +1”
2. In horizontal plane from adjacent post = +1/2”
3. Post plumb = +1” per 10’ of wall height

Panels:

Panel Dimension Tolerances:
1. Panel Length and Height = +1/4”
2. Panel Structural Thickness = +1/4”
3. Panel Absorptive Material Thickness = +1/4”
4. Panel Horizontal Sweep = +1/8”
5. Panel Vertical Sweep = +1/8”

Position of Lifting Inserts:
1. Along Panel Length = +1”
2. Along Panel Thickness = +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 driving piles, 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 driven unless alternate methods are proposed by the noise barrier wall designer and approved by the Engineer.

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.

Tolerance of driven posts shall be 1" in any two directions from the proposed pile location. If a post becomes driven off-line the post shall be re-aligned to obtain the desired tolerance.

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 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).

Rock in so far as it applies to "Rock in Pole Excavation" shall be defined as rock in definite ledge formation, boulders or portions of boulders, cement masonry structures, or existing concrete structures. Where rock is encountered, it will be measured for payment from the top of the rock to the bottom of the necessary rock excavation when such rock has a cross-sectional area that exceeds 50% of the cross-sectional area of the designed noise wall upright support hole. Concrete required to fill the excavation beyond the designed support hole diameter or depth will not be measured for payment.

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 (sq ft).

Crushed Stone used under and/or adjacent to the Noise barrier wall shall not be measured for payment but included in the price for the noise barrier wall.

Basis of Payment:

Payment for this work will be made at the Contract unit price per square foot for Noise Barrier Wall and Noise barrier wall (earth retaining panels 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.

When rock is encountered within the limits of excavation for vertical supports, its removal will be paid for at the Contract unit price per vertical foot for "Rock in Pole Excavation," which

price shall include any additional excavation to remove the rock and any additional concrete required to fill the excavation beyond the designed pier hole diameter or depth.

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.

No additional payment will be made for delivery of the additional panels to the DOT Maintenance Facility.

Pay Item	Pay Unit
Noise Barrier Wall	s.f.
Noise Barrier Wall (Earth Retaining Panels)	s.f.
Rock in Pole Excavation	v.f.

ITEM #0916406A - REMOVE NOISE BARRIER WALL

Description:

The contractor shall remove the existing noise barrier walls to be replaced with new precast concrete noise barrier walls as shown in the plans.

Materials:

Materials encountered during the removal of the noise barrier walls will be existing panels made of mineral wool wrapped in plastic with an external plastic casing, timber panels, steel posts and concrete foundations.

Construction Methods:

Existing noise wall materials shall be removed in their entirety. Any concrete foundations associated with the noise wall shall be removed according to plans. Following completion of the noise wall removal, the area shall be left in a safe manner as described in Section 1.07.

Method of Measurement:

Noise barrier walls removed under this item will be measured for payment by the actual number of linear feet of wall removed, measured along the centerline of the posts.

Basis of Payment:

Removal of noise barrier walls will be paid for at the Contract unit price per linear foot, for which price shall include all equipment, tools, and labor incidental to the completion of these items. All costs incidental to the disposal of the panels, posts, reinforcing steel and other debris will be included in the price above. The removal of concrete noise wall foundations will be paid for at the contract unit price per cubic yard for “Rock Excavation”.

Pay Item	Pay Unit
Remove Noise Barrier Wall	l.f.

ITEM #0917010A - REPAIR GUIDERAIL (ESTIMATED COST)

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.

Pay Item	Pay Unit
Repair Guiderail (Estimated Cost)	est.

ITEM #0921160A - SIDEWALK SHED

Description:

Work under this item shall consist of furnishing, erecting, maintaining and removing structures over public sidewalks to protect pedestrians from falling objects from construction activities where shown on the plans or as directed by the Engineer.

Materials:

All materials used for the sidewalk sheds shall be suitable for the intended purpose and shall meet the minimum material requirements identified in the Contractor's Working Drawing submission and shall also meet the requirements of sections M.03, M.06, M.11 and M.15 as applicable. All material proposed for use that has been salvaged shall be subject to inspection by the Engineer. Material deemed to be damaged or otherwise unsuitable for use shall be removed from the site by the Contractor.

Construction Methods:

The Contractor shall prepare a Working Drawing submission for the sidewalk sheds in accordance with Section 1.05.02. The submission shall include the details of the sheds, lighting, anchorage, material requirements, and construction and maintenance requirements. The working drawings shall be signed and sealed by an Engineer registered in the State of Connecticut and shall include the supporting design calculations.

Sidewalk sheds shall be erected in accordance with the manufacturer's recommendations for prefabricated pedestrian shelters or in accordance with any special construction requirements specified in the working drawing submission for Contractor designed systems.

Shed construction shall be performed in a workmanlike manner with care taken to provide a secure structure that satisfies the need to provide a roofed enclosure without introducing hazards including sharp edges, projections or other potential safety hazards. Sheds shall be in place prior to any construction or demolition on overpass structures and shall typically extend 10 feet beyond the limits of the overpass structure. Sheds shall be removed within one week of the completion of all construction or demolition activity on the overpass structure.

Sheds shall provide an unobstructed passageway with a minimum clear width of 4 feet and a clear height of 8 feet for pedestrian access and shall be lighted at all times by either natural or artificial light. The level of illumination shall have an intensity of not less than five foot-candles (54 lux) measured at the walkway level to ensure the safe movement of persons. Lighting shall be vandal proof fixtures mounted a minimum of 8 feet above the sidewalk level. Sheds shall have a solid roof deck designed for a minimum construction load of 150 psf. Edges of roof deck shall be detailed with debris guards that prevent miscellaneous construction debris from falling onto areas accessible to pedestrians. Sheds shall be designed with open sides facing the adjacent roadway. The side walls on the far side from the roadway may be designed as open or solid faced. he

Contractor shall not store materials on the shed or use the shed to support other construction activities unless the shed was specifically designed and detailed for such use.

The Contractor shall be responsible for the maintenance of sidewalk sheds including the lighting. Snow or construction debris accumulations on the roof of sheds shall be removed as a regular maintenance activity and the Contractor's design of the shed shall account for the loads associated with snow, construction debris and the removal of same.

The Contractor shall remove portions of the shed when construction access or a work area is required to perform adjacent construction on bridge substructures. Such removal and the subsequent reinstallation shall only take place when the section of sidewalk is closed to pedestrian traffic and an alternate pathway is open for pedestrians in accordance with the Item #0971001A - Maintenance and Protection of Traffic.

Method of Measurement:

This work will be measured for payment by the actual number of linear feet of sidewalk sheds installed as shown on the plans or as ordered by the Engineer, measured along the centerline of the shed.

Basis of Payment:

This work will be paid for at the contract unit price per linear foot for "SIDEWALK SHED" complete in place, which price shall include all materials, equipment, tools and labor incidental thereto, including the preparation of working drawings, the furnishing of lighting including the power source, maintenance of the sheds including lighting and removal of the sheds at the completion of the construction activity requiring the shed. Partial removal of sheds and reinstallation required for Contractor construction access or a work area is included in the unit price for this item with no additional payment for this work.

Temporary barrier required to protect shed structures from vehicles shall be paid under the item "TEMPORARY PRECAST CONCRETE BARRIER CURB".

Pay Item	Pay Unit
Sidewalk Shed	l.f.

ITEM #0945005A - WILDFLOWER ESTABLISHMENT

Description: The work included in this item shall consist of providing an accepted uniform stand of established wildflowers by furnishing and placing seed and mulch on all areas to be treated as shown on the plans, permits or as directed by the Engineer.

The work will also include the installation of bio-degradable erosion control matting, as shown on plans, permits or as directed by the Engineer, consisting of mulch and netting woven together as a unit.

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

Mulch shall meet the requirements of Article M.13.05.

Bio-degradable erosion control matting, if required, shall be from the Department's Qualified Products List and shall meet the requirements of Article M.13.09.

All seed mixture sources, mulch and erosion control matting shall be approved by Engineer prior to application.

Three approved seed mixtures are detailed below.

1. **New England Wildflower Seed Mix: (NEWP) New England WetMix**, New England Wetland Plants, Inc. 800 Main Street Amherst, MA 01002, or equal. Rate shall be 1 pound PLS per 1900 sq.ft.

2. **XERCES Northeastern Pollinator Mix:** Ernst Conservation Seeds Inc. 8884 Mercer Pike, Meadville, PA, 16335, or equal. Rate shall be 8 pound PLS per 1 acre.

3. **Wildflower & Grass Mix**, Vermont Wetland Plant Supply, LLC, P.O. Box 153, Orwell, VT, 05760, or equal. Rate shall be 1 pound PLS per 1600 sq.ft.

All seed mixtures must be approved by the Environmental Scientist from the Office of Environmental Planning in advance of purchase. The materials certification for any proposed mixture shall be submitted a minimum of thirty (30) days prior to delivery on site by the Contractor. All seed material certifications must have seed mixtures that shall not include any invasive species pursuant to Connecticut General Statute Sec. 22a-381d or any State Threatened or State Endangered species known pursuant to Connecticut General Statute Sec. 26-303 which would be a violation of the Connecticut Endangered Species Act. The seed tags from the bags are to be removed by the Engineer upon delivery and attached to the Material Certification. A copy of the seed tag is to be provided to the Environmental Scientist. No seeding shall occur if the requirements are not met.

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

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

Preparation of Seedbed Areas:

a. Level areas, median areas, interchanges and lawns: These areas shall be made friable and receptive for seeding by discing or by other approved methods to the satisfaction of the Engineer. The final prepared surface which has been seeded shall meet the lines and grades for such surface areas as shown on the plans, or as directed by the Engineer.
b. Slope and embankment areas: These areas shall be made friable and receptive to seeding by approved methods which will not disrupt the line and grade of the slope surface. In no event, will seeding be permitted on hard or crusted soil surface.

All areas to be seeded shall be reasonably free from weeds taller than 3 inches. Removal of weed growth for the slope areas shall be those methods which do not rut or scar the slope surface or cause excessive disruption of the slope line or grade as approved by the Engineer. Seeding on level areas shall not be permitted until substantial weed growth is removed and approved by the Engineer.

Seeding Season: The calendar dates for seeding shall be:

Spring – March 1 to June 15
Fall – September 15 to November 15

Seeding Methods: The wildflower seed mixture shall be applied by an agronomically acceptable procedure approved by Environmental Scientist. The rate of application shall be as shown on the plans or directed by the Engineer.

(Germination Percentage X Purity Percentage)/ 100 = Percentage PLS

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

Method of Measurement: The work will be measured for payment by the number of pounds of each size and kind of wildflower seed counted, planted and accepted.

Basis of Payment: This work will be paid at the contract unit price per pound for "Wildflower Establishment," which price shall include all materials, maintenance, equipment tools, labor, transportation, operations, and all work incidental thereto. Partial payment of up to 50% may be

made for work completed, but not accepted. Full payment shall not be made until the area has been accepted by the Engineer.

Pay Item	Pay Unit
Wildflower Establishment	lb.

ITEM #0950043A - WETLAND GRASS ESTABLISHMENT

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

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

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

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

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

1. **New England Wet Mix (Wetland Seed Mix)**, New England Wetland Plants, Inc. 820 West Street Amherst, MA 01002, or equal. Rate shall be 1 pound PLS per 2,500 sq. ft.

2. **OBL Wetland Mix,** Ernst Conservation Seeds, Inc. 8884 Mercer Pike, Meadville, PA 16335, or equal. Rate shall be 1 pound PLS per 2,000 sq. ft.

3. **Vermont Wetland Shrub**, Vermont Wetland Plant Supply, LLC, P.O. Box 153, Orwell, VT 05760, or equal. Rate shall be 1 pound PLS per 2,420 sq. ft.

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

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

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

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

Wetland grass establishment seeding for areas other than the Wetland Mitigation Site(s), when required: Seeding dates shall adhere to Form 817 Section 9.50 – Turf Establishment.

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

(Germination Percentage X Purity Percentage)/100 = Percentage PLS

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

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

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

Pay Item	Pay Unit
Wetland Grass Establishment	s.f.

ITEM #0952001A - SELECTIVE CLEARING AND THINNING

Section 9.52 is amended as follows:

Article 9.52.03 – Construction Methods is supplemented as follows:

Where directed by the Engineer, materials to be cut, trimmed or removed shall be those items

Where the Contractor is directed by the Engineer or shown on the plans, materials to be cut, trimmed or removed shall be as follows:

- Those items that obstruct the sight lines of the CCTV and VMS locations. The Contractor shall refer to the plans for approximate location and limits of the sight line clearing for each site. The Contractor shall not conduct any selective clearing and thinning work, unless directed by the Engineer, until such time that the proposed CCTV and VMS equipment is operational so that the sight lines can be verified by the Engineer and the Highway Operations Center. Final limits shall be determined in the field and coordinated with the Highway Operations Center following the installation and testing of the proposed CCTV and VMS devices and equipment.

- Those items that restrict visibility to an extruded aluminum sign to less than 800 ft (244 m). The entire sign will be visible for 800 ft (244 m) measured from the center of the right-travel lane approaching the sign, as viewed from a 3.5 ft (1.1 m) height above the roadway.

  All trees scheduled to be removed shall be visibly marked or flagged by the Contractor at least seven (7) days prior to the cutting of such trees.

  The Engineer will inspect the identified trees with the Contractor and the limits of the clearing and thinning prior to the Contractor proceeding with cutting operations.

ITEM #0969030A - PROJECT COORDINATOR (MINIMUM BID)

Article 1.05.08 – Schedules and Reports of the Standard Specifications is hereby amended by the following:

Add the following:

Description: Under this item the Contractor shall furnish the services of an administrative employee, entitled the Project Coordinator, for this Project, to coordinate and expedite all phases of the work required for the Project and to ensure that the construction schedule is maintained.

The minimum lump sum bid for this item shall be equal to 0.5% of the Contractor's total bid. Failure of the Contractor to bid at least the minimum amount will result in the Department adjusting the Contractor's bid to include the minimum bid amount for this item.

The Project Coordinator's resume shall be submitted for approval by name, in writing, within seven (7) calendar days of the award of the Contract, and shall not be changed without prior written notice to the Department.

This resume must demonstrate the Project Coordinator is experienced and versatile in the preparation, interpretation and modification of Critical Path Method (CPM) construction schedules. This must include successful completion of at least three (3) construction projects of similar complexity, where they served in a lead scheduling capacity. If the Contractor does not have a person in their company that has these skills, then the Contractor shall engage the services of a Consultant, subject to the approval of the Engineer, for the scheduling work required. If a Consultant is engaged, they shall be present at the first meeting, along with the Project Contractor, prepared to discuss, in detail, the methods and techniques they propose to use. Thereafter, the Project Coordinator or the Consultant responsible for updating the CPM Schedule shall attend all meetings between the Contractor, its Subcontractors, and any other meetings, which will affect the CPM schedule. The Contractor shall prepare CPM Schedules utilizing the latest version of Primavera Project Planner software.

When the Contract is administered under Section 1.20, the following requirement shall also apply:

The Project Coordinator shall have, in addition to the above noted requirements, a minimum of eight (8) years' experience related to commercial/industrial building construction as a Project Coordinator performing duties similar to those required herein. The Project Coordinator shall have knowledge of all trades involved in the construction, including civil/site work, environmental work, concrete work, masonry work, steel work, wood work, electrical work, and mechanical work. Other combinations of experience and education totaling ten (10) years in commercial building construction will be considered subject to the approval of the Engineer.

Computer Software and Printer: The Contractor shall provide the following equipment with all the required maintenance and repairs (to include labor and parts) throughout the Contract life.

The Engineer reserves the right to expand or relax the specification to adapt to the software and hardware limitations and availability.

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 the software producer for the duration of the project. The Contractor shall deliver to the Engineer all supporting documentation for the software and hardware including any instructions or manuals.

Software – Minimum Specification: The Contractor shall provide the Engineer with a licensed copy of the latest version of the Oracle Primavera Contractor – Deluxe Version scheduling software, registered in the Department's name, and maintain the Primavera customer support service contract over the duration of the project.

Printer: An addition printer shall be provided that meets the printer specifications noted under contract item for "Construction Field Office" and is compatible with the software.

The Contractor is responsible for service and repairs to all computer hardware. All repairs must be performed within 24 hours. If the repairs require more than a 24 hours then a replacement must be provided.

Construction Methods: The Project Coordinator shall attend all meetings between the Contractor and the Department, the Contractor and its Subcontractors, and any other meetings that affect the progress of the job. The Project Coordinator shall be knowledgeable of the status of all parts of the work throughout the length of the Contract.

Please delete any reference to Bar Chart under 1.05.08 – Schedule and Reports and replace with the following:

Critical Path Method (CPM)

Please add the following:

Proper relationship between all major activities shall be indicated. Node numbers shall be coded such that the major activities shown on the Critical Path Schedule shall be easily referenced to the Detailed Project Schedule when it is developed. Break down the work covered under each Special Provision, or Division and Section of Article 1.20 of the Standard Specifications, into individual activities required and logically group related activities together within the CPM.

All documents, which require approval by the Department, shall be clearly identified within the schedule. The Department and any outside agency shall be allocated a minimum number of calendar days in accordance with Article 1.20-1.05.02. If Article 1.20 does not apply, then the Department shall be allocated a minimum of thirty (30) calendar days for review and approval of each submittal. Any submittals requiring approval by an outside Agency (ConnDEEP, Coast Guard, Army Corps of Engineers, etc.) shall be allocated a minimum of sixty (60) calendar days.

The Department shall not be held responsible for any delay associated with the approval or rejection of any substitution or other revisions proposed by the Contractor.

The schedule shall indicate the logic of the work for the major elements and components of work under the Contract, such as the planned mobilization of plant and equipment, sequences of operations, procurement of materials and equipment, duration of activities, type of relationship, lag time (if any), and such other information as it is necessary to present a clear statement of the intended activities.

The schedules shall consist of a network technique of planning, scheduling and control, shall be a clear statement of the logical sequence of work to be done, and shall be prepared in such a manner that the Contractor's work sequence shall be optimized between early start and late start restraints. The Contractor shall use the same criteria in a consistent manner throughout the term of the project. If, at any time, the Contractor alters logic, original durations, and descriptions, adds activities or activity codes or in any way modifies the Baseline Schedule, they must notify the Engineer of the change, in writing, presenting in detail the reasons for the change. The Engineer reserves the right to approve or reject any such change.

The critical path of the project must be identified on the CPM schedule. The critical path is the longest-duration path through the network. The significance of the critical path is that the activities that lie on it cannot be delayed without delaying the project. Because of its impact on the entire project, critical path analysis is an important aspect of project planning.

The critical path can be identified by determining the following four (4) parameters for each activity:

1. ES - Earliest Start Time: the earliest time at which the activity can start given that its precedent activities must be completed first.

2. EF - Earliest Finish Time: equal to the earliest start time for the activity plus the time required to complete the activity.

3. LF - Latest Finish Time: the latest time at which the activity can be completed without delaying the project.

4. LS - Latest Start Time: equal to the latest finish time minus the time required to complete the activity.

The *float time* for an activity is the time between its earliest and latest start time, or between its earliest and latest finish time. Float is the amount of time that an activity can be delayed past its earliest start or earliest finish without delaying the project. Delays to activities on the critical path through the project network in which no float exists, that is, where ES=LS and EF=LF will delay the project.

Float available in the schedule, at any time shall not be considered for the exclusive use of either the Department or the Contractor. During the course of Contract, any float generated due to the efficiencies of either party is not for the sole use of the party generating the float; rather it

is a shared commodity to be reasonably used by either party. Project float will be a resource available to both the Department and the Contractor.

Each CPM Schedule submittal shall be in the form of an activity on node diagram (precedence diagramming method) and shall include at a minimum; an Early Start computer sort, a Total Float computer sort, an Activity Number computer sort, a Schedule Diagram in the Time Scaled Logic format and a backup data CD-ROM which includes all Primavera project files. The diagrams may be requested printed out by the Department and shall be on 22" x 34" sheets. Additional, more detailed diagrams for important aspects or phases of the work may be required on large or complex projects.

Activity I.D. numbers shall be keyed to the item numbers assigned on the detailed estimate sheet. The first three digits (four digits for highway illumination, signing, traffic signals and utility work) of the activity I.D. number shall be identical to the first three digits of the item number in the Contract. The remaining digits may be used to provide unique, orderly and sequential I.D. numbers for each activity.

Activity codes shall be added to the schedule dictionary at the direction of the Engineer. At a minimum, activity codes for responsibility (prime, subcontractor by name), location of work (bridge #, span #, sta. #, site, building, type of work, etc.) and stage or phase number should be included.

1. Recovery Schedules: If, in the opinion of the Engineer, the updated schedule indicates that the Project has fallen behind schedule, or that a revision in sequence of operations may be necessary for any other reason, absent a justifiable time extension, the Contractor shall immediately institute all necessary steps to improve the Project's progress and shall submit such revised network diagrams, tabulations and operational plans, as may be deemed necessary by the Engineer, to demonstrate the manner in which an acceptable rate of progress will be regained.

   Should the Contractor not demonstrate an ability to regain an acceptable rate of progress, the Engineer shall require the schedule to be resource loaded with the next monthly update. No additional compensation will be allowed for resource loading the schedule.

2. As-Built Schedules: Within thirty (30) days of completion of the project, including all corrective work, the Contractor shall submit an "As-Built Schedule" showing the actual progress of work. The Contractor shall submit three prints of this final CPM Schedule and one project backup data CD-ROM which include all Primavera project files for the Engineer's exclusive use.

   The following shall also apply to Contracts administered under Section 1.20:

3. Daily Construction Reports: The Project Coordinator shall assist the Engineer in the preparation of a daily construction report by ensuring that each of the Contractor's employees and subcontractors working on the Project Site on a given day signs the Engineer's sign-in sheet for that day; and by keeping and providing to the Engineer its

own daily list of employees and subcontractors who worked on the Project Site on that day.

Method of Measurement: Within ten (10) calendar days of the award of the Contract, the Contractor shall submit to the Engineer for approval a breakdown of its lump sum bid price for this item detailing:

1. The development cost to prepare the Baseline Schedule in accordance with these specifications. Development costs shall not exceed 25% of the total cost of the item and shall include costs to furnish and install all specified hardware.

2. The cost to provide the services of the Project Coordinator, including costs to prepare and submit the Monthly Updates and Narrative; furnish and submit any Recovery Schedules; furnish and submit Two Week Look Ahead Schedules and maintenance of and supplies for the specified hardware noted above. A per month cost will be derived by taking this cost divided by the number of original Contract months remaining from the date of acceptance of the Baseline Schedule.

3. The cost of submission and certification of the As-Built Schedule in accordance with these specifications. The submission and certification costs shall be no less than 2% of the total cost of the item.

4. Substantiation showing that the costs submitted are reasonable based on the Contractor's lump sum bid.

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

1. Upon approval of the "Baseline" Schedule by the Engineer, the lump sum development cost will be certified for payment.

2. Upon receipt of each monthly narrative and update of the "Baseline" Schedule, the per month cost for the services of the Project Coordinator will be certified for payment.

3. Upon approval of the As-Built Schedule by the Engineer, the lump sum submission and certification cost will be certified for payment.

Basis of Payment: This service will be paid for at the Contract lump sum price for "Project Coordinator" complete, which price shall include the preparation and submission of all schedules, narratives, updates, reports and submittals. The lump sum price shall also include the cost of providing a complete, licensed copy of the Primavera software which will remain the property of the Engineer, and all materials, equipment, labor and work incidental of this service.

The lump sum price will be certified for payment as described in "Method of Measurement" subject to the following conditions:

1. Any month where the monthly update of the "Baseline" CPM schedule is submitted late, without authorization from the Engineer, will result in the following actions:
    a. The monthly payment for the Project Coordinator item will be deferred to the next monthly payment estimate. If any monthly submittal is more than thirty (30) calendar days late, there will be no monthly payment for the services of the Project Coordinator.

    b. The greater of 5% of the monthly payment estimate or $25,000 will be retained from the monthly payment estimate until such time as the Contractor submits all required reports.

    c. If in the opinion of the Engineer, the Contractor is not in compliance with this specification, the Engineer may withhold all Contract payments.

2. In the event the Contract time extends beyond the original completion date by more than thirty (30) calendar days, and a time extension is granted to the Contractor, the Department may require additional CPM updates. The per month costs for the monthly update will be revised and submitted by the Contractor for review and acceptance.

3. If the Contractor is not in compliance with this specification or has failed to submit a "Baseline" schedule, monthly update, or a Recovery Schedule for any portion of the work, the Engineer will withhold all Contract payments until the schedule is submitted to, and approved by, the Engineer.

Pay Item	Pay Unit
Project Coordinator	L.S.

ITEM #0969053A - CONTRACTOR QUALITY CONTROL PROGRAM LEVEL 2

Description: The Contractor shall establish, maintain, and implement a written Project-specific Quality Control (QC) Program tailored to the complexity and scope of the work. This Program shall detail the programmatic documentation of the Contractor's processes for delivering the level of construction quality required by the Contract.

The written QC Program shall provide a comprehensive description of the planning, monitoring and reporting program the Contractor shall implement to ensure and document the quality of the work as it progresses.

The QC Program shall address, as a minimum, the following elements: Organization; Document Control; Design Control; Procurement Control; Control of Subcontractors, Fabricators and Suppliers; Inspection; Special Process Control; Non-Conformance Resolution; Records; and Reporting.

The QC Program shall identify and list critical and routine work categories, which shall be used to differentiate the level of reporting, inspection and attention throughout the process.

The QC Program shall include a method to identify and resolve any deviations from the Contract while maintaining the Project schedule. The QC Program shall include a method to prevent recurring deviations once identified and resolved.

The Contractor shall modify the QC Program as needed to meet the requirements of this specification. The QC Program shall be recognized as a dynamic document, subject to revisions and amendments, as required, in response to actual Site conditions, work methods, and to address deviations encountered and corrected throughout the Project.

The Contractor shall furnish the services of a dedicated (sole responsibility), full-time, on-Site Quality Control Manager (QCM) for the Project. The QCM shall report directly to the Contractor's upper management and shall have the authority to issue stop work orders.

When simultaneous critical work categories are required by the Contractor's schedule, additional QC personnel (independent of trade staff) shall be required to meet the requirements of this specification.

The additional Contractor Quality Control requirements described herein shall be used in conjunction with the Standard Specifications. The QC Program is neither intended to relieve the Contractor from its responsibility under the Contract, nor to replace the external inspections of the work carried out by the Engineer.

The minimum lump sum bid for this item shall be **$1,200,000**. Failure of the Contractor to bid at least the minimum amount will result in the Department adjusting the Contractor's bid to the minimum bid amount for this item.

Construction Methods:

Submittals

(1) QCM: Within seven (7) days of Contract award, the Contractor shall submit, in writing, the name of their proposed QCM with a resume of their qualifications, submitted in accordance with the requirements listed below, for concurrence by the Engineer. The QCM shall not be changed without prior written notification to and concurrence by the Engineer.

The submittal shall outline the credentials of the proposed QCM, who shall be an individual with a bachelor's degree in Engineering and demonstrated construction experience. This shall include at least 10 years of experience in any combination of the following areas:

- Field inspection experience
- Construction experience relevant to the type of work and the scope of the Project
- Previous experience as a Quality Control professional

The submittal shall also include documented certification or training in quality control principles (NETTCP Quality Assurance Technologist or approved equal) and two (2) letters of recommendation from previous clients.

(2) QC Program: Within forty-five (45) days of Contract award, the Contractor, with direct input from the QCM, shall prepare and submit to the Engineer, for review and approval, a written QC Program, including the Elements listed below, and in accordance with all requirements of this specification.

Sample forms and reports intended to be used to assure compliance with this specification shall be included in the initial submittal of the QC Program. Sample forms and reports shall include, but are not limited to:

- Sample document control tracking form
- Sample design control tracking form (for Contractor design-build items)
- Sample shop drawing/working drawing review
- Sample material receiving inspection report
- Sample inspection forms for critical work categories
- Sample special process control forms
- Sample non-conformance report
- Sample daily and monthly reports

The Contractor's QCM, Project Manager and a representative of their upper management shall sign the final QC Program submission and any revisions or amendments thereto. Any revisions or amendments made to the QC Program shall be submitted in writing to the Engineer for acceptance.

Subcontractors, fabricators and suppliers involved in critical work categories, as defined in the QC Program, shall have their own work-item specific QC Plan which shall be included as an addendum to the Contractor's QC Program, and shall comply with all conditions of this item.

(3) Additional QC Personnel: When additional QC personnel are required due to simultaneous work operations, the Contractor shall provide resume(s) of qualifications of the proposed personnel at least thirty (30) days in advance of the work. All additional QC personnel utilized for inspecting, sampling, and testing of materials shall be certified by NETTCP (or another entity approved by the Engineer) in the appropriate designation for the work or materials being inspected, sampled, or tested. These individual(s) shall also have demonstrated construction experience of at least 5 years in any combination of the following areas:

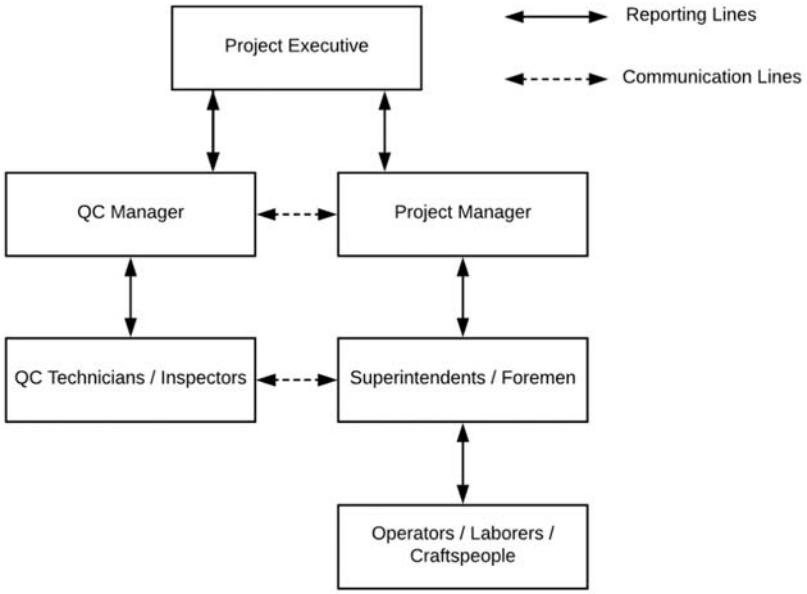
- Field inspection experience
- Construction experience relevant to the type of work and the scope of the Project
- Previous experience as a Quality Control professional

(4) Laboratories: All laboratories performing QC testing of Project Produced Materials shall be qualified through either the AASHTO Accreditation Program (AAP) or the NETTCP Laboratory Qualification Program. The Contractor shall provide laboratory proof of qualification at least thirty (30) days in advance of the work.

(5) Reports: The Contractor shall be required to produce and submit to the Engineer daily and monthly inspection reports as described in the Reporting Element of this specification.

Elements of the Contractor Quality Control Program:

1. Organization: This Element shall describe the Contractor's organization, including reporting relationships within and external to the Contractor's organization. The name of the QCM shall be clearly stated and this individual shall be responsible to upper management (executive level) and have the authority to stop work. An organizational chart shall be included to graphically depict the Contractor's organizational structure and major reporting lines and relationships. The organizational chart shall clearly show the hierarchy between the QCM, upper management and additional QC personnel; and a narrative shall follow which shall define the roles, duties and responsibilities of each person in the implementation of the QC Program and in the resolution of QC issues. This Element shall also include the resumes of all QC personnel.



2. Document Control: This Element shall describe the methods used by the Contractor and the QCM to control the use of the various design documents, shop drawings, procedures, etc. to assure that only the most current, accepted documents are used and are distributed to the individuals performing the work. The process to recall documents which have been superseded or revised shall be addressed. This Element shall identify the submittals that are required by the Contract, the system used to track these submittals and their current status.

A submittal status update spreadsheet shall be submitted with each monthly report, in accordance with the Reporting Element.

3. Design Control: This Element shall describe how the Contractor and the QCM control any design process (i.e. working and shop drawings) for which it is responsible. This shall include the selection of design input data, checking for correctness, completeness, compatibility and format, and reviewing and approving design output documents prior to submission to the

Engineer. This Element shall provide guidance as to how the QCM or other personnel shall indicate that documents have been reviewed by the Contractor prior to submission, and that Department comments have been adequately addressed prior to any required resubmissions.

4. Procurement Control: This Element shall describe the methods used by the Contractor and the QCM to assure that all materials and specialized equipment provided for the work are as specified. Included shall be guidelines for documenting that purchase documents have been reviewed to assure that correct details have been ordered, including specification, grade, type, color, Buy America or other aspects as required by the Contract.

This Element shall describe receiving inspection activities to be performed, and documentation required to confirm that the correct material or equipment has been delivered. A list of items requiring Materials Certificates and/or Certified Test Reports shall be developed by the Contractor and included in this Element. The Contractor shall prepare a "Material Receiving Inspection Report" which shall include records of inspections performed and reviews of material test reports or other documentation required by the Contract. It shall also include copies of Materials Certificates and/or Certified Test Reports for all these items.

As a minimum, receiving inspections shall be performed on the following materials:

- Materials requiring a Materials Certificate or Certified Test Report
- Source-Controlled Materials (not inspected at the manufacturing plant)
- Job-Controlled Materials (other than concrete, bituminous and soils)

Following a receiving inspection, a copy of the "Material Receiving Inspection Report," along with associated documents, shall be submitted to the Engineer.

5. Control of Subcontractors, Fabricators and Suppliers: Subcontractors, fabricators and suppliers involved in critical work categories, as defined in 6(a) herein, shall develop their own QC Plan to be added as an addendum to the Contractor's QC Program, which shall comply with all conditions of this item. The Contractor shall be responsible for reporting on QC activities performed by or for subcontractors, fabricators and suppliers.

It is the Contractor's responsibility to notify all subcontractors, fabricators, and suppliers of the requirements of the Contract. This Element shall describe the methods used by the Contractor and the QCM to assure that all the applicable requirements of the Contract are passed on to the subcontractors, fabricators and suppliers. This Element shall include the methods used by the Contractor and the QCM to monitor and control the quality of the work performed by subcontractors, fabricators and suppliers, and to obtain the required quality records.

This Element shall also describe how the Contractor will ensure that:

- The Engineer receives advance notice of:
  - The source of supply
  - The location of fabrication, including component parts
  - The schedule of fabrication, including the date of beginning of fabrication and the date the material is to be delivered to the Project
- Material fabricated specifically for the Project will be inspected and approved prior to being shipped or incorporated into the work
- Properly documented mill test reports are furnished by suppliers
- Subcontractors are approved prior to performing any work for or on the Project

6. Inspection: This Element shall describe how the Contractor and the QCM will assure that the specified quality of materials and workmanship will be achieved. The Contractor's QC Program is not related to any inspection carried out by the Engineer. Inspection will include the

identification and tracking of the quality characteristics (metrics) used to verify that the level of quality of materials and workmanship conforms to the requirements of the Contract.

The QC Program shall identify the reporting requirements for each item based on its work category, and these reporting requirements will be approved by the Engineer. The work categories will be identified as **critical** or **routine**.

(a) Critical Work Categories: For this Project, critical work categories shall include, but are not limited to the following:

- Construction Staking
- Maintenance & Protection of Traffic (including closing of ramps)
- Stage Construction
- Earthwork
- Subbase and Base Material
- Hot Mix Asphalt
- Drainage
- Bridge Demolition
- Bridge Construction
- Earth Retaining Systems
- Retaining Walls
- Reinforcing Steel
- Structural Steel
- Structural Concrete
- Electrical (traffic signals, IMS, illuminations etc.)
- Landscaping
- Sign Support Foundation
- Environmental Compliance
- Permit Compliance
- Roadside Safety (guiderail, barrier, impact attenuators, etc.)
- Noise Barrier Wall

The QCM shall be familiar with all aspects of work related to critical work categories and no work shall be performed on these categories without the prior knowledge of the QCM. The QC Program shall define specific means and methods that shall be employed to minimize, identify, resolve and prevent recurrence of deviations from the Contract in regards to materials or workmanship for each of the critical work categories listed.

The QC Program shall identify hold points in the critical work categories beyond which work operations cannot proceed until the QCM and the Engineer have inspected the work in place and releases the hold.

When simultaneous critical work categories are required by the Contractor's schedule, additional QC personnel shall be required.

This Element shall describe the system(s) used to assure that all materials and workmanship for critical work categories are in conformance with the Contract, including but not limited to:

- visual inspection of the work, including frequency and hold points
- materials to be tested
- tests to be conducted

- frequency of testing
- locations of sampling
- checks
- intermittent or continuous inspections
- inspections of completed work
- or a combination of above methods

Quality control reporting forms shall be developed to document the work performed by the QCM and QC personnel, on each of these critical work categories. The forms shall be signed by Contractor supervisory field personnel, the QCM and QC personnel (if applicable), to document conformance of the work being performed. All work performed by the QCM and QC personnel on these critical work categories shall be documented and included in the QCM's daily and monthly reports.

(b) Routine Work Categories: All other work categories not covered by 6(a) will be defined as routine work categories and the general provisions of this specification shall apply.

7. Special Process Control: This Element shall describe the measures to be used to assure that any special processes (such as, but not limited to, welding, high-strength bolting, nondestructive examination, critical coatings, surveys, and control of critical tolerances) shall be controlled by procedures that are described in and comply with the Contractor's approved QC Program. The recording of results shall properly document that processes are in conformance with the Contract. In addition, this Element shall describe the methods used to verify, document and track any pre-qualification of the processes, personnel and equipment where required by the Contract.

8. Non-Conformance Resolution: This Element shall describe the protocol(s) for correcting any material or workmanship found not to be in compliance with the Contract, the reporting requirements for documenting any non-compliance, subsequent corrective measures and issue resolution.

(a) Contractor-Issued Non-Conformance Reports: This Element shall describe the Contractor's self-issued non-conformance reporting used to

- document actions taken to identify non-conformance
- notify the Engineer in writing of non-conformance as soon as it is identified
- collaborate with the Engineer to establish a resolution

The non-conformance reports shall include signatures of the responsible persons for each process of the corrective action taken. Upon resolution of a non-conformance issue, the QC Program shall be revised to identify preventive measures that shall be taken to prevent similar deviations. Contractor supervisory field personnel involved in the work shall be informed of any changes implemented to avoid recurrence of deviations.

(b) Engineer-Issued Non-Compliance Notices (NCN): Non-compliance notices (NCNs) issued by the Engineer shall also be an indication of non-conformance and shall be addressed according to 1.05.11 and resolved to the satisfaction of the Engineer. Upon resolution, the QC Program shall be revised to identify preventive measures that shall be taken to prevent similar deviations. Contractor supervisory field personnel involved in the work shall be informed of any changes implemented to avoid recurrence of deviations.

9. Records: This Element shall describe how various records generated by the Contractor are originated, maintained, received, filed, protected and authenticated. Quality Control records

required for submittal to the Engineer shall be described. This Element shall outline the Contractor's procedure for retaining records for a period of 3 years after acceptance of the Contract.

10. Reporting: QC Inspection Reports: The Contractor shall be required to produce and submit to the Engineer daily and monthly inspection reports in accordance with all requirements of this specification. The QC Program shall clearly define the information that shall be provided as part of the daily and monthly reports.

(a) Daily Reports: Daily reports shall include documentation of all activities, including inspection, material testing, and any work associated with the Elements of this specification, performed by the QCM and other QC personnel. The location of any forms relative to this specification shall be referenced in the daily reports.

For any week that a non-conformance report is issued, either by the Contractor or the Engineer, actions taken to resolve the non-conformance report shall be summarized and included with the submission of the daily reports. Updates on the status of the non-conformance shall continue in each submission of daily reports until the non-conformance issue is resolved. Once resolved, the next submission of daily reports shall document that supervisory field personnel involved in the work have been informed of any changes to be implemented to avoid recurrence of deviations. Any revisions or amendments made to the QC Program, once submitted and accepted by the Engineer, shall be documented in the next submission of daily reports.

Daily reports shall be submitted (as a package) to the Engineer by 12 PM on the Tuesday following the week of the inspection reports, or as agreed to by the Engineer. Except as otherwise authorized by the Engineer, submissions after that time will be considered late.

(b) Monthly Reports: Monthly reports shall include a summary of the work performed, including QC activities, in the previous month and also a one (1) month "look ahead" schedule with expected QC efforts and procedures for critical and routine work categories. Monthly reports shall also include a submittal status update spreadsheet.

Monthly reports shall be submitted to the Engineer by the fifth (5th) business day each month. Except as otherwise authorized by the Engineer, monthly submissions after that time will be considered late.

(c) Quality Assurance/Quality Control (QA/QC) Meetings: Meetings shall be held specific to the QC Program. The Contractor shall, at minimum, be represented by the QCM and shall meet with the Engineer every other week, or more frequently at the Engineer's request, to review reporting and all work related to this specification.

Method of Measurement: Within twenty-one (21) calendar days of the award of the Contract, the Contractor shall submit to the Engineer for approval a schedule of values of its lump sum bid price for this item detailing the following:

1. The development costs to prepare the written QC Program. Development costs shall be ten percent (10%) of the total cost of the item.
2. The cost per-month to provide the services of the QC Program, including the QCM, QC activities, necessary QC personnel, preparing and submitting daily and monthly reports, and all other requirements of this specification. A per-month cost will be derived by taking the lump sum bid price, subtracting the development cost to prepare the written

QC Program, and dividing the remainder by the number of Contract months remaining from the date of submission of the written QC Program.

Basis of Payment: This item will be paid for at the Contract lump sum price for "Contractor Quality Control Program Level 2" complete, which price shall include all submittals, QC Program revisions and amendments, inspections, monitoring, daily logs, reports, meetings, records, and all materials, equipment, labor and work incidental thereto.

Upon approval of the schedule of values by the Engineer, payments for work performed will be made as follows:

1. Upon acceptance of the written QC Program, the lump sum development cost from the payment schedule will be approved for payment.
2. Upon acceptable completion of the services of the QC Program for the month, the per-month cost will be approved for payment.

The Engineer reserves the right to apply the following reductions to the monthly payment portion, which cannot be recovered and will result in a reduction in the lump sum amount, should the Contractor fail to meet the requirements of this specification:

1. QC staff: A five percent (5%) reduction to the monthly payment will be applied for each day that acceptable QC services are not provided. The total reduction for any calendar month will not exceed the monthly payment for the item.
2. Reports: A five percent (5%) reduction to the monthly payment will be applied for each day that the required reports have been submitted late, up to a maximum of fifty percent (50%) of the monthly payment per report. This five percent (5%) reduction will apply to each independent report (each package of daily reports, described in 9(a) above, submitted on a weekly basis is considered one independent report). The total reduction for any calendar month will not exceed the monthly payment for the item.
3. QA/QC Meetings: A twenty-five percent (25%) reduction to the monthly payment will be applied for each bi-weekly QA/QC meeting not attended by the QCM. The total reduction for any calendar month will not exceed the monthly payment for the item.

Should the Contractor fail to continuously provide an acceptable QC Program, as required by this specification, the Engineer may withhold the entire monthly estimate until such time as all requirements are met.

Should the Contractor fail to comply with the QCM requirements of this specification, the QCM shall be replaced at the Engineer's request.

Only one monthly payment will be made for each calendar month regardless of the number of personnel required to complete the specified work.

Pay Item	Pay Unit
Contractor Quality Control Program Level 2	l.s.

ITEM #0969066A - CONSTRUCTION FIELD OFFICE, EXTRA LARGE

Description: Under the item included in the bid document, adequate weatherproof office quarters with related furnishings, materials, equipment and other services, shall be provided by the Contractor for the duration of the work, and if necessary, for a close-out period determined by the Engineer. The office, furnishings, materials, equipment, and services are for the exclusive use of CTDOT forces and others who may be engaged to augment CTDOT forces with relation to the Contract. The office quarters shall be located convenient to the work site and installed in accordance with Article 1.08.02. This office shall be separated from any office occupied by the Contractor. Ownership and liability of the office quarters shall remain with the Contractor.

Furnishings/Materials/Supplies/Equipment: All furnishings, materials, equipment and supplies shall be in like new condition for the purpose intended and require approval of the Engineer.

Office Requirements: The Contractor shall furnish the office quarters and equipment as described below:

Description \ Office Size	Small	Med.	Large	Extra Large
Minimum Sq. Ft. of floor space with a minimum ceiling height of 7 ft.	400	400	1000	2000
Minimum number of exterior entrances.	2	2	2	2
Minimum number of parking spaces.	7	7	10	15

Office Layout: The office shall have a minimum square footage as indicated in the table above, and shall be partitioned as shown on the building floor plan as provided by the Engineer.

Tie-downs and Skirting: Modular offices shall be tied-down and fully skirted to ground level.

Lavatory Facilities: For field offices sizes Small and Medium the Contractor shall furnish a toilet facility at a location convenient to the field office for use by CTDOT personnel and such assistants as they may engage; and for field offices sizes Large and Extra Large the Contractor shall furnish two (2) separate lavatories with toilet (men and women), in separately enclosed rooms that are properly ventilated and comply with applicable sanitary codes. Each lavatory shall have hot and cold running water and flush-type toilets. For all facilities the Contractor shall supply lavatory and sanitary supplies as required.

Windows and Entrances: The windows shall be of a type that will open and close conveniently, shall be sufficient in number and size to provide adequate light and ventilation, and shall be fitted with locking devices, blinds and screens. The entrances shall be secure, screened, and fitted with a lock for which four keys shall be furnished. All keys to the construction field office shall be furnished to the CTDOT and will be kept in their possession while State personnel are using the office. Any access to the entrance ways shall meet applicable building codes, with appropriate handrails. Stairways shall be ADA/ABA compliant and have non-skid tread surfaces. An ADA/ABA compliant ramp with non-skid surface shall be provided with the Extra-Large field office.

Lighting: The Contractor shall equip the office interior with electric lighting that provides a minimum illumination level of 100 foot-candles at desk level height, and electric outlets for each desk and drafting table. The Contractor shall also provide exterior lighting that provides a minimum illumination level of 2 foot-candles throughout the parking area and for a minimum distance of 10 ft. on each side of the field office.

Parking Facility: The Contractor shall provide a parking area, adjacent to the field office, of sufficient size to accommodate the number of vehicles indicated in the table above. If a paved parking area is not readily available, the Contractor shall construct a parking area and driveway consisting of a minimum of 6 inches of processed aggregate base graded to drain. The base material will be extended to the office entrance.

Field Office Security: Physical Barrier Devices - This shall consist of physical means to prevent entry, such as: 1) All windows shall be barred or security screens installed; 2) All field office doors shall be equipped with dead bolt locks and regular day operated door locks; and 3) Other devices as directed by the Engineer to suit existing conditions.

Electric Service: The field office shall be equipped with an electric service panel, wiring, outlets, etc., to serve the electrical requirements of the field office, including: lighting, general outlets, computer outlets, calculators etc., and meet the following minimum specifications:

A. 120/240 volt, 1 phase, 3 wire
B. Ampacity necessary to serve all equipment. Service shall be a minimum 100 amp dedicated to the construction field office.
C. The electrical panel shall include a main circuit breaker and branch circuit breakers of the size and quantity required.
D. Additional 120 volt, single phase, 20 amp, isolated ground dedicated power circuit with dual NEMA 5-20 receptacles will be installed at each desk and personal computer table (workstation) location.
E. Additional 120 volt, single phase, 20 amp, isolated ground dedicated power circuit with dual NEMA 5-20 receptacles will be installed, for use by the Telephone Company.
F. Additional 120-volt circuits and duplex outlets as required meeting National Electric Code requirements.
G. One exterior (outside) wall mounted GFI receptacle, duplex, isolated ground, 120 volt, straight blade.
H. After work is complete and prior to energizing, the State's CTDOT electrical inspector, must be contacted at 860-594-2240. (Do Not Call Local Town Officials)
I. Prior to field office removal, the CTDOT Office of Information Systems (CTDOT OIS) must be notified to deactivate the communications equipment.

Heating, Ventilation and Air Conditioning (HVAC): The field office shall be equipped with sufficient heating, air conditioning and ventilation equipment to maintain a temperature range of 68^{o}-80^{o} Fahrenheit within the field office.

Telephone Service: The Contractor shall provide telephone service with unlimited nation-wide calling plan. For a Small, Medium and Large field office this shall consist of the installation of two (2) telephone lines: one (1) line for phone/voice service and one (1) line dedicated for the facsimile machine. For an Extra-Large field office this shall consist of four (4) telephone lines: three (3) lines for phone/voice service and one (1) line dedicated for facsimile machine. The Contractor shall pay all charges.

Data Communications Facility Wiring: Contractor shall install a Category 6 568B patch panel in a central wiring location and Cat 6 cable from the patch panel to each PC station, Smart Board location, Multifunction Laser Printer/Copier/Scanner/Fax, terminating in a (Category 6 568B) 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 CTDOT OIS staff in coordination with the designated field office personnel as soon as the facility is in place.

For Small, Medium and Large field offices the Contractor shall run a CAT 6 LAN cable a minimum length of 25 feet for each CTDOT networked device (including but not limited to: smartboards and Multi-Function Laser Printer/Copier/Scanner/Fax) to LAN switch area leaving an additional 10 feet of cable length on each side with terminated RJ45 connectors. For an Extra-Large field office the Contractor shall run CAT 6 LAN cables from workstations, install patch panel in data circuit demark area and terminate runs with RJ45 jacks at each device location. Terminate runs to patch panel in LAN switch area. Each run / jack shall be clearly labeled with an identifying Jack Number.

The Contractor shall supply cables to connect the Wi-Fi printer to the Contractor supplied internet router and to workstations/devices as needed. These cables shall be separate from the LAN cables and data Jacks detailed above for the CTDOT network.

The number of networked devices anticipated shall be at least equal to the number of personal computer tables, Multi-Function Laser Printer/Copier/Scanner/Fax, and smartboards listed below.

The installation of a data communication circuit between the field office and the CTDOT OIS in Newington will be coordinated between the CTDOT District staff, CTDOT OIS staff and the local utility company once the Contractor supplies the field office phone numbers and anticipated installation date. The Contractor shall provide the field office telephone number(s) to the CTDOT Project Engineer within 10 calendar days after the signing of the Contract as required by Article 1.08.02. This is required to facilitate data line and computer installations.

Additional Equipment, Facilities and Services: The Contractor shall provide at the field Office at least the following to the satisfaction of the Engineer:

Furnishing Description	Office Size			
	Small	Med.	Large	Extra Large
	Quantity			
Office desk (2.5 ft. x 5 ft.) with drawers, locks, and matching desk chair that have pneumatic seat height adjustment and dual wheel casters on the base.	1	3	5	8
Standard secretarial type desk and matching desk chair that has pneumatic seat height adjustment and dual wheel casters on the base.	-	-	-	1
Personal computer tables (4 ft. x 2.5 ft.).	2	3	5	8
Drafting type tables (3 ft. x 6 ft.) and supported by wall brackets and legs; and matching drafters stool that have pneumatic seat height adjustment, seat back and dual wheel casters on the base.	1	1	1	2
Conference table, 3 ft. x 12 ft.	-	-	-	1
Table – 3 ft. x 6 ft.	-	-	-	1
Office Chairs.	2	4	8	20
Mail slot bin – legal size.	-	-	1	1
Non-fire resistant cabinet.	-	-	2	4
Fire resistant cabinet (legal size/4 drawer), locking.	1	1	2	3
Storage racks to hold 3 ft. x 5 ft. display charts.	-	-	1	2
Vertical plan racks for 2 sets of 2 ft. x 3 ft. plans for each rack.	1	1	2	2
Double door supply cabinet with 4 shelves and a lock – 6 ft. x 4 ft.	-	-	1	2
Case of cardboard banker boxes (Min 10 boxes/case)	1	1	2	3
Open bookcase – 3 shelves – 3 ft. long.	-	-	2	2
White Dry-Erase Board, 36” x 48”min. with markers and eraser.	1	1	1	1
Interior partitions – 6 ft. x 6 ft., soundproof type, portable and freestanding.	-	-	6	6
Coat rack with 20 coat capacity.	-	-	-	1
Wastebaskets - 30 gal., including plastic waste bags.	1	1	1	2
Wastebaskets - 5 gal., including plastic waste bags.	1	3	6	10
Electric wall clock.	-	-	-	2
Telephone.	1	1	1	-
Full size stapler 20 (sheet capacity, with staples)	1	2	5	8
Desktop tape dispensers (with Tape)	1	2	5	8
8 Outlet Power Strip with Surge Protection	3	4	6	9
Rain Gauge	1	1	1	1
Business telephone system for three lines with ten handsets, intercom capability, and one speaker phone for conference table.	-	-	-	1
Mini refrigerator - 3.2 c.f. min.	1	1	1	1

Hot and cold water dispensing unit. Disposable cups and bottled water shall be supplied by the Contractor for the duration of the project.	1	1	1	1
Microwave, 1.2 c.f. , 1000W min.	1	1	1	1
Fire extinguishers - provide and install type and *number to meet applicable State and local codes for size of office indicated, including a fire extinguisher suitable for use on a computer terminal fire.	*	*	*	*
Electric pencil sharpeners.	1	2	2	2
Electronic office type printing calculators capable of addition, subtraction, multiplication and division with memory and a supply of printing paper.	1	1	2	4
Small Multi-Function Laser Printer/Copier/Scanner/Fax combination unit, network capable, as specified below under Computer Related Hardware and Software.	1	1		
Large Multi-Function Laser Printer/Copier/Scanner/Fax combination unit, network capable, as specified below under Computer Related Hardware and Software.			1	1
Field Office Wi-Fi Connection as specified below under Computer Related Hardware and Software	1	1	1	1
Wi-Fi Printer as specified below under Computer Related Hardware and Software.	1	1	1	1
Digital Camera as specified below under Computer Related Hardware and Software.	1	1	3	3
Video Projector as specified below under Computer Related Hardware and Software.	-	-	-	1
Smart Board as specified below under Computer Related Hardware and Software.	-	-	-	1
Infrared Thermometer, including annual third party certified calibration, case, and cleaning wipes.	1	1	1	2
Concrete Curing Box as specified below under Concrete Testing Equipment.	1	1	1	1
Concrete Air Meter and accessories as specified below under Concrete Testing Equipment as specified below. Contractor shall provide third party calibration on a quarterly basis.	1	1	1	1
Concrete Slump Cone and accessories as specified below under Concrete Testing Equipment.	1	1	1	1
First Aid Kit	1	1	1	1
Flip Phones as specified under Computer Related Hardware and Software.	-	-	-	-
Smart Phones as specified under Computer Related Hardware and Software.	-	-	-	-

The furnishings and equipment required herein shall remain the property of the Contractor. Any supplies required to maintain or operate the above listed equipment or furnishings shall be provided by the Contractor for the duration of the project.

Computer Related Hardware and Software: The CTDOT will supply by its own means the actual Personal Computers for the CTDOT representatives. The Contractor shall supply the Field Office Wi-Fi Connection, Wi-Fi Printer, Digital Camera(s), Flip Phones, Smart Phones, Multifunction Laser Printer/Copier/Scanner/Fax, Video Projectors, and Smart Board(s) as well as associated hardware and software, must meet the requirements of this specification as well as the latest minimum specifications posted, as of the project advertising date, at CTDOTs web site http://www.ct.gov/dot/cwp/view.asp?a=1410&q=563904

Within 10 calendar days after the signing of the Contract but before ordering/purchasing the Wi-Fi Printer (separate from the Multifunction Laser Printer/Copier/Scanner/Fax), Field Office Wi-Fi, Digital Camera(s), Flip Phones, Smart Phones, Multifunction Laser Printer/Copier/Scanner/Fax, Video Projector(s) and Smart Board(s) as well as associated hardware, the Contractor must submit a copy of their proposed order(s) with catalog cuts and specifications to the Administering CTDOT District for review and approval. The Wi-Fi Printer, Wi-Fi Router, Flip Phones, Smart Phones, digital cameras, Projector(s) and Smart Board(s) will be reviewed by CTDOT District personnel. The Multifunction Laser Printer/Copier/Scanner/Fax will be reviewed by the CTDOT OIS. The Contractor shall not purchase the hardware, software, or services until the Administering CTDOT District informs them that the proposed equipment, software, and services are approved. The Contractor will be solely responsible for the costs of any hardware, software, or services purchased without approval.

The Contractor and/or their internet service provider shall be responsible for the installation and setup of the field office Wi-Fi, Wi-Fi printer, and the configuration of the wireless router as directed by the CTDOT. Installation will be coordinated with CTDOT District and Project personnel.

After the approval of the hardware and software, the Contractor shall contact the designated representatives of the CTDOT administering District, a minimum of 2 working days in advance of the proposed delivery or installation of the Field Office Wi-Fi Connection, Wi-Fi Printer, Digital Camera(s), Flip Phones, Smart Phones, Multifunction Laser Printer/Copier/Scanner/Fax, Video Projectors and Smart Board(s), as well as associated hardware, software, supplies, and support documentation.

The Contractor shall provide all supplies, paper, maintenance, service and repairs (including labor and parts) for the Wi-Fi printers, copiers, field office Wi-Fi, fax machines and other equipment and facilities required by this specification for the duration of the Contract. All repairs must be performed with-in 48 hours. If the repairs require more than a 48 hours then an equal or better replacement must be provided.

Once the Contract has been completed, the hardware and software will remain the property of the Contractor.

First Aid Kit: The Contractor shall supply a first aid kit adequate for the number of personnel expected based on the size of the field office specified and shall keep the first aid kit stocked for the duration that the field office is in service.

Rain Gauge: The Contractor shall supply install and maintain a rain gauge for the duration of the project, meeting these minimum requirements. The rain gauge shall be installed on the top of a post such that the opening of the rain gauge is above the top of the post an adequate distance to avoid splashing of rain water from the top of the post into the rain gauge. The Location of the rain gauge and post shall be approved by the Engineer. The rain gauge shall be made of a durable material and have graduations of 0.1 inches or less with a minimum total column height of 5 inches. If the rain gauge is damaged the Contractor shall replace it prior to the next forecasted storm event at no additional cost.

Concrete Testing Equipment: If the Contract includes items that require compressive strength cylinders for concrete, in accordance with the Schedule of Minimum Testing Requirements for Sampling Materials for Test, the Contractor shall provide the following equipment.

A) Concrete Cylinder Curing Box – meeting the requirements of Section 6.12 of the Standard Specifications.

B) Air Meter – The air meter provided shall be in good working order and meet the requirements of AASHTO T 152.

C) Slump Cone Mold – Slump cone, base plate, and tamping rod shall be provided in like-new condition and meet the requirements of AASHTO T119, Standard Test Method for Slump of Hydraulic-Cement Concrete.

All testing equipment will remain the property of the Contractor at the completion of the project.

Insurance Policy: The Contractor shall provide a separate insurance policy, with no deductible, in the minimum amount of five thousand dollars ($5,000) 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 CTDOT shall be an additional named insured on the policy. These losses shall include, but not be limited to: theft, fire, and physical damage. The CTDOT will be responsible for all maintenance costs of CTDOT owned computer hardware. In the event of loss, the Contractor shall provide replacement equipment in accordance with current CTDOT equipment specifications, within seven days of notice of the loss. If the Contractor is unable to provide the required replacement equipment within seven days, the CTDOT may provide replacement equipment and deduct the cost of the equipment from monies due or which may become due the Contractor under the Contract or under any other contract. The Contractor's financial liability under this paragraph shall be limited to the amount of the insurance coverage required by this paragraph. If the cost of equipment replacement required by this paragraph should exceed the required amount of the insurance coverage, the CTDOT will reimburse the Contractor for replacement costs exceeding the amount of the required coverage.

Maintenance: During the occupancy by the CTDOT, the Contractor shall maintain all facilities and furnishings provided under the above requirements, and shall maintain and keep the office quarters clean through the use of 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, rounded up to the nearest month.

There will not be any price adjustment due to any change in the minimum computer related hardware and software requirements.

Basis of Payment: The furnishing and maintenance of the Construction Field Office will be paid for at the Contract unit price per month for "Construction Field Office, (Type)," which price shall include all material, equipment, labor, service contracts, licenses, software, repair or replacement of hardware and software, related supplies, utility services, parking area, external illumination, trash removal, snow and ice removal, and work incidental thereto, as well as any other costs to provide requirements of this specified this specification.

Pay Item	Pay Unit
Construction Field Office, (Type)	Month

ITEM #0971001A - MAINTENANCE AND PROTECTION OF TRAFFIC

Article 9.71.01 – Description is supplemented by the following:

The Contractor shall maintain and protect traffic as follows and as limited in the Special Provision "Prosecution and Progress".

ROUTE I-84

The Contractor shall maintain and protect existing traffic operations on Route I-84. During stage construction, existing traffic operations will be considered to be as shown on the Maintenance and Protection of Traffic (MPT) Plans contained in the contract plans.

Excepted therefrom will be those periods, during the allowable periods, when the Contractor will be allowed to halt traffic on Route I-84 for periods not to exceed ten (10) or fifteen (15) minutes for the specific construction activities as identified in Section 1.08.04 – Limitations of Operations. The Contractor's work plan, subject to approval by the Engineer, shall minimize the need for and duration of temporary traffic stoppages. The Contractor shall allow all stored vehicles to proceed through the work area before halting traffic for another period. The Contractor shall provide the Engineer written notification of the intent to halt traffic a minimum of four (4) weeks in advance of the planned work to allow for proper notification to motorists. Similarly, through the use of changeable message signs, motorists shall also be given a minimum seven (7) days notice.

RAMP A (I-84 EB 40 ON-RAMP FROM ROUTE 71 (NEW BRITAIN AVENUE))

The Contractor shall maintain and protect the existing number of lanes of traffic, including turning lanes at intersections on Ramp A. During stage construction, the existing number of lanes will be considered to be the number of lanes as shown on the Maintenance and Protection of Traffic (MPT) Plans contained in the contract plans.

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 one lane of through traffic on a paved travelpath 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 halt traffic for periods not to exceed ten (10) or fifteen (15) minutes for the specific construction activities as identified in Section 1.08.04 – Limitations of Operations. The Contractor shall allow all stored vehicles to proceed through the work area before halting traffic for another period.

During construction of Stage 1B, the Contractor will be allowed to temporarily close Ramp A to through traffic following the traffic shift to Temporary Ramp A and prior to the start of Stage 1 construction of Bridge No. 01744 (I-84 over Berkshire Road). The Contractor will be allowed to

continue the temporary closure of Ramp A for the duration of Stage 2A while maintaining traffic on Temporary Ramp A.

The Contractor must maintain an acceleration lane for Ramp A and Temporary Ramp A with an acceleration length that meets or exceeds the length for each stage of construction as shown on the Maintenance and Protection of Traffic (MPT) Plans, or that meets or exceeds the length of the existing on-ramp acceleration lane. If this cannot be provided, the Contractor shall contact the Engineer for a determination on the appropriate pavement markings and signing for the on-ramp.

RAMP B (I-84 WB 40 OFF-RAMP TO S.R. 535 (RIDGEWOOD ROAD))

The Contractor shall maintain and protect the existing number of lanes of traffic, including turning lanes at intersections on Ramp B. During stage construction, the existing number of lanes will be considered to be the number of lanes as shown on the Maintenance and Protection of Traffic (MPT) Plans contained in the contract plans.

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 one lane of through traffic on a paved travelpath 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 halt traffic for periods not to exceed ten (10) or fifteen (15) minutes for the specific construction activities as identified in Section 1.08.04 – Limitations of Operations. The Contractor shall allow all stored vehicles to proceed through the work area before halting traffic for another period.

RAMP C (I-84 EB 41 OFF-RAMP TO ROUTE 173 (SOUTH MAIN STREET))

The Contractor shall maintain and protect the existing number of lanes of traffic, including turning lanes at intersections on Ramp C. During stage construction, the existing number of lanes will be considered to be the number of lanes as shown on the Maintenance and Protection of Traffic (MPT) Plans contained in the contract plans.

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 one lane of through traffic on a paved travelpath 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 halt traffic for a period not to exceed fifteen (15) minutes for the specific construction activities as identified in Section 1.08.04 – Limitations of Operations. The Contractor shall allow all stored vehicles to proceed through the work area before halting traffic for another period.

RAMP D (I-84 WB 41 ON-RAMP FROM ROUTE 173 (SOUTH MAIN STREET))

The Contractor shall maintain and protect the existing number of lanes of traffic, including turning lanes at intersections on Ramp D. During stage construction, the existing number of lanes will be considered to be the number of lanes as shown on the Maintenance and Protection of Traffic (MPT) Plans contained in the contract plans.

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 one lane of through traffic on a paved travelpath 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 halt traffic for a period not to exceed fifteen (15) minutes for the specific construction activities as identified in Section 1.08.04 – Limitations of Operations. The Contractor shall allow all stored vehicles to proceed through the work area before halting traffic for another period.

The Contractor must maintain an acceleration lane for Ramp D with an acceleration length that meets or exceeds the length for each stage of construction as shown on the Maintenance and Protection of Traffic (MPT) Plans, or that meets or exceeds the length of the existing on-ramp acceleration lane. If this cannot be provided, the Contractor shall contact the Engineer for a determination on the appropriate pavement markings and signing for the on-ramp.

RAMP E (I-84 EB 4I ON-RAMP FROM ROUTE 173 (SOUTH MAIN STREET))

The Contractor shall maintain and protect the existing number of lanes of traffic, including turning lanes at intersections on Ramp E. During stage construction, the existing number of lanes will be considered to be the number of lanes as shown on the Maintenance and Protection of Traffic (MPT) Plans contained in the contract plans.

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 one lane of through traffic on a paved travelpath 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 halt traffic for a period not to exceed fifteen (15) minutes for the specific construction activities as identified in Section 1.08.04 – Limitations of Operations. The Contractor shall allow all stored vehicles to proceed through the work area before halting traffic for another period.

The Contractor must maintain an acceleration lane for Ramp E with an acceleration length that meets or exceeds the length for each stage of construction as shown on the Maintenance and Protection of Traffic (MPT) Plans, or that meets or exceeds the length of the existing on-ramp acceleration lane. If this cannot be provided, the Contractor shall contact the Engineer for a determination on the appropriate pavement markings and signing for the on-ramp.

RAMP F (I-84 WB 4I OFF-RAMP TO ROUTE 173 (SOUTH MAIN STREET))

The Contractor shall maintain and protect the existing number of lanes of traffic, including turning lanes at intersections on Ramp F. During stage construction, the existing number of lanes will be considered to be the number of lanes as shown on the Maintenance and Protection of Traffic (MPT) Plans contained in the contract plans.

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 one lane of through traffic on a paved travelpath 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 halt traffic for a period not to exceed fifteen (15) minutes for the specific construction activities as identified in Section 1.08.04 – Limitations of Operations. The Contractor shall allow all stored vehicles to proceed through the work area before halting traffic for another period.

RAMP G (I-84 WB 40 ON-RAMP FROM S.R. 535 (RIDGEWOOD ROAD))

The Contractor shall maintain and protect the existing number of lanes of traffic, including turning lanes at intersections on Ramp G. During stage construction, the existing number of lanes will be considered to be the number of lanes as shown on the Maintenance and Protection of Traffic (MPT) Plans contained in the contract plans.

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 one lane of through traffic on a paved travelpath 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 halt traffic for periods not to exceed ten (10) or fifteen (15) minutes for the specific construction activities as identified in Section 1.08.04 – Limitations of Operations. The Contractor shall allow all stored vehicles to proceed through the work area before halting traffic for another period.

During construction of Stage 1A, the Contractor will be allowed to temporarily close Ramp G to complete Stage 1 construction of Bridge No. 01743B (I-84 WB over Ridgewood Road) and after the ramp detour, as shown on the Detour Plan contained in the contract plans, is in place and operational. The Contractor will be required to re-open the ramp as identified in Section 1.08.04 – Limitations of Operations.

During construction of Stage 2A, the Contractor will be allowed to temporarily close Ramp G to complete Stage 2 construction of Bridge No. 01743B (I-84 over Ridgewood Road) and after the ramp detour, as shown on the Detour Plan contained in the contract plans, is in place and operational. The Contractor will be required to re-open the ramp as identified in Section 1.08.04 – Limitations of Operations.

The Contractor must maintain an acceleration lane for Ramp G with an acceleration length that meets or exceeds the length for each stage of construction as shown on the Maintenance and Protection of Traffic (MPT) Plans, or that meets or exceeds the length of the existing on-ramp acceleration lane. If this cannot be provided, the Contractor shall contact the Engineer for a determination on the appropriate pavement markings and signing for the on-ramp.

RAMP H (I-84 EB 40 OFF-RAMP TO ROUTE 71 (NEW BRITAIN AVENUE))

The Contractor shall maintain and protect the existing number of lanes of traffic, including turning lanes at intersections on Ramp H. During stage construction, the existing number of lanes will be considered to be the number of lanes as shown on the Maintenance and Protection of Traffic (MPT) Plans contained in the contract plans.

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 one lane of through traffic on a paved travelpath 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 halt traffic for a period not to exceed ten (10) minutes for the specific construction activities as identified in Section 1.08.04 – Limitations of Operations. The Contractor shall allow all stored vehicles to proceed through the work area before halting traffic for another period.

RAMP I (I-84 WB 42 OFF-RAMP TO TROUT BROOK DRIVE)

The Contractor shall maintain and protect the existing number of lanes of traffic, including turning lanes at intersections on Ramp I. During stage construction, the existing number of lanes will be considered to be the number of lanes as shown on the Maintenance and Protection of Traffic (MPT) Plans contained in the contract plans.

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 one lane of through traffic on a paved travelpath 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 halt traffic for a period not to exceed fifteen (15) minutes for the specific construction activities as identified in Section 1.08.04 – Limitations of Operations. The Contractor shall allow all stored vehicles to proceed through the work area before halting traffic for another period.

RAMP J (I-84 WB 39A OFF-RAMP TO ROUTE 9 SB

The Contractor shall maintain and protect the existing number of lanes of traffic, including turning lanes at intersections on Ramp J. During stage construction, the existing number of lanes will be considered to be the number of lanes as shown on the Maintenance and Protection of Traffic (MPT) Plans contained in the contract plans.

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 one lane of through traffic on a paved travelpath 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 halt traffic for a period not to exceed fifteen (15) minutes for the specific construction activities as identified in Section 1.08.04 – Limitations of Operations. The Contractor shall allow all stored vehicles to proceed through the work area before halting traffic for another period.

ALL OTHER RAMPS AND TURNING ROADWAYS

The Contractor shall maintain and protect the existing number of lanes of traffic, including turning lanes at intersections on all other ramps and turning roadways. During stage construction, the existing number of lanes will be considered to be the number of lanes as shown on the Maintenance and Protection of Traffic (MPT) Plans contained in the contract plans.

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 one lane of through traffic on a paved travelpath 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 halt traffic for a period not to exceed ten (10) minutes for the specific construction activities as identified in Section 1.08.04 – Limitations of Operations. The Contractor shall allow all stored vehicles to proceed through the work area before halting traffic for another period.

ROUTE 71 (NEW BRITAIN AVENUE)

The Contractor shall maintain and protect the existing number of lanes of traffic, including turning lanes at intersections on Route 71 (New Britain Avenue). During construction of Stages 1A and 2A, the existing number of lanes will be considered to be the number of lanes as shown on the Maintenance and Protection of Traffic (MPT) Plans contained in the contract plans.

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 halt traffic for a period not to exceed ten (10) minutes for the specific construction activities as identified in Section 1.08.04 –

Limitations of Operations. The Contractor shall allow all stored vehicles to proceed through the work area before halting traffic for another period.

A dedicated sidewalk shall be maintained and protected to allow for safe passage of pedestrians during all construction phases.

S.R. 535 (RIDGEWOOD ROAD)

The Contractor shall maintain and protect the existing number of lanes of traffic, including turning lanes at intersections on S.R. 535 (Ridgewood Road). During construction of Stages 1A and 2A, the existing number of lanes will be considered to be the number of lanes as shown on the Maintenance and Protection of Traffic (MPT) Plans contained in the contract plans.

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 one lane of through traffic in each direction and two right turn lanes in the southbound direction, each lane on a paved travelpath 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 halt traffic for a period not to exceed ten (10) minutes for the specific construction activities as identified in Section 1.08.04 – Limitations of Operations. The Contractor shall allow all stored vehicles to proceed through the work area before halting traffic for another period.

BERKSHIRE ROAD

The Contractor shall maintain and protect the existing number of lanes of traffic, including turning lanes at intersections on Berkshire Road. During construction of Stages 1B and 2A, the existing number of lanes will be considered to be the number of lanes as shown on the Maintenance and Protection of Traffic (MPT) Plans contained in the contract plans.

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 one lane of through traffic in each direction, each lane on a paved travelpath 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 halt traffic for a period not to exceed ten (10) minutes for the specific construction activities as identified in Section 1.08.04 – Limitations of Operations. The Contractor shall allow all stored vehicles to proceed through the work area before halting traffic for another period.

A dedicated sidewalk shall be maintained and protected along the east side of the roadway to allow for safe passage of pedestrians during all construction phases.

ALL OTHER ROADWAYS

The Contractor shall maintain and protect the existing number of lanes of traffic, including turning lanes at intersections on all other roadways.

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 one lane of through traffic in each direction, each lane on a paved travelpath not less than 11 feet in width.

A dedicated sidewalk shall be maintained and protected to allow for the safe passage of pedestrians during all construction phases.

PEDESTRIAN ACCESS

Pedestrian access shall be maintained on all local roads in accordance with the Maintenance and Protection of Traffic (MPT) Plans to allow for the safe passage of pedestrians during all construction phases with the following exception: during active construction overhead or adjacent to a sidewalk area, the Contractor may halt pedestrian traffic for a period not to excess ten (10) minutes.

A dedicated, signed walkway shall be provided meeting the minimum requirements of Section 6D.02 of the Manual of Uniform Traffic Control Devices, 2009 Edition. In areas where existing sidewalks are present on both sides of a roadway, both sidewalks shall be maintained when construction activities allow both to remain open. During periods when construction activities do not allow walkways on both sides to be maintained, the sidewalk serving the most pedestrians shall be the preferred sidewalk to be maintained.

At locations where overhead bridge construction is required, pedestrian shelters are required to be installed and maintained in accordance with the item “Sidewalk Shed.”

COMMERCIAL AND RESIDENTIAL DRIVEWAYS

The Contractor shall maintain access to and egress from all commercial and residential driveways throughout the project limits. The Contractor will be allowed to close said driveways to perform the required work during those periods when the businesses are closed unless permission is granted from the business owner to close the driveway during business hours. If a temporary closure of a residential driveway is necessary, the Contractor shall coordinate with the owner to determine the time period of the closure.

Article 9.71.03 - Construction Method is supplemented as follows:

GENERAL

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

The Contractor shall schedule operations so that pavement removal and roadway resurfacing shall be completed full width across a roadway (bridge) section by the end of a workday (work night), or as directed by the Engineer. The pavement milling will be restricted to one-mile sections at a time to protect the shoulders from deteriorating under a heavy traffic load.

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

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

The Contractor, during the course of active construction work on overhead signs and structures, shall close the lanes directly below the work area for the entire length of time overhead work is being undertaken. At no time shall an overhead sign be left partially removed or installed.

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

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

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

Construction vehicles entering travel lanes at speeds less than the posted speed are interfering with traffic and shall not be allowed without a lane closure. The lane closure shall be of sufficient length to allow vehicles to enter or exit the work area at posted speeds, in order to merge with existing traffic.

SIGNING

The Contractor shall maintain all existing overhead and side-mounted signs throughout the project limits during the duration of the project. The Contractor shall temporarily relocate

existing signs, temporary signs, and sign supports as many times as deemed necessary as shown on the Maintenance and Protection of Traffic (MPT) Plans and as directed by the Engineer. The Contractor shall install temporary signs, sign supports, and foundations as called for in the Maintenance and Protection of Traffic (MPT) Plans and as directed by the Engineer.

TRAFFIC SIGNALS

The Contractor shall keep each traffic signal in the project limits operational at all times during construction in accordance with Special Provision "Temporary Signalization."

The Contractor shall install final pavement markings and signing prior to the proposed traffic signal being made fully operational.

Loop detectors disturbed by the Contractor's operations shall be made operational or temporary detection must be provided within 24 hours of the termination of the existing loop detectors.

REQUIREMENTS FOR WINTER

The Contractor shall schedule a meeting with representatives of the Engineer, Maintenance, Traffic and the Town of West Hartford 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.

SIGNING PATTERNS

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

Pavement Markings - Limited Access Highways, Turning Roadways and Ramps

During construction, the Contractor shall maintain all pavement markings throughout the limits of the project.

Interim Pavement Markings

The Contractor shall install painted pavement markings, which shall include lane lines (broken lines), 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" 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, 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, 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; 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" 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 advance 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 advance 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) Temporary road closures using Rolling Road Blocks (RRB) may be allowed on limited access highways for operations associated with the installation and removal of temporary lane closures. RRB may be allowed for the installation and removal of lead signs and lane tapers only and shall meet the following requirements:

- RRB may not start prior to the time allowed in the contract Limitations of Operation for sign pattern installation. Sign pattern removal must be complete prior to the time indicated in the Limitations of Operation for restoring the lanes to traffic.
- On limited access highways with 4 lanes or more, a RRB may not start until the Limitations of Operation Chart allows a 2 lane closure. In areas with good sight lines and full shoulders, opposite side lead signs should be installed in a separate operation.
- Truck-Mounted Impact Attenuators (TMAs) equipped with arrow boards shall be used to slow traffic to implement the RRB. State Police Officers in marked vehicles may be used to support the implementation of the RRB. The RRB shall start by having all vehicles, including Truck-Mounted Impact Attenuators TMAs and police vehicles leave the shoulder or on-ramp and accelerate to a normal roadway speeds in each lane, then the vehicles will position themselves side by side and decelerate to the RRB speed on the highway.
- An additional Truck-Mounted Impact Attenuator TMAs equipped with a Portable Changeable Message Sign shall be utilized to advise the motorists that sign pattern installation / removal is underway. The Pre-Warning Vehicle (PWV) should be initially positioned in the right shoulder ½ mile prior to the RRB operation. If a traffic queue reaches the PWV's initial location, the contractor shall slowly reverse the PWV along the shoulder to position itself prior to the new back of queue. A Pre-

Warning Vehicle, as specified elsewhere in the contract, shall be utilized to advise the motorists that sign pattern installation / removal is underway.

- The RRB duration shall not exceed 15 minutes from start of the traffic block until all lanes are opened as designated in the Limitation of Operation chart. If the RRB duration exceeds 15 minutes on 2 successive shifts, no further RRB will be allowed until the Contractor obtains approval for a revised installation procedure from the respective construction District.
- RRB should not be utilized to expand a lane closure pattern to an additional lane during the shift. The workers and equipment required to implement the additional lane closure should be staged from within the closed lane. Attenuator trucks (and State Police if available) should be used to protect the workers installing the taper in the additional lane.
- Exceptions to these work procedures may be submitted to the District Office for consideration. A minimum of 2 business days should be allowed for review and approval by the District.
- The RRB procedures (including any approved exceptions) will be reviewed and discussed by the inspection team and the Contractor in advance of the work. The implementation of the agreed upon plan will be reviewed with the State Police during the Work Zone Safety meeting held before each shift involving temporary lane closures. If the State Police determine that alternative procedures should be implemented for traffic control during the work shift, the Department and Contractor will attempt to resolve any discrepancies with the duty sergeant at the Troop. If the discrepancies are unable to be resolved prior to the start of the shift, the work will proceed as recommended by the Department Trooper. Any unresolved issues will be addressed the following day.

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 travelpath 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 OR TRAILER 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 "Truck-Mounted or Trailer-Mounted Impact Attenuator". 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. If it is used as a TMA and is in the proper location as specified, then it should be paid at the specified hourly rate for "Truck-Mounted or Trailer-Mounted Impact Attenuator". 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 is also used as a Flashing Arrow in the same day, then the unit should be paid as a "Truck-Mounted or Trailer-Mounted Impact Attenuator" for the hours used to install and remove the pattern, typically 2 hours (1 hour to install and 1 hour to remove). If the TMA is also used as a Flashing Arrow during the same day, then the unit should be paid at the daily rate 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:

Message No.	Frame 1	Frame 2	Message No.	Frame 1	Frame 2
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.

SECTION 8. USE OF STATE POLICE OFFICERS

8.a) State Police may be utilized only on limited access highways and secondary roadways under their primary jurisdiction. One Officer may be used per critical sign pattern. Shoulder closures and right lane closures can generally be implemented without the presence of a State Police Officer. Likewise in areas with moderate traffic and wide, unobstructed medians, left lane closures can be implemented without State Police presence. Under some situations it may be desirable to have State Police presence, when one is available. Examples of this include: nighttime lane closures; left lane closures with minimal width for setting up advance signs and staging; lane and shoulder closures on turning roadways/ramps or mainline where sight distance is minimal; and closures where extensive turning movements or traffic congestion regularly occur, however they are not required.

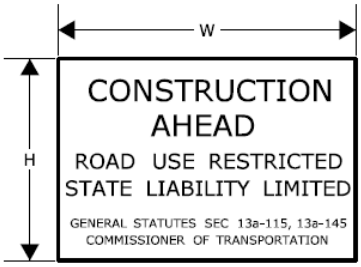
8.b) Once the pattern is in place, the State Police Officer should be positioned in a non-hazardous location in advance of the pattern If traffic backs up beyond the beginning of the pattern, then the State Police Officer shall be repositioned prior to the backup to give warning to the oncoming motorists. The State Police Officer and TMA should not be in proximity to each other.

8.c) Other functions of the State Police Officer(s) may include:

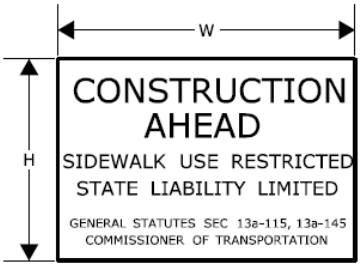
- Assisting entering/exiting construction vehicles within the work area.
- Enforcement of speed and other motor vehicle laws within the work area, if specifically requested by the project.

8.d) State Police Officers assigned to a work site are to only take direction from the Engineer.

SERIES 16 SIGNS



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



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

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.

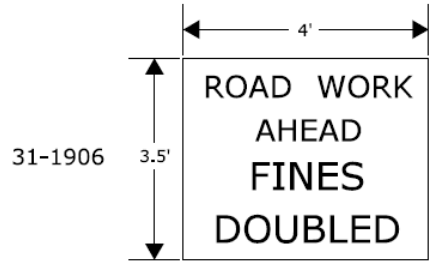
REGULATORY SIGN "ROAD WORK AHEAD, FINES DOUBLED"

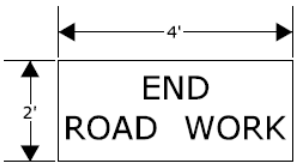
THE REGULATORY SIGN "ROAD WORK AHEAD FINES DOUBLED" SHALL BE INSTALLED FOR ALL WORK ZONES THAT OCCUR ON ANY STATE HIGHWAY IN CONNECTICUT WHERE THERE ARE WORKERS ON THE HIGHWAY OR WHEN THERE IS OTHER THAN EXISTING TRAFFIC OPERATIONS.

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 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

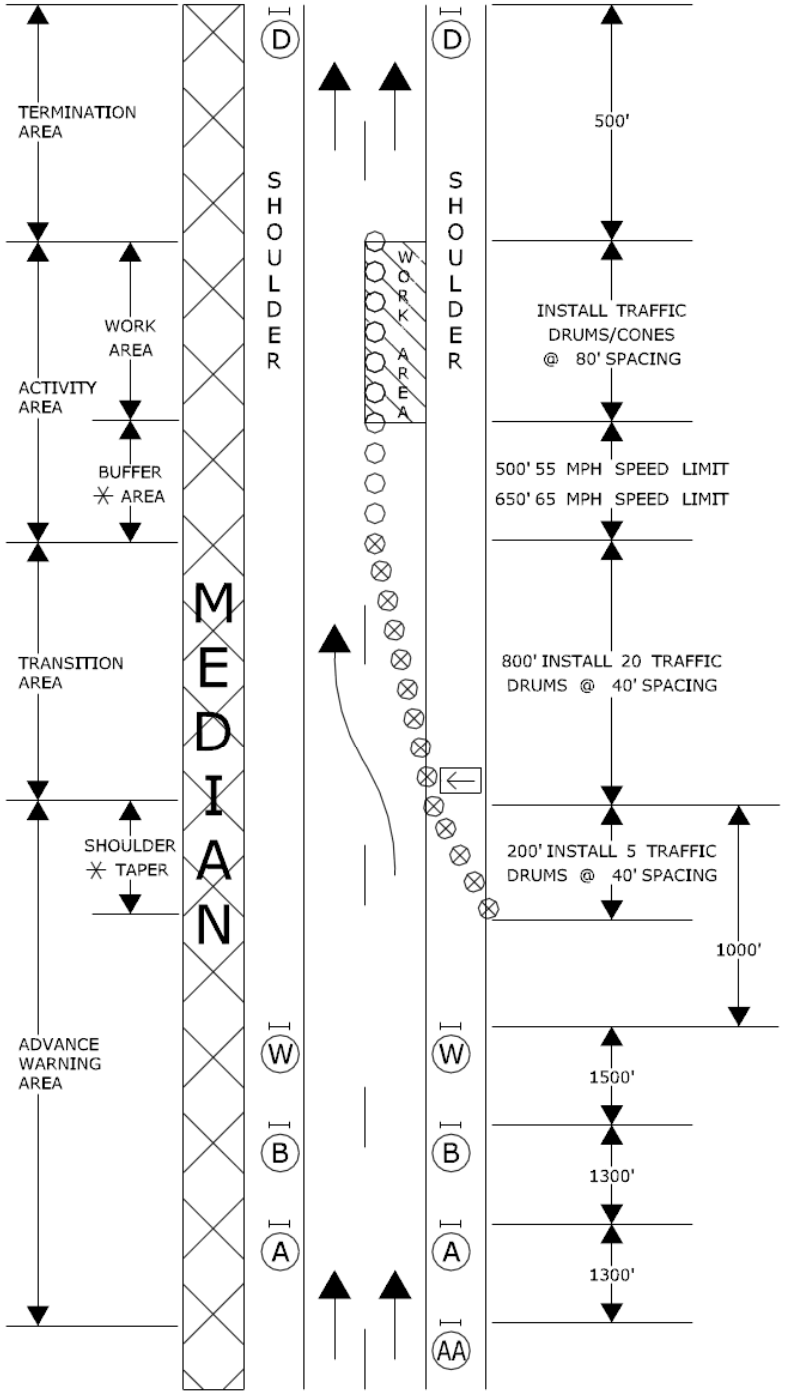
NOTES

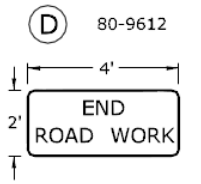
CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION

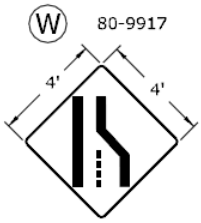
APPROVED Charles S. Harlow 2012.06.05 15:50:35-04'00'
PRINCIPAL ENGINEER

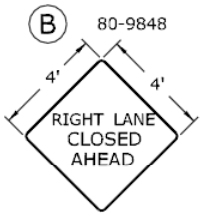
WORK IN RIGHT LANE - MULTILANE HIGHWAY

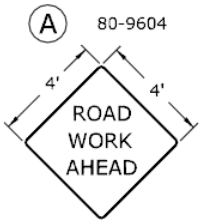
SIGN FACE
126 SQ. FT (MIN.)

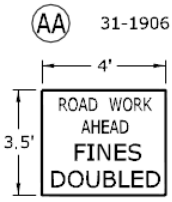












TRAFFIC CONE **OR** TRAFFIC DRUM
OPTIONAL TRAFFIC DRUM PORTABLE SIGN SUPPORT
HIGH MOUNTED INTERNALLY ILLUMINATED FLASHING ARROW

SCALE: NONE

CONSTRUCTION TRAFFIC CONTROL PLAN

PLAN 1

SEE NOTES 1, 2, 3, 4, 5, 6, 8, 9

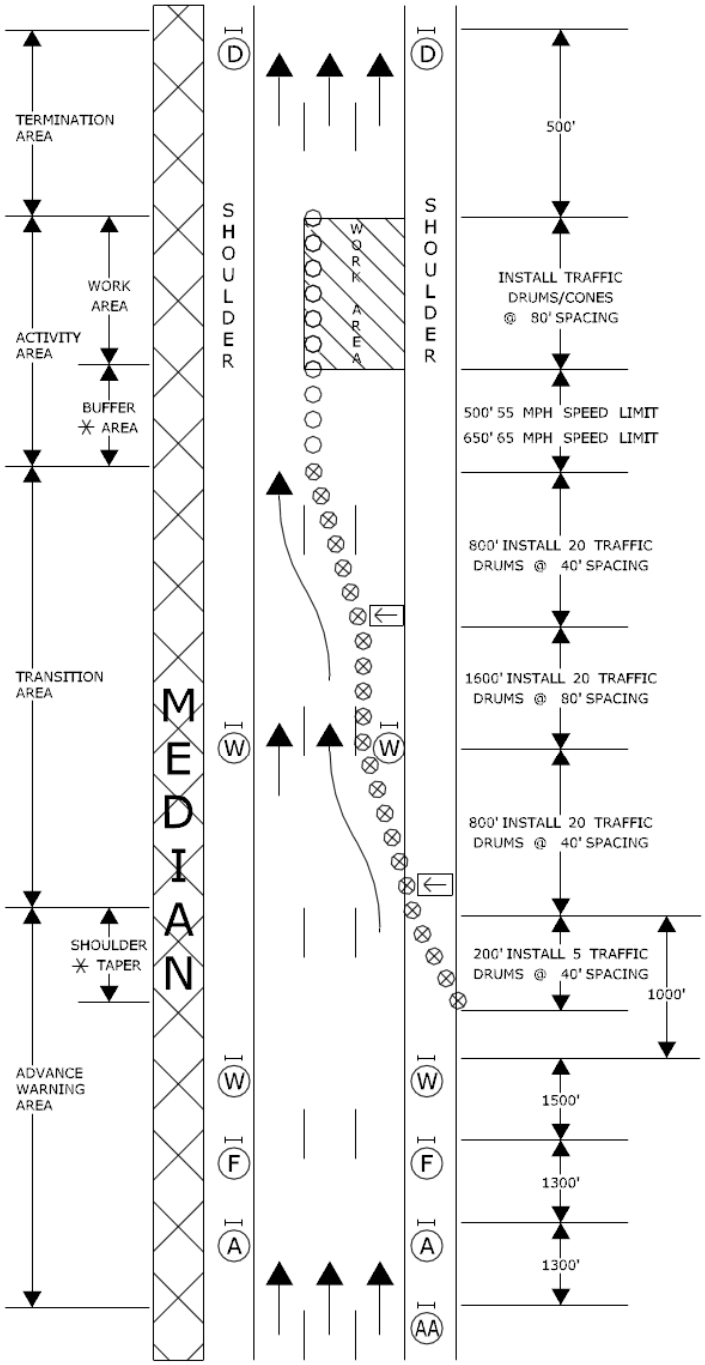
CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION

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

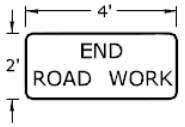
155-171 ITEM #0971001A

WORK IN RIGHT TWO LANES - MULTILANE HIGHWAY

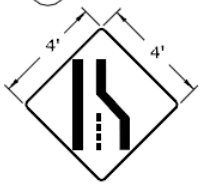
SIGN FACE
158 SQ. FT (MIN.)



D 80-9612

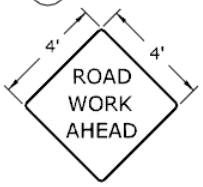


W 80-9917

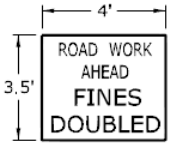


F 80-9838

A 80-9604



AA 31-1906



TRAFFIC CONE **OR** TRAFFIC DRUM
OPTIONAL TRAFFIC DRUM PORTABLE SIGN SUPPORT
HIGH MOUNTED INTERNALLY ILLUMINATED FLASHING ARROW

SCALE: NONE

CONSTRUCTION TRAFFIC CONTROL PLAN

PLAN 2

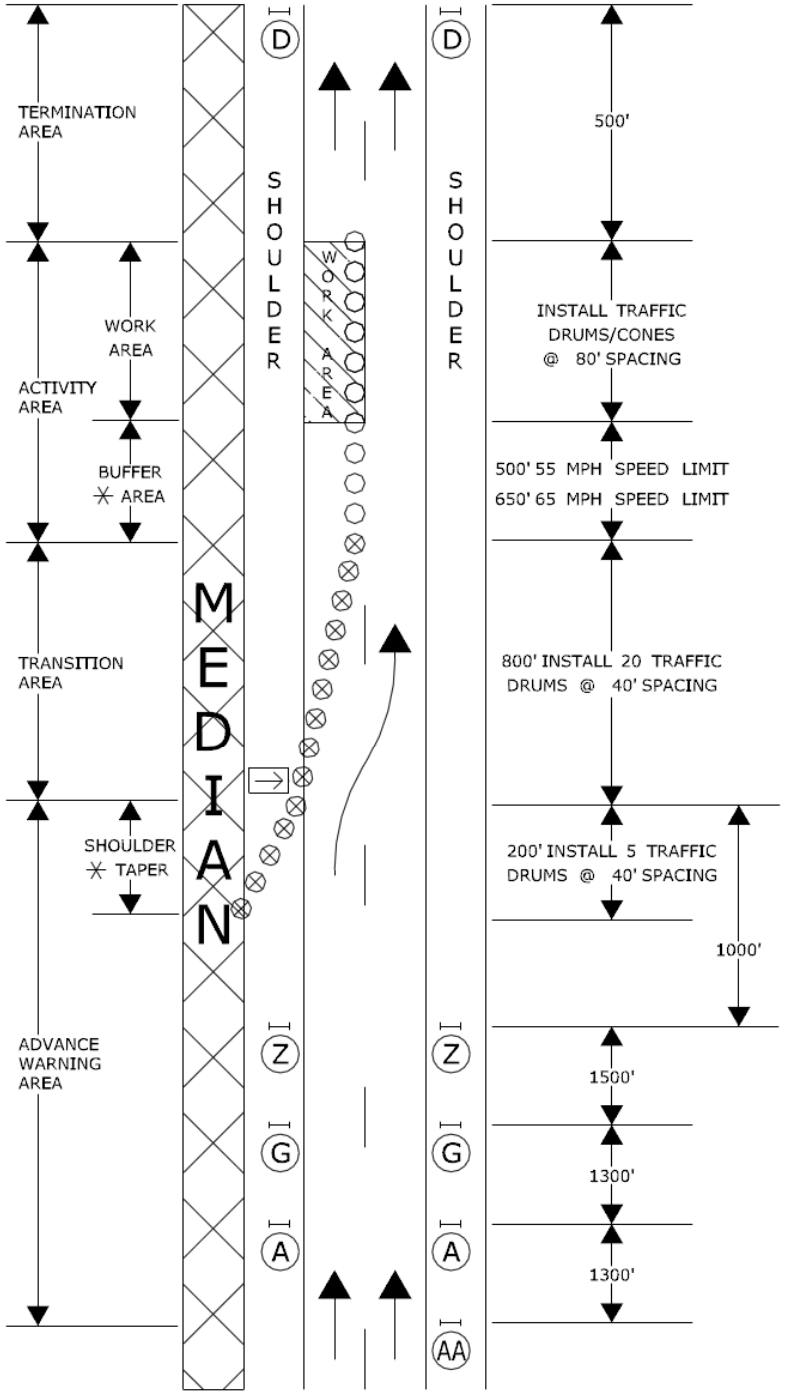
SEE NOTES 1, 2, 3, 4, 5, 6, 8, 9

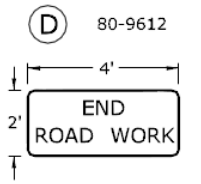
CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION

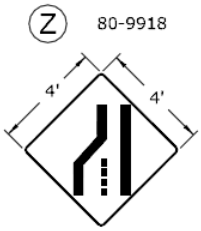
APPROVED Charles S. Harlow 2012.06.05 15:51:23-04'00'
PRINCIPAL ENGINEER

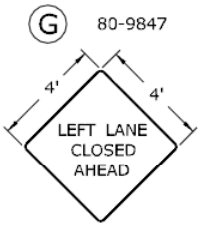
WORK IN LEFT LANE - MULTILANE HIGHWAY

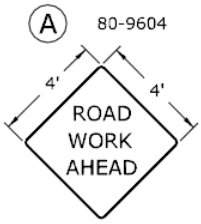
SIGN FACE
126 SQ. FT (MIN.)

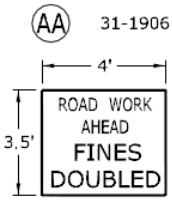












TRAFFIC CONE **OR** TRAFFIC DRUM
OPTIONAL TRAFFIC DRUM PORTABLE SIGN SUPPORT
HIGH MOUNTED INTERNALLY ILLUMINATED FLASHING ARROW

SCALE: NONE

CONSTRUCTION TRAFFIC CONTROL PLAN

PLAN 3

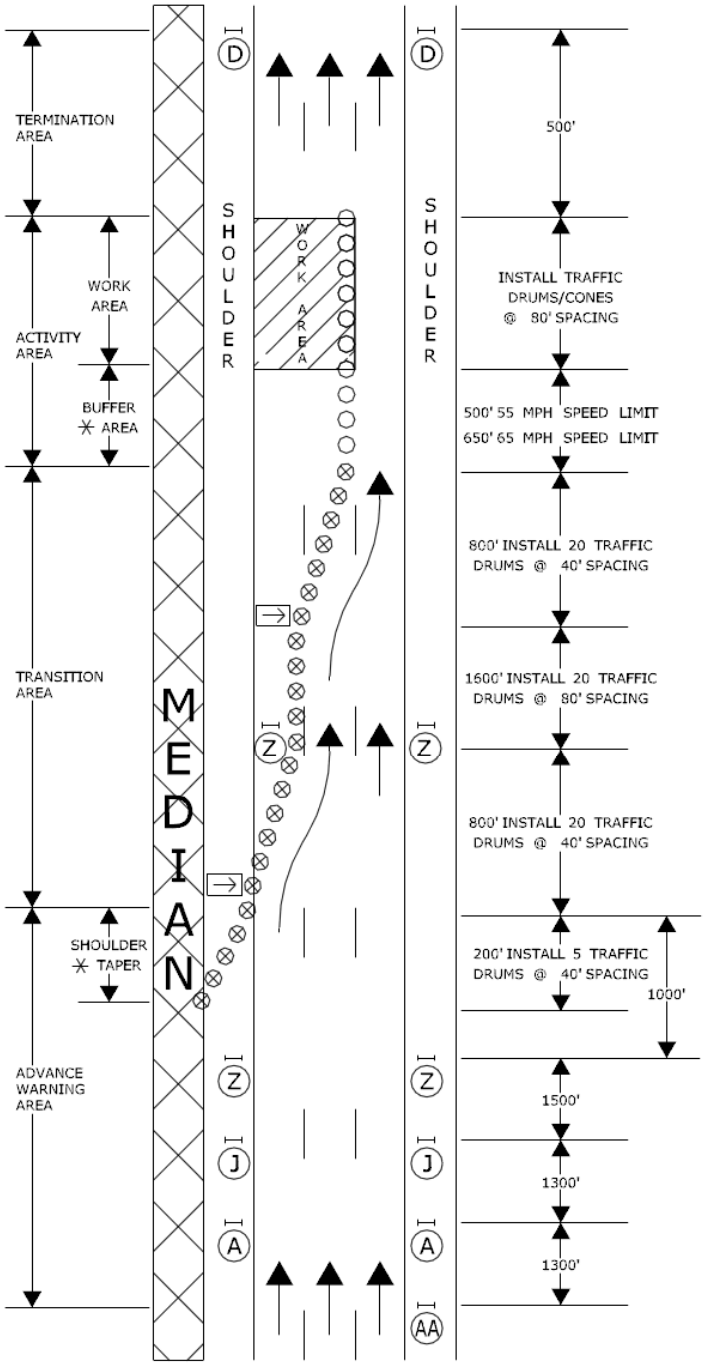
SEE NOTES 1, 2, 3, 4, 5, 6, 8, 9

CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION

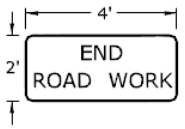
APPROVED Charles S. Harlow 2012.06.05 15:51:46-04'00'
PRINCIPAL ENGINEER

WORK IN LEFT TWO LANES - MULTILANE HIGHWAY

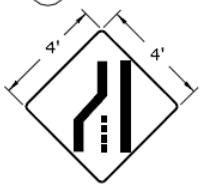
SIGN FACE
158 SQ. FT (MIN.)



D 80-9612

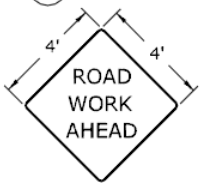


Z 80-9918

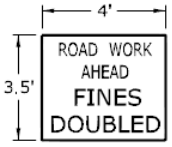


J 80-9837

A 80-9604



AA 31-1906



TRAFFIC CONE **OR** TRAFFIC DRUM
OPTIONAL TRAFFIC DRUM PORTABLE SIGN SUPPORT
HIGH MOUNTED INTERNALLY ILLUMINATED FLASHING ARROW

SCALE: NONE

CONSTRUCTION TRAFFIC CONTROL PLAN

PLAN 4

SEE NOTES 1, 2, 3, 4, 5, 6, 8, 9

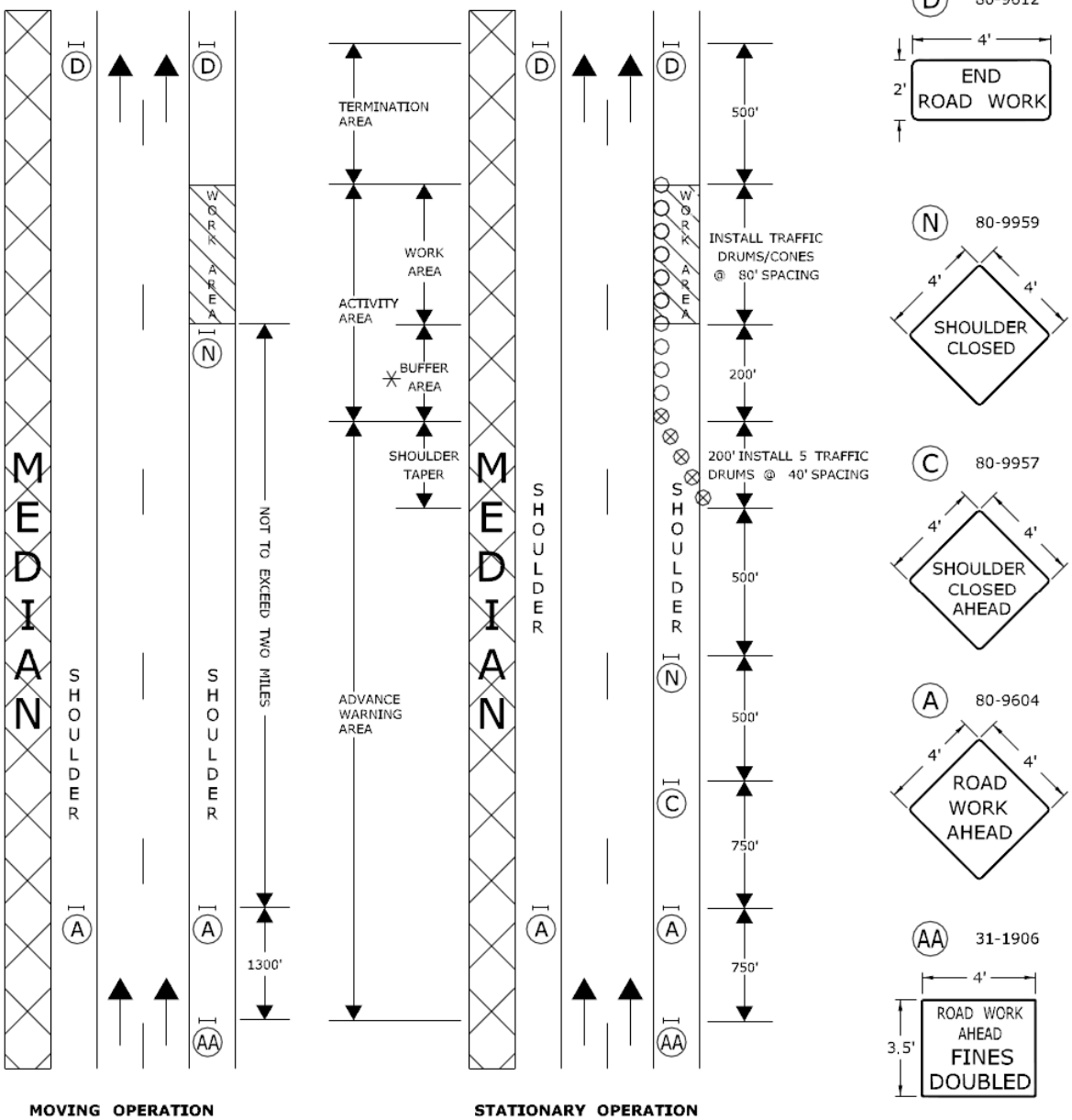
CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION

APPROVED Charles S. Harlow 2012.06.05 15:52:10-04'00'
PRINCIPAL ENGINEER

155-171 ITEM #0971001A

WORK IN SHOULDER AREA - MULTILANE HIGHWAY

SIGN FACE
94 SQ. FT (MIN.)



TRAFFIC CONE **OR** TRAFFIC DRUM
OPTIONAL TRAFFIC DRUM PORTABLE SIGN SUPPORT
HIGH MOUNTED INTERNALLY ILLUMINATED FLASHING ARROW

SCALE: NONE

CONSTRUCTION TRAFFIC CONTROL PLAN

PLAN 6

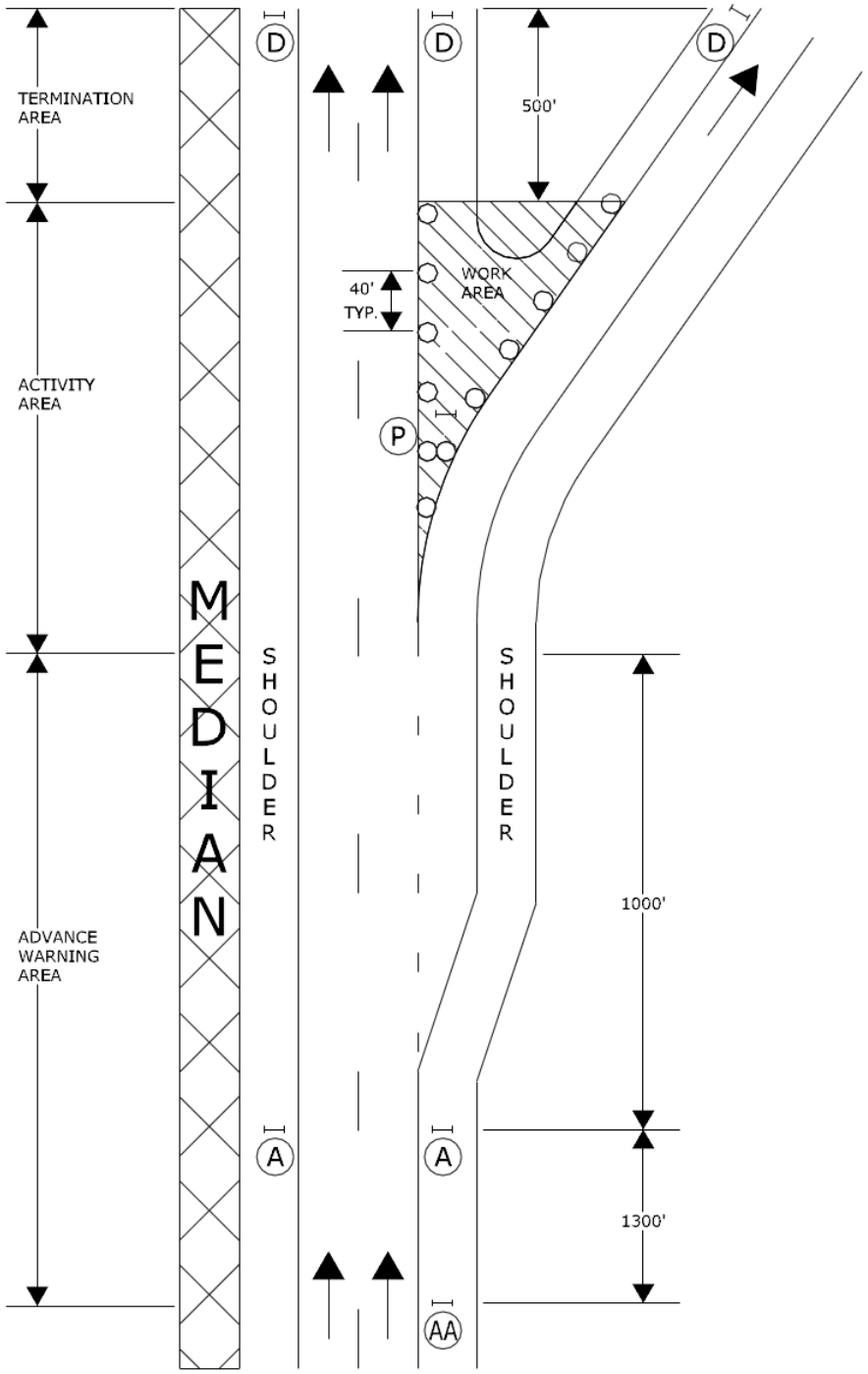
SEE NOTES 1, 2, 4, 8

CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION

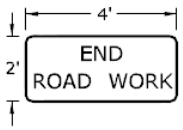
APPROVED Charles S. Harlow 2012.06.05 15:52:38-04'00'
PRINCIPAL ENGINEER

WORK IN RAMP GORE AREA

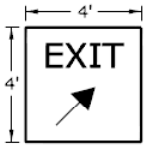
SIGN FACE
86 SQ. FT (MIN.)



D 80-9612

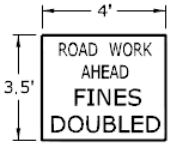


P 51-6147



A 80-9604

AA 31-1906



TRAFFIC CONE **OR** TRAFFIC DRUM
OPTIONAL TRAFFIC DRUM PORTABLE SIGN SUPPORT
HIGH MOUNTED INTERNALLY ILLUMINATED FLASHING ARROW

SCALE: NONE

CONSTRUCTION TRAFFIC CONTROL PLAN

PLAN 7

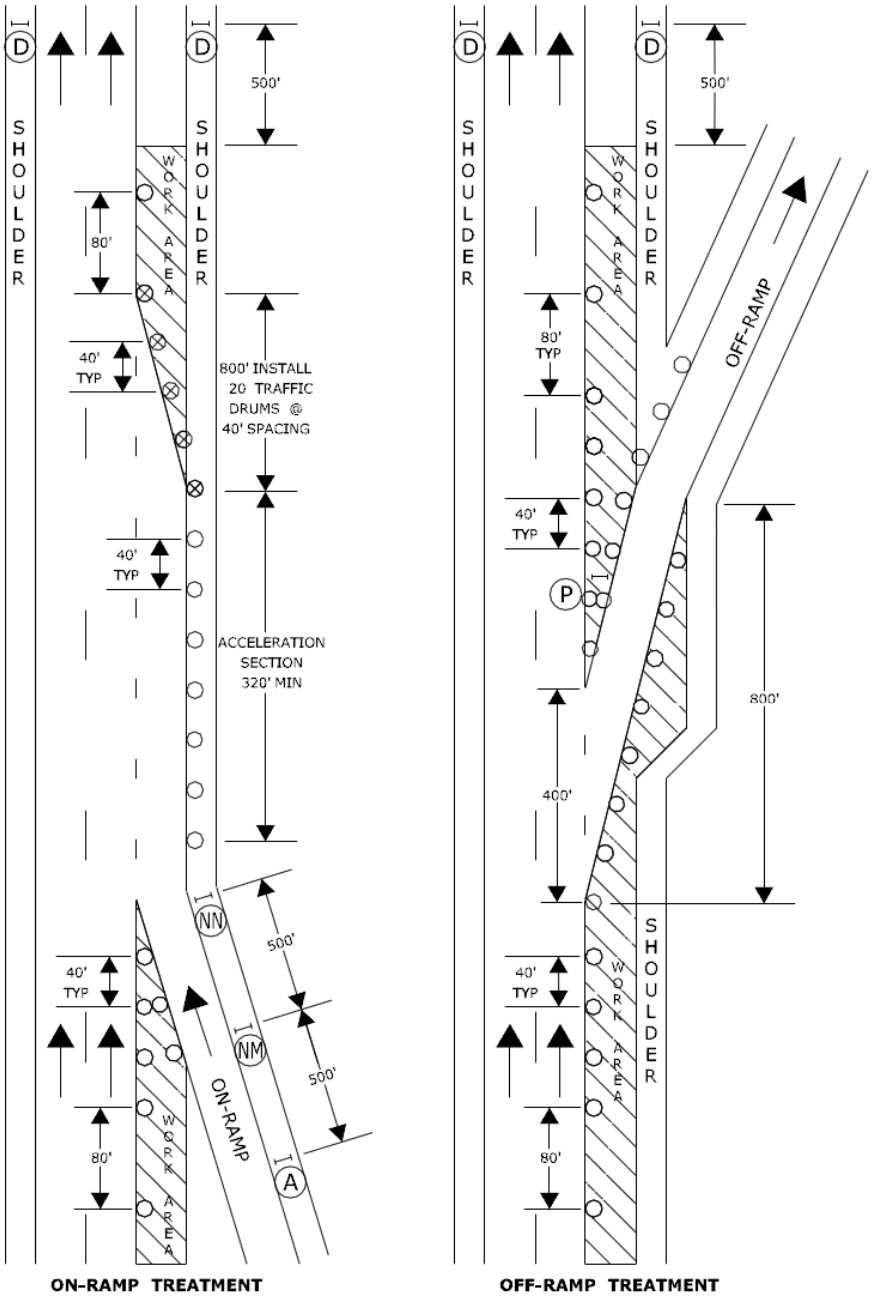
SEE NOTES 1, 2, 4, 8, 10

CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION

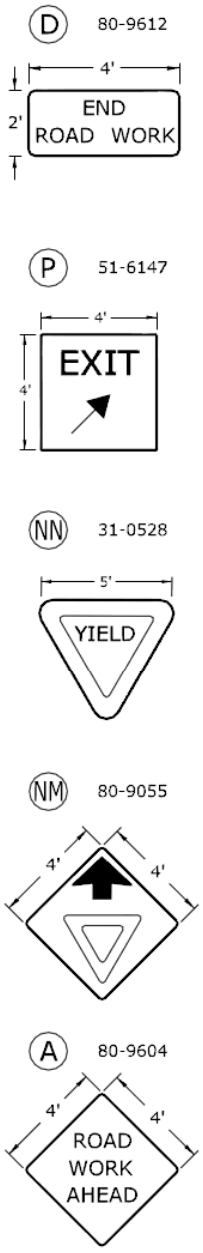
APPROVED Charles S. Harlow 2012.06.05 15:53:03-04'00'
PRINCIPAL ENGINEER

TYPICAL RAMP TREATMENTS FOR MAINLINE LANE CLOSURE - MULTILANE HIGHWAY

SIGN FACE
SQ. FT VARIES



ON-RAMP TREATMENT **OFF-RAMP TREATMENT**



USE TRAFFIC CONTROL PLAN 1 TO CLOSE THE RIGHT LANE

TRAFFIC CONE **OR** TRAFFIC DRUM
OPTIONAL TRAFFIC DRUM PORTABLE SIGN SUPPORT
HIGH MOUNTED INTERNALLY ILLUMINATED FLASHING ARROW

SCALE: NONE

CONSTRUCTION TRAFFIC CONTROL PLAN

PLAN 8

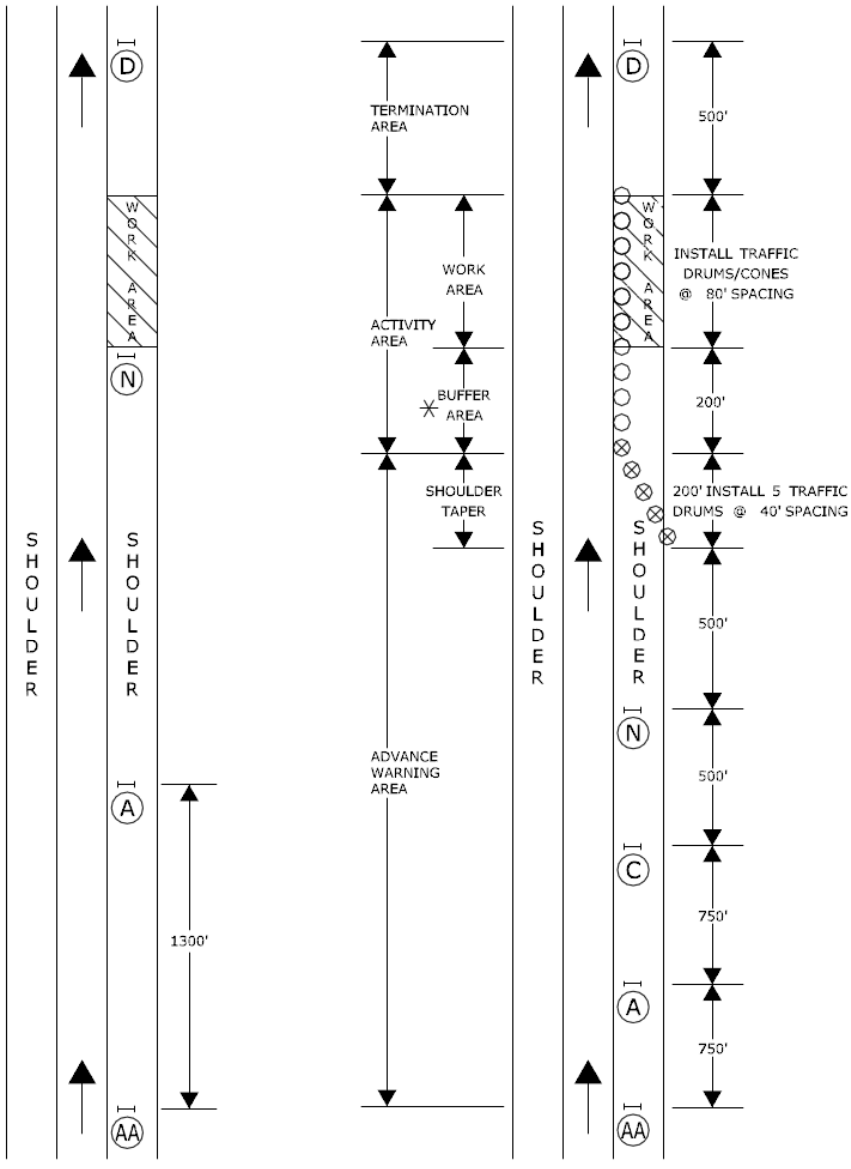
SEE NOTES 1, 2, 3, 4, 5, 6, 8, 9, 10

CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION

APPROVED Charles S. Harlow 2012.06.05 15:53:31-04'00'
PRINCIPAL ENGINEER

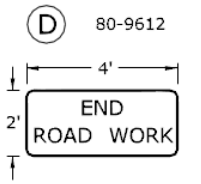
WORK IN SHOULDER AREA - TURNING ROADWAYS / RAMPS

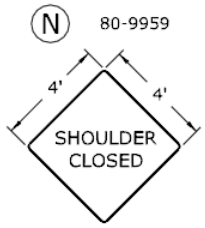
SIGN FACE
70 SQ. FT (MIN.)

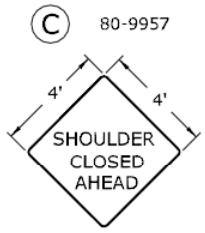


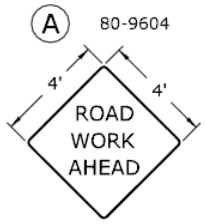
MOVING OPERATION

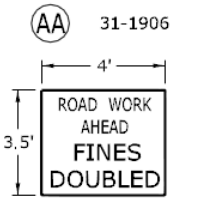
STATIONARY OPERATION











◯ 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

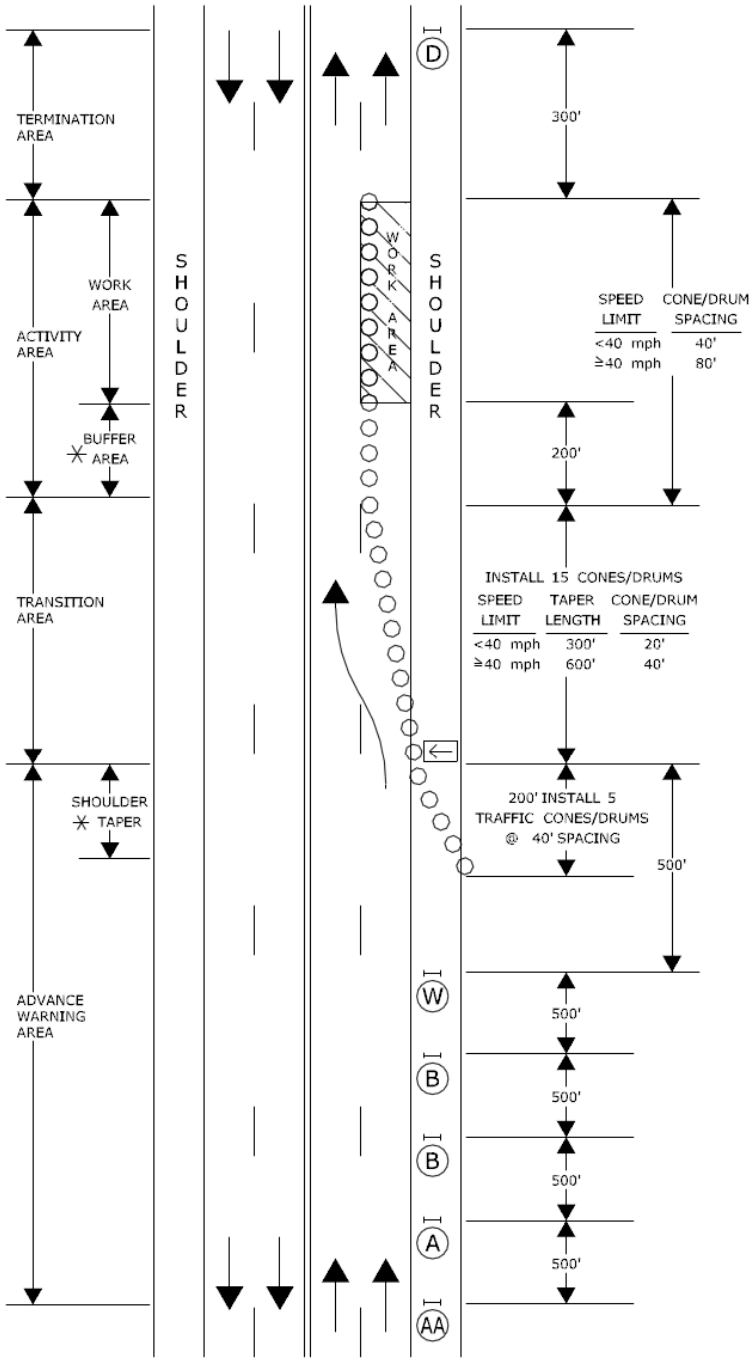
SEE NOTES 1, 2, 4, 8

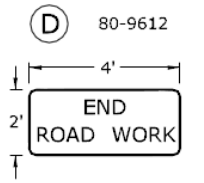
CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION

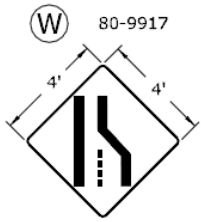
APPROVED Charles S. Harlow 2012.06.05 15:53:53-04'00'
PRINCIPAL ENGINEER

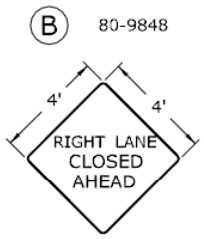
WORK IN RIGHT LANE - 4 LANE UNDIVIDED HIGHWAY

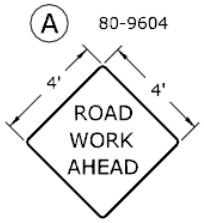
SIGN FACE
86 SQ. FT (MIN.)

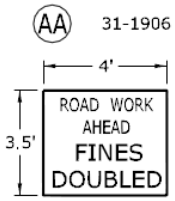












TRAFFIC CONE **OR** TRAFFIC DRUM
OPTIONAL TRAFFIC DRUM PORTABLE SIGN SUPPORT
HIGH MOUNTED INTERNALLY ILLUMINATED FLASHING ARROW

SCALE: NONE

CONSTRUCTION TRAFFIC CONTROL PLAN

PLAN 10

SEE NOTES 1, 2, 3, 4, 5, 6, 7, 8

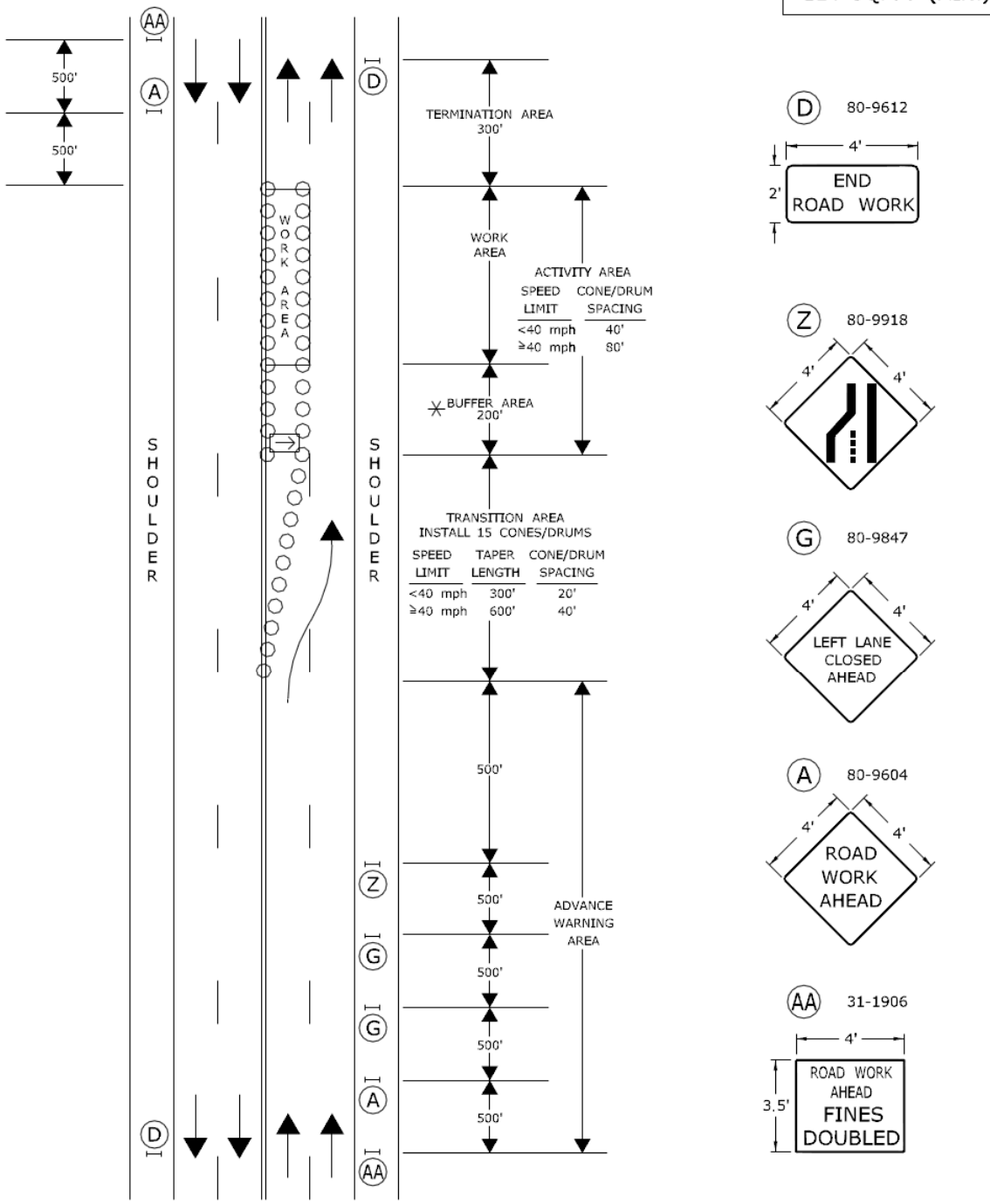
CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION

APPROVED Charles S. Harlow 2012.06.05 15:54:15-04'00'
PRINCIPAL ENGINEER

155-171 ITEM #0971001A

WORK IN LEFT LANE - 4 LANE UNDIVIDED HIGHWAY

SIGN FACE
124 SQ. FT (MIN.)



D 80-9612

Z 80-9918

G 80-9847

A 80-9604

AA 31-1906

○ TRAFFIC CONE **OR** TRAFFIC DRUM
✳ OPTIONAL ⊗ TRAFFIC DRUM ⊢ PORTABLE SIGN SUPPORT
⇐ HIGH MOUNTED INTERNALLY ILLUMINATED FLASHING ARROW

SCALE: NONE

CONSTRUCTION TRAFFIC CONTROL PLAN

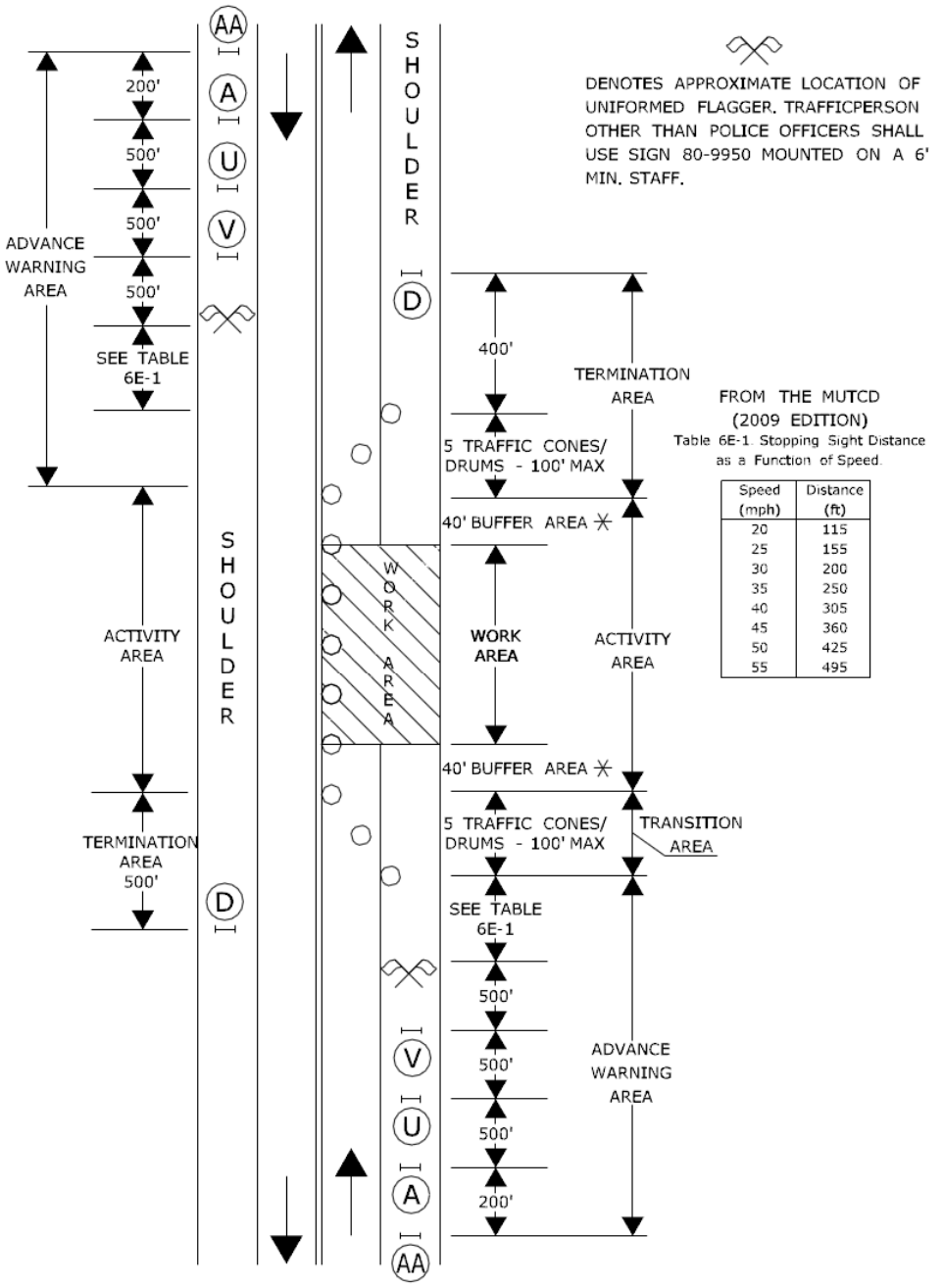
PLAN 11

SEE NOTES 1, 2, 3, 4, 5, 6, 7, 8

CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION

APPROVED Charles S. Harlow 2012.06.05 15:54:36-04'00'
PRINCIPAL ENGINEER

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

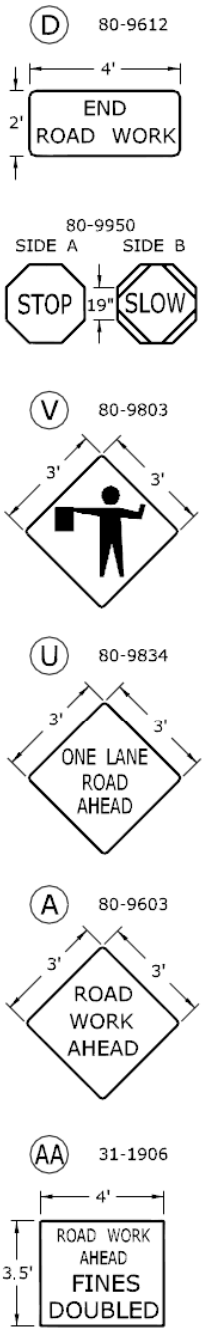


DENOTES APPROXIMATE LOCATION OF UNIFORMED FLAGGER. TRAFFICPERSON OTHER THAN POLICE OFFICERS SHALL USE SIGN 80-9950 MOUNTED ON A 6' MIN. STAFF.

FROM THE MUTCD (2009 EDITION)
Table 6E-1 Stopping Sight Distance as a Function of Speed

Speed (mph)	Distance (ft)
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495

SIGN FACE
108 SQ. FT (MIN.)



TRAFFIC CONE **OR** TRAFFIC DRUM
OPTIONAL TRAFFIC DRUM PORTABLE SIGN SUPPORT
HIGH MOUNTED INTERNALLY ILLUMINATED FLASHING ARROW

SCALE: NONE

CONSTRUCTION TRAFFIC CONTROL PLAN

PLAN 13 - SHEET 1 OF 2

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

CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION

APPROVED _____ PRINCIPAL ENGINEER
Charles S. Harlow
2012.06.05 15:55:23-04'00'

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

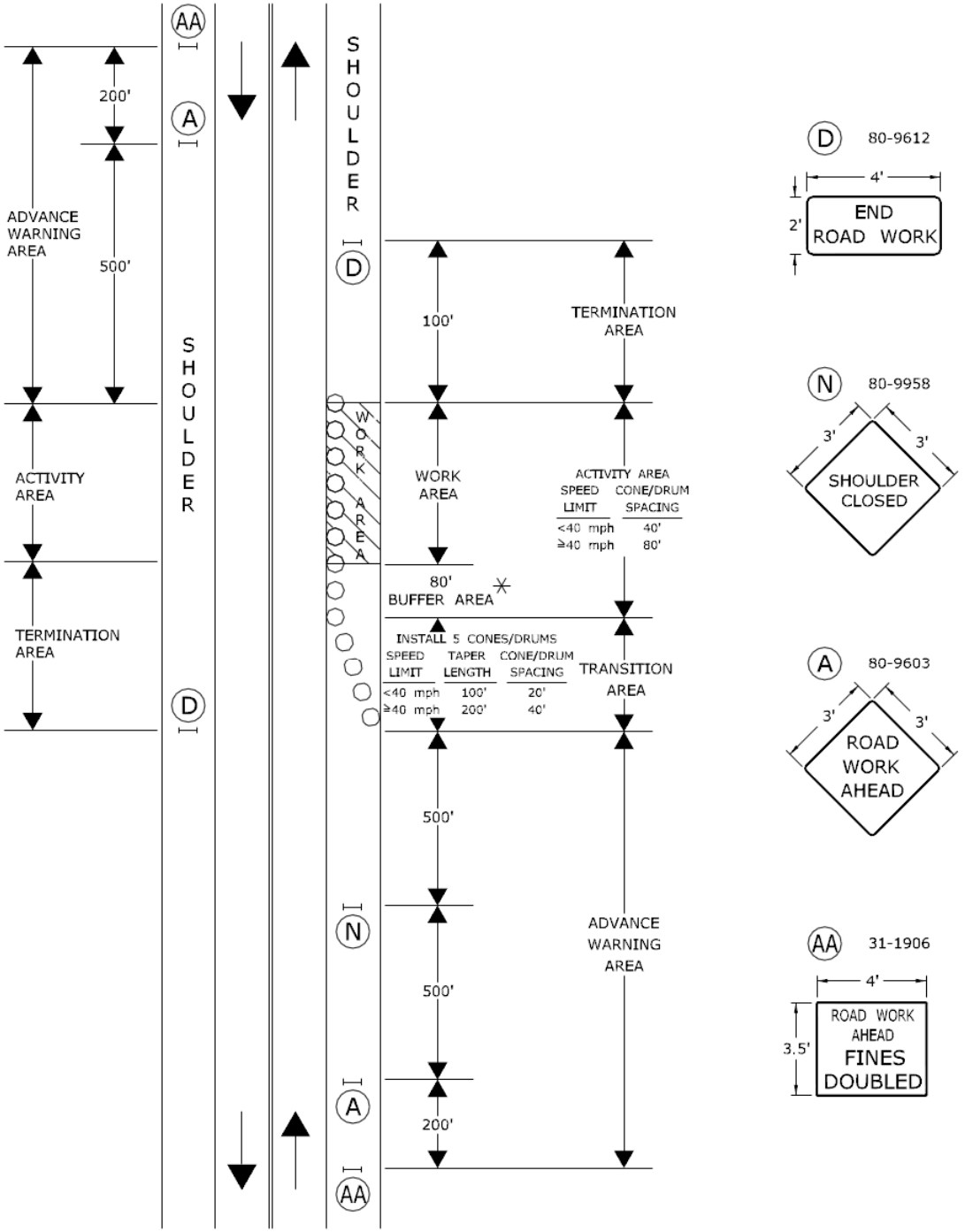
CONSTRUCTION TRAFFIC CONTROL PLAN
PLAN 13 - SHEET 2 OF 2
SEE NOTES 1, 2, 4, 6, 7, 8

CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION

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

WORK IN SHOULDER - TWO LANE HIGHWAY

SIGN FACE
71 SQ. FT (MIN.)



TRAFFIC CONE **OR** TRAFFIC DRUM
OPTIONAL TRAFFIC DRUM PORTABLE SIGN SUPPORT
HIGH MOUNTED INTERNALLY ILLUMINATED FLASHING ARROW

SCALE: NONE

CONSTRUCTION TRAFFIC CONTROL PLAN

PLAN 14

SEE NOTES 1, 2, 4, 7, 8

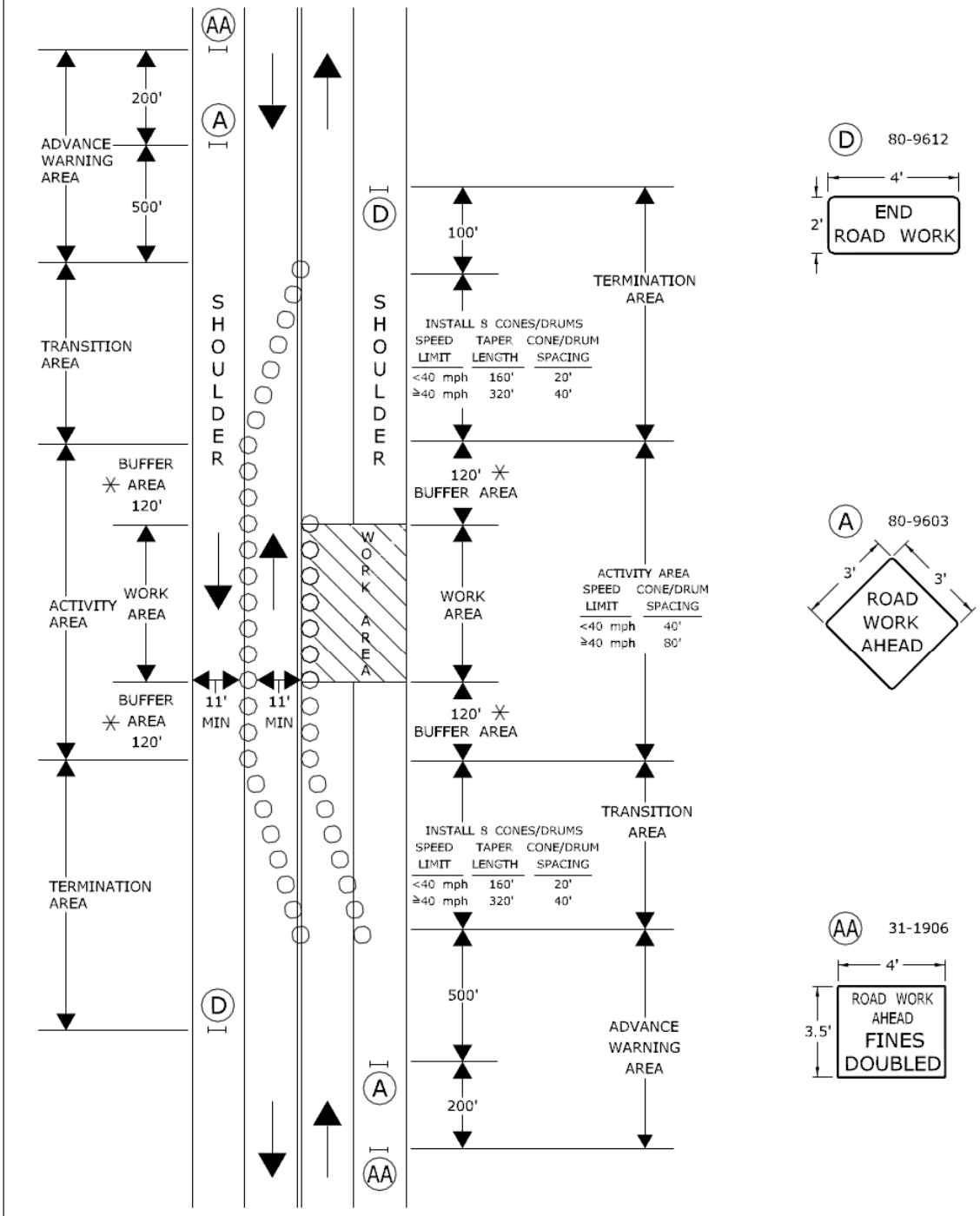
CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION

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

155-171 ITEM #0971001A

WORK IN TRAVEL LANE AND SHOULDER
TWO LANE HIGHWAY

SIGN FACE
62 SQ. FT (MIN.)



D 80-9612

A 80-9603

AA 31-1906

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

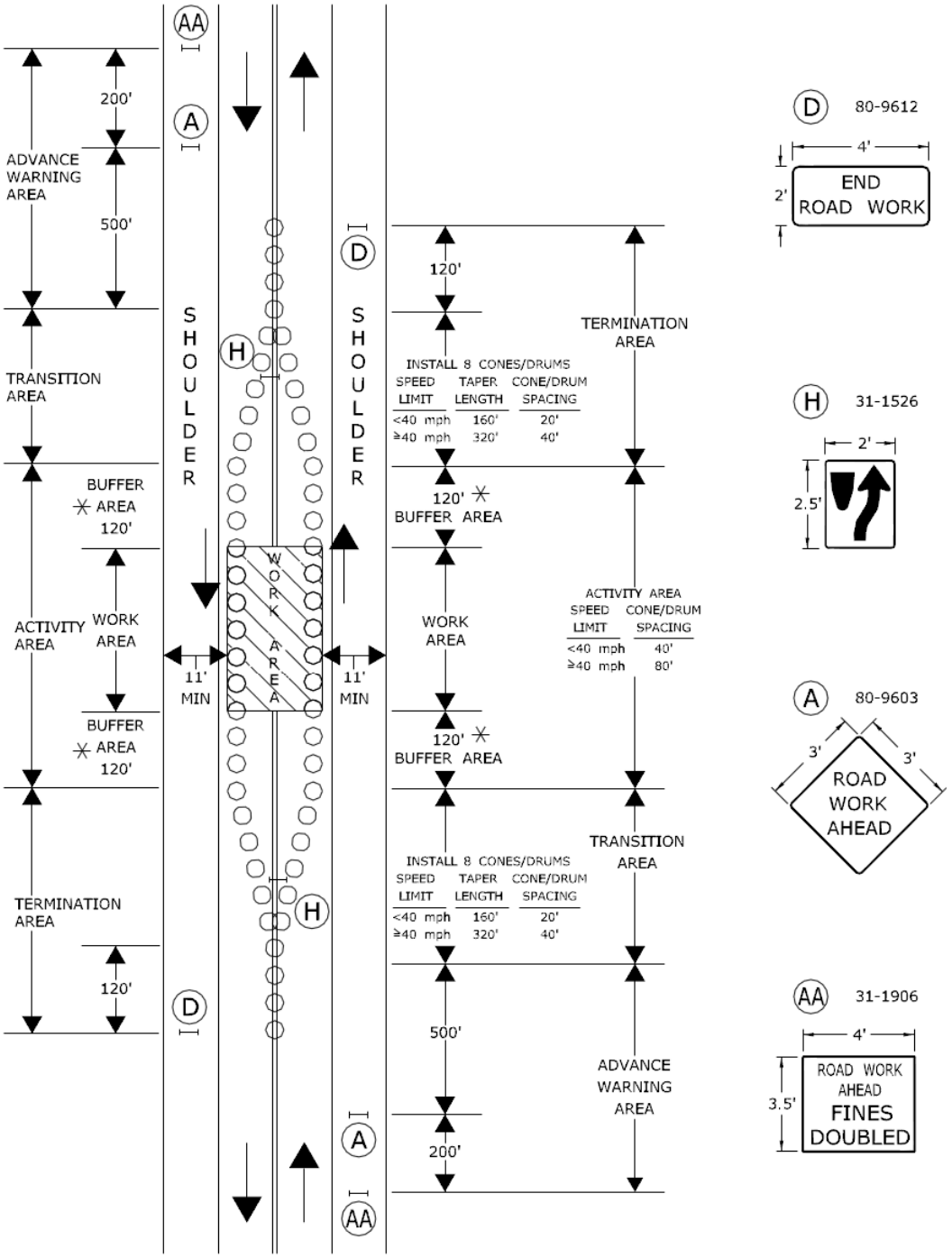
CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION

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

155-171 ITEM #0971001A

WORK IN MIDDLE OF ROADWAY
TWO LANE HIGHWAY

SIGN FACE
72 SQ. FT (MIN.)



◯ TRAFFIC CONE **OR** TRAFFIC DRUM
✳ OPTIONAL ⊗ TRAFFIC DRUM ⊢ PORTABLE SIGN SUPPORT
⇐ HIGH MOUNTED INTERNALLY ILLUMINATED FLASHING ARROW

SCALE: NONE

CONSTRUCTION TRAFFIC CONTROL PLAN

PLAN 16

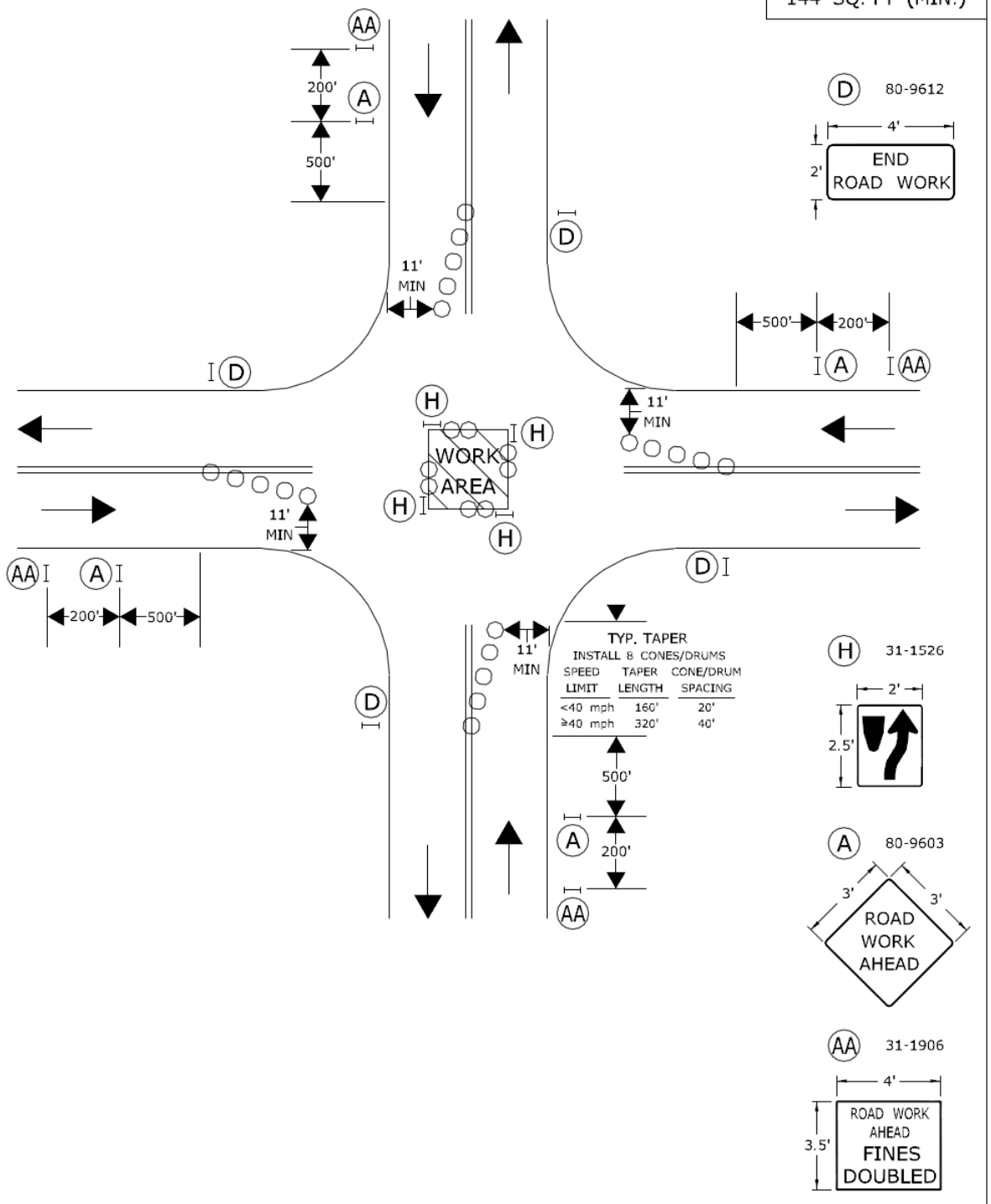
SEE NOTES 1, 2, 4, 6, 7, 8

CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION

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

WORK IN MIDDLE OF ROADWAY AT INTERSECTION

SIGN FACE
144 SQ. FT (MIN.)



TRAFFIC CONE **OR** TRAFFIC DRUM
OPTIONAL TRAFFIC DRUM PORTABLE SIGN SUPPORT
HIGH MOUNTED INTERNALLY ILLUMINATED FLASHING ARROW

SCALE: NONE

CONSTRUCTION TRAFFIC CONTROL PLAN

PLAN 17

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

CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION

APPROVED Charles S. Harlow 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". Temporary overhead sign supports and foundations shall be paid for under the appropriate item(s).

The cost of furnishing, installing, and removing the material for the 4H:1V traversable slope shall be paid for under the item "Maintenance and Protection of Traffic."

Pay Item	Pay Unit
Maintenance and Protection of Traffic	LS

ITEM #0974001A - REMOVAL OF EXISTING MASONRY

Work under this item shall conform to the requirements of Section 9.74 supplemented and amended as follows:

Article 9.74.01 – Description:

Delete the entire article and replace with the following:

This work shall include the removal and satisfactory disposal of dry masonry, cement rubble masonry, and concrete construction retaining walls, bridge substructures, and bridge approach slabs, the removal of which is necessary to the final completion of the work.

Article 9.74.03 – Construction Methods:

Add the following:

1. General Removal:

At locations where partial removal of concrete substructure units is required, the Contractor shall perform the removal work using equipment and methods that minimizes damage to the concrete to remain in place unless such concrete is being abandoned in place.

At locations where partial removal is required adjacent to concrete to remain, the Contractor shall saw cut the concrete to a minimum depth of 1 inch at the removal limits and shall use pneumatic hammers or any other method approved by the Engineer to remove the concrete. Maximum 30 pound hammers shall be used for general removal while maximum 15 pound hammers shall be used within 6 inches of concrete or reinforcing steel that is to remain. Pneumatic tools shall not be placed in direct contact with the reinforcing steel that is to remain.

Existing footing concrete shall be removed to full depth and an adequate horizontal distance around piles to be extracted, to allow access for extraction equipment to engage the pile for removal. Equipment and methods used for concrete removal shall limit the damage to the pile head to allow for any required extractions.

Reinforcing steel shall be cut and removed as shown on the plans. Loose and small concrete fragments shall be cleaned from the reinforcing steel required to be left in place.

The Contractor shall take necessary precautions to prevent any damage to the portions of the structure to remain. Any damage shall be repaired by the Contractor, as directed by the Engineer, and at no cost to the State.

When removing the concrete and reinforcing steel, the Contractor shall take necessary precautions to prevent debris from dropping to areas below the structure or onto adjacent traffic lanes.

All debris shall be properly disposed, from the site, by the Contractor.

Existing pile sections embedded in footing concrete removed under this item shall be removed as part of the masonry removal.

Article 9.74.05 – Basis of Payment:

Delete the entire article 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.

No additional payment will be made for the removal of pile sections embedded in existing footings that are removed as part of the item "Removal of Existing Masonry" unless the plans require pile removal to an elevation below the bottom of footing.

No additional payment will be made for the required concrete saw cutting, cutting of reinforcing steel, and the cleaning of reinforcing steel to remain, when such work is associated with the removal of masonry payable under this item, such work being included in the unit price for "Removal of Existing Masonry."

Pay Item	Pay Unit
Removal of Existing Masonry	c.y.

ITEM #0974105A - CONCRETE HAUNCH REMOVAL

Description:

The work included under this item shall consist of removing the existing concrete haunches as shown on the Plans, and/or as directed by the Engineer and furnishing, fabricating, erecting, maintaining, removing and disposing of debris shields as described in this special provision. Work under this item shall conform to the requirements of Section 9.74 amended as follows:

Materials:

At the discretion of the Contractor and as called for in the Contractor's design, debris shields may be constructed from timber, steel, aluminum or any combination thereof.

Steel and aluminum shall conform to the requirements of Section M.06 Metals.

Timber and hardware shall be as required by the Contractor's design. Timber material shall be structural lumber in accordance with the National Design Specifications for stress graded lumber recommended by the National Forest Products Association (NFPA). Plywood shall be exterior grade as outlined in the latest edition of Voluntary Product Standard PS 1-95 for Construction and Industrial Plywood of the American Plywood Association.

Article 9.74.03 - Construction Methods: Add the following:

The concrete shall be removed to the extents and the limits shown on the Plans. The concrete shall be sawcut to delineate the removal limits, except at locations determined to be inaccessible as approved by the Engineer. Pneumatic hammers or any other method approved by the Engineer may be used to remove the concrete. Maximum 15 lb hammers shall be used near the existing steel. Pneumatic tools shall not be placed in direct contact with the steel to remain.

The Contractor shall take necessary precautions to prevent any damage to the portions of the structure to remain. Any damage shall be repaired by the Contractor, as directed by the Engineer, and at no cost to the State.

When removing the concrete, the Contractor shall take necessary precautions to prevent debris from dropping to areas below the structure onto adjacent walkways or traffic lanes.

All debris shall be disposed, from the site, by the Contractor.

The debris shields for concrete haunch removal shall meet or exceed the following requirements:

1. It shall be the Contractor's responsibility, as part of this item of work, to design and detail the debris shield to conform to all Federal, State, and Local laws and regulations, as well as the requirements contained here in this Specification.

2. The Contractor shall submit working drawings, stamped by a Professional Structural Engineer registered in the State of Connecticut, in accordance with Subsection 1.05.02; Plans, Working Drawings and Shop Drawings, of all proposed debris shielding to the Engineer for his review and approval prior to installation. The working drawings shall include design and details of the debris shield including all connections, brackets, and fasteners. The various components of the debris shield shall be designed for the anticipated weight of all personnel, material, equipment, and debris to be supported, based on the Contractor's method and sequence of work, but in no case shall be designed for less than 75 pounds per square foot. Vertical elements of the debris shield shall be designed for anticipated loads including wind, or a minimum of 30 pounds per square foot, whichever is higher.

3. The debris shields shall be placed and secured against all applicable loads, including wind. If, in the opinion of the Engineer, the shields are not secure, the Contractor shall remove and install them to the satisfaction of the Engineer.

4. Debris shields shall be placed so as to maintain the existing roadway width and vertical clearance. Traffic control for the work shall be performed during off- peak hours in accordance with Section 1.08 – Prosecution and Progress and shall be provided in accordance with the special provision "Maintenance and Protection of Traffic."

The debris shields shall not contain any gaps or openings that would allow debris to pass through, and shall be sufficiently strong to support any debris from falling onto the roadway or walkway below.

Article 9.74.04 - Method of Measurement: Delete in its entirety and replace with the following:

This work shall be measured for payment by the actual number of linear feet of "Concrete Haunch Removal" accepted by the Engineer. The debris shield shall not be measured separately for payment.

Article 9.74.05 - Basis of Payment: Delete in its entirety and replace with the following:

This work shall be paid for at the contract unit price per linear foot for "Concrete Haunch Removal" complete, removed, disposed and accepted, including debris shields, which price shall include all materials, equipment, tools and labor incidental thereto.

Pay Item	Pay Unit
Concrete Haunch Removal	l.f.

ITEM #1001001A - TRENCHING AND BACKFILLING

The work under the item Trenching and Backfilling shall conform to Section 10.01 of the Standard Specifications amended as follows:

Materials: Article 10.01.02 – Materials, add the following:

Concrete fill for restoration of bituminous concrete overlayed concrete pavement shall conform to the requirements of Article M.03.01 and Article M.03.02 of the Standard Specifications and shall be capable of achieving 3,000 psi (21 MPa) within 12 hours. The Contractor shall submit a design mix to the Engineer for approval.

Processed Aggregate Base shall conform to the requirements of Article M.05.01 of the Standard Specifications.

Bituminous Concrete HMA S0.5 and HMA S1.0 shall conform to the requirements of Special Provision M.04 –Bituminous Concrete Materials.

Joint Seal shall conform to the requirements of Article M.04.01-8 – Joint Seal Material Requirements of the Standard Specifications.

Reinforcement shall conform to the requirements of ASTM A615, Grade 60.

Topsoil shall conform to the requirements of Article M.13.01 – Topsoil of the Standard Specifications. Turf Establishment materials shall conform to Article M.13 of the Standard Specifications.

Underground utility marking tape shall have a minimum tensile strength of 78 lbf (350 N) and a minimum elongation of 700 percent before breakage. The utility marking tape shall not delaminate nor smear when wet and shall be resistant to insects. The utility marking tape shall not degrade when exposed to alkalis, acids or other corrosive elements found in soil.

Construction Methods: Article 10.01.03 – Construction Methods, add the following:

All cuts in roadways shall be done in a neat and workmanlike manner, so as to cause the least possible injury to all other improvements. The Contractor should provide protection to all slopes, roadways, guide rails, drainage structures, illumination conduit and appurtenances, utilities, etc. as may be necessary or as required by the Engineer. Any property damage caused by excavation shall be repaired as directed by, and to the satisfaction of, the Engineer at no additional compensation. Excavating shall not be performed until immediately before installation of conduit and other appurtenances. The material from the excavation shall be placed where directed by the Engineer and in a position where the least damage and obstruction to vehicular traffic and the least interference with the surface drainage will occur.

All excavations shall be closed at the end of each day.

All pavement cutting required for this item, regardless of the type, shall be included as work under this item.

Where possible, communication conduit and electrical conduit shall be installed in the same trench and shall be paid for under this item as one. Payment shall not be made for separate trenching and backfilling where electrical and communication conduit may be installed in the same trench, but have been installed separately by the Contractor.

When trenching occurs in roadways, neat lines shall be drawn on the surface and the roadway shall be saw cut and removed to neat lines as indicated on the plans or as directed by the Engineer. The Contractor shall repair the pavement immediately upon completion of the trench backfilling and compaction in accordance with these specifications and to the dimensions on the contract drawings, or as directed by the Engineer. Where trenching occurs across bituminous concrete overlayed concrete pavement, repairs shall include filling the trench with high-early concrete fill and upon curing, permanent surface pavement repairs.

Unpaved areas disturbed during construction shall be restored with a minimum of 2 inches (50 mm) of topsoil and established turf.

Topsoil shall be provided in conformance to Section 9.44.03 of the standard specifications. Turf Establishment shall conform to Section 9.50.03 of the Standard Specifications.
The Contractor shall install utility marking tape above installed conduit as identified on the conduit installation details in the plans.

Method of Measurement: Article 10.01.04 – Method of Measurement: Add the following:

There shall be no separate measurement for sawcutting, temporary pavement repair, concrete fill, joint sealing, permanent pavement repair, sidewalk repair, cutting reinforcement, reinforcement, utility marking tape, topsoil and turf establishment.

Basis of Payment:

Article 10.01.05 -- Basis of Payment: Replace the second paragraph with the following:

It shall also include all sand encasement, backfilling, utility marking tape, grading, seeding, fertilizing, mulching, disposal of surplus material, sawcutting sidewalks and paved areas, as well as furnishing and installing curbing, riprap, crushed stone, processed aggregate subbase, gravel borrow, concrete fill, topsoil, sidewalk, pavement or structure, as the case may be.

Pay Item	Pay Unit
Trenching and Backfilling	l.f.

ITEM #1002214A - TRAFFIC CONTROL FOUNDATION--CONTROLLER--TYPE IV MODIFIED

All work shall conform to the requirements of Section 10.02 of the Standard Specifications with the following modifications:

Article 10.02.01 - Description:

Add the following:

This item will also include the installation of a traffic control foundation for a traffic management system cabinet.

Article 10.02.03 - Construction Methods:

Add the following paragraph:

Where a foundation is placed within or adjacent to a concrete sidewalk, unless otherwise directed by the Engineer, the entire section of sidewalk shall be replaced in accordance with Section 9.21.

The foundation dimensions will be as required to support the traffic management system cabinet and as shown on the approved foundation drawing.

The Contractor shall be responsible for the re-grading of the area surrounding the Traffic Control Foundation - Type IV Modified to allow for the adjacent concrete sidewalk pad installation to be installed level with a 2% (¼" per foot) pitch. See the Miscellaneous Details provided in the contract plans.

Article 10.02.05 - Basis of Payment:

In the first sentence insert the words "installation of borrow" after the words "disposal of surplus material".

Pay Item	Pay Unit
Traffic Control Foundation-Controller-Type IV Modified	ea.

ITEM #1002232A - TRAFFIC CONTROL FOUNDATION - SPAN POLE – TYPE C

Description:
This item consists of furnishing and installing a foundation of the type specified in accordance with the plans, as directed by the Engineer and in conformance with this specification.

Materials:
Concrete for the formed top of foundation shall conform to the requirements for Class "F" Concrete in Section 6.01 of the Standard Specifications and shall attain a 28-day compressive strength of 4,000 psi (27.6 MPa).

Concrete for the drilled shaft below the construction joint shall also conform to the requirements for Class "F" Concrete, except for the following:

- Entrained air will not be allowed
- Accelerators will not be allowed
- Slump shall be at least 6" to 8" (150mm to 200mm) for placement in dry shafts and 8" (200mm) when wet or casing methods are used. Slump shall not exceed 8" (200mm).
- A trial mix study for drilled shaft concrete should include the construction of a graph of slump loss versus time after batching. A proper mix design will maintain a slump of at least 4" (100mm) for at least 4 hours (the 4-inch (100mm) slump value is the minimum at which adequate fluid pressures can be assumed to develop against the sides of the drilled shaft hole). Testing shall be performed at the approximate temperature at which the concrete will exist in the field. An increase in temperature of 18 degrees F. (10 degrees C.) will increase the rate of slump loss by a factor of approximately 2.

Type III cement is prohibited.

Reinforcing steel shall conform to the requirements of Section 6.02 and Article M.06.01.

Anchor rods shall conform to ASTM F1554, Grade 105 (Grade 725). The leveling nuts shall conform to ASTM A563, Heavy Hex Grade DH (A563M, Heavy Hex Class 12). The internal threads of nuts shall be re-tapped after galvanizing to accommodate the increased diameter of the rods. The washers shall conform to ASTM F436 (F436M), Type 1. The rods, nuts and washers shall be galvanized in accordance with ASTM A153 (A153M), Class C. Hooked anchor rods are not permitted. Welding to anchor rods is not permitted.

Anchor plates shall conform to the requirements of AASHTO M270, Grade 50 (Grade 345), galvanized. The Contractor shall not drill holes or perform other operations on plates that are harmful to the galvanizing.

Rigid metal conduit, ground rod sleeves and related hardware and end caps shall be galvanized steel conduit and shall conform to Section M.15.09.

Bare copper grounding conductor shall be #8 AWG stranded bare copper wire conforming to M.15.13. The grounding bolt shall be stainless steel with a hex head.

Ground rods shall be 5/8-inch (16mm) in diameter by 12-feet (3660mm) long copper clad steel. The copper cladding shall be a minimum thickness of 0.128 inches (4mm). The ground rod clamp shall be a square-head bolt type listed for direct soil burial.

Zinc-rich field primer for touch up of galvanized hardware shall conform to the requirements of ASTM A780. The use of aerosol spray cans will not be permitted.

Granular Fill for backfill around formed foundation shall conform to Article M.02.01.

Bituminous concrete shall be as directed by the Engineer.

Topsoil shall conform to Article M.13.01.

Fertilizer shall conform to Article M.13.03.

Seed Mixture shall conform to Article M.13.04.

Mulch Materials shall conform to Article M.13.05.

Any admixtures proposed for use in a bentonite slurry, if used to construct a drilled shaft, shall be approved by the Engineer. Bentonite slurry properties may be adjusted to suit field conditions with the approval of the Engineer. Polymer or other slurry materials may be submitted to the Engineer for review.

Construction Methods:

Submittals:

The Contractor is required to submit the following:

1. Working Drawings
   - The Contractor shall obtain survey elevations of the ground surface at the foundation. He shall submit to the Engineer for approval an elevation view of the foundation showing:
     - The proposed foundation with elevations at the top and bottom of the proposed foundation
     - The proposed elevation at the mandatory construction joint
     - The existing ground elevations at the high and low side of the proposed foundation

     The Contractor shall furnish the approved foundation elevations to the reinforcing bar detailer. These elevations shall be included with the foundation reinforcing shop drawings when submitted to the Designer for review.
   - The Contractor shall submit a foundation constructability plan which includes the following:

- Access to the area including the following, when applicable:
  - Temporary road
  - Removal of guide rails or concrete barriers
  - Utility locations and drainage installations that could obstruct construction
  - Clearing and grubbing (this shall be accomplished in accordance with Section 2.01)
- Traffic Protection including the following applicable considerations:
  - Temporary guide rails and/or concrete barriers
  - Maintenance and Protection of Traffic Control Plans for work that cannot be accomplished using the Typical Traffic Control Plans (All work to install the camera pole foundation shall be accomplished in accordance with Article 1.08.04 – Prosecution & Progress and item 0971001A- Maintenance & Protection of Traffic unless otherwise approved in writing by the Engineer)
- Drilling procedure including all calculations and specifications associated with the Contractor's proposed drilling procedure and tools and machinery used.
- Fabrication drawings
  - The use of hooked anchor rods in not permitted
  - Welding of anchor rods is not permitted

2. Shop Drawings

- The Contractor shall submit shop drawings for the reinforcement including the following:
  - A note indicating that no welding of reinforcement will be allowed.
  - Supplemental cages or ties that will be used to lift the reinforcing cage and prevent distortion. Reinforcing cages shall be tied adequately for handling, but may need internal ties or cages, which shall be detailed for approval. The support bars or cage, if intended to remain in the finished foundation, shall be arranged so as not to interfere with concrete placement. Supplemental cages, if composed of weldable bars, may be welded, but may only be secured to the designed cage by ties. If the Contractor determines that supplemental cages or ties will not be necessary, a note indicating this shall be included on the shop drawings.

- The Contractor shall submit shop drawings for the anchor rods and plates including the following:
  - Material designations
  - Length and diameter of anchor rods
  - Number of anchor rods
  - Thickness and dimensions of anchor plate
  - Anchor rod hole diameters and locations, including bolt circle diameter and edge distance
  - Angular orientation of the anchor rods around the bolt circle
  - Galvanizing requirements

Constructing the Drilled Shaft Portion of the Foundation

The Contractor is responsible for properly locating the foundation. He shall notify the Engineer two weeks before beginning to drill the foundation. Should ledge, high ground water, or unsuitable materials be encountered, the Contractor shall notify the Engineer immediately so the Engineer may determine if relocation or alteration of the foundation is necessary.

The top of rock will be considered as the point where rock, defined as bedded deposits and conglomerate deposits exhibiting the physical characteristics and difficulty of rock removal as determined by the Engineer, is encountered which cannot be drilled with earth augers and/or underreaming tools configured to be effective in the soils indicated in the contract documents, and requires the use of special rock augers, core barrels, air tools, blasting, or other methods of hand excavation. Minimum required lengths of rock socket shall be determined from the table provided in the contract plans (refer to Camera Pole Foundation Details) based on the depth to the top of rock from the foundation grade level.

It is the Contractor's responsibility to utilize proper equipment and methodology to drill through the boulders. It should be noted that boulders may also be encountered at other structure locations.

Prior to drilled shaft construction, the grade in the vicinity of the shafts shall be constructed to the finished grade.

This work may require rock excavation, drilling rock or using slurry filled shafts through whatever materials are encountered to reach the depths indicated on the plans and specifications. The Contractor shall submit a sequence plan outlining drilling, casing, slurry, reinforcement and concrete placement procedures for the Engineer to review.

Temporary casing of the drilled shafts may be necessary to prevent sloughing of the granular soils. While the casing is being withdrawn, a sufficient head of concrete shall be maintained above the bottom of the casing, to prevent "necking" of the shaft due to sloughing soils. Concrete placed near the surface shall be in full contact with the undisturbed soil to provide lateral stability for the full length of the shaft.

Provisions shall be made to minimize surface water infiltration into the shaft excavations.

Construction of drilled shaft shall be in accordance with AASHTO Standard Specifications for Highway Bridges 2002 Division II, Section 5 and with U.S.D.O.T. Publication FHWA-IF-99-025, "Drilled Shafts: Construction Procedures and Design Methods."

The maximum allowable horizontal variation of the center of the top of the drilled shaft from the required location shall be 0.5% of the shaft diameter. The ground surface at each shaft location shall be re-compacted if disturbed during construction in order to minimize lateral deflection of the shafts.

The concrete shaft shall not be out of plumb by more than 1% of the total length.

Should the depth of drilled shaft extend below the depth shown on the plans, a minimum of one half of the longitudinal bars required in the upper portion of the shaft shall be extended the

additional length by adding longitudinal reinforcing bars at the bottom of the cage. Tie or spiral bars shall be continued for the extra depth and the stiffener bars shall be extended to the final depth. All longitudinal and transverse bars shall be lap spliced or spliced with mechanical splices. Welding to the reinforcing steel will not be permitted.

Approved cylindrical concrete feet (bottom supports) shall be provided to insure that the bottom of the reinforcing cage is maintained the proper distance above the base.

The drilled shaft concrete shall be placed as soon as possible after the placement of reinforcing steel. Concrete shall be placed to the level of the construction joint shown on the plans. Longitudinal reinforcing shall extend above the construction joint to within 3" (75mm) of the top of foundation.

Casings, if used in drilling operations, shall be removed from the hole. The casing may be removed as concrete is placed provided a 5 foot (1525mm) head of concrete is maintained, or the casing may be removed after the concrete has been poured, provided that the concrete has not been set. Separation of the concrete by hammering or otherwise vibrating the casing during withdrawal operations shall be avoided.

Concrete may be placed by free fall in dry holes if dropped vertically and concrete does not hit the reinforcing, supporting cage or the side walls of the shaft before it reaches the base. Smaller maximum-sized aggregate in the concrete mix will increase cohesion of the mix and discourage segregation. Concrete placement down the center of the shaft shall be directed by use of a hopper and drop chute.

Concrete may be placed in wet installations by tremie or concrete pump. Groundwater may be encountered during drilled shaft construction. So, concrete shall be placed using a concrete pump or tremie pipe in accordance with the specifications. Place concrete in the slurry filled shaft by the tremie method in such a manner that the concrete displaces the slurry from bottom and rises like a liquid, and mixing of concrete with the slurry will not occur. The concrete shall be placed through a top metal hopper and into a rigid leak- proof elephant trunk tremie pipe sufficiently large enough to permit free flow of concrete. The tremie pipe shall be located so that it can be removed without disturbing the position of the reinforcing. Initially, there shall be a suitable plug at the bottom of the tremie pipe that will not discharge concrete until the concrete head has at least reached the top level of the slurry.

The intent is that bentonite slurry not be permitted to contaminate the concrete as the concrete is initially introduced to the tremie pipe. Thereafter, a positive concrete head shall be maintained throughout. The bottom of the tremie pipe shall be inside the concrete for at least a depth of 60 inches (1524mm), and this depth shall be maintained throughout. The concrete level shall be horizontal during the pouring operations. No horizontal movement of the tremie pipe will be permitted. The concreting of the shaft shall proceed continuously to 12 inches (305mm) above the final top of shaft elevation to produce a monolithic shaft foundation, with uncontaminated concrete for the design shaft length.

Concrete placement shall be continuous from the bottom of drilled shaft to the construction joint at the top. The elapsed time from the beginning of concrete placement in the shaft to the

completion of the placement shall not exceed 2 hours. Admixtures such as water reducers, plasticizers, when approved for use, shall be adjusted for the conditions encountered on the job so the concrete remains in a workable plastic state throughout the 2-hour placement limit. Prior to concrete placement, the Contractor shall provide test results of both a trial mix and a slump loss test conducted by an approved testing laboratory using approved methods to demonstrate that the concrete will maintain a minimum slump of 4" (100mm) for 4 hours. Tests shall be conducted at temperatures comparable to those at which the concrete will be placed.

Cross-Hole Sonic Logging (CSL) tests are not required for the CCTV structures because the axial loads are light. Instead, careful records of concrete quantities placed shall be kept and compared with the theoretical quantities.

Constructing the Top of the Foundation

The top portion of the concrete foundation shall be formed and reinforced as shown on the plans. The top surface shall be level within ± 1/8" (± 3mm). The shape may be round or square as shown to facilitate forming. If a square shape is chosen, additional reinforcing is required to reinforce the corners and flat sides.

The number of conduits in the foundation shall be as shown on the plans. Electrical conduits of the size specified on the plans shall extend 2 feet (610mm) out from the side of the formed portion of the foundation. All conduit ends terminating below grade shall be capped with a malleable iron cap. All above grade conduit ends shall be terminated with an insulated bonding bushing with tinned insert. Conduit caps shall be installed before the concrete is placed and shall remain in place until the cable is installed.

Rigid metal conduit, drain pipe, anchor rods and the anchor plate shall be placed and secured in proper position in the formed portion of the top of foundation. A template shall be used to hold the required anchor rod assembly, ground rod sleeve and conduits in their correct positions. The orientation of the anchor rods on the bolt circle are important to the positioning of the handhole on the pole. The anchor rod locations shall be in accordance with approved shop drawings. Each anchor rod shall be fitted with two leveling nuts and double nuts above the base plate. Conduits shall extend up from the top of foundation to the height shown on the plans.

Concrete shall be placed in the forms in accordance with the applicable provisions of Subarticle 6.01.03-6.

Curing of the concrete shall be performed in accordance with Subarticle 6.01.03-9.

Forms shall not be removed until after the concrete has hardened properly and not less than 24 hours after the concrete has been placed.

The portions of the foundations that will remain exposed to view shall be finished to the satisfaction of the Engineer and in conformance with the pertinent requirements of Subarticle 6.01.03-10.

The Contractor may install the camera pole after a minimum of 7 days of proper curing of the concrete if he can show that the concrete has reached 3000 psi (21MPa) as confirmed by test cylinders. Concrete cylinders shall be cast, cured and tested in accordance with Subarticle 6.01.03-4. A sufficient number of cylinders shall be cast to enable further testing at a later date if the compressive strength is determined to be below the minimum strength specified.

Where a foundation is placed within or adjacent to a concrete sidewalk, the entire section of sidewalk between joints shall be replaced in accordance with Section 9.21, unless otherwise directed by the Engineer.

The disturbed ground along the access path to the shaft locations shall be restored and protected from erosion within 5 calendar days of the completion of the foundation construction.

Method of Measurement:
This work will be measured for payment by the number of foundations completely installed and accepted.

Basis of Payment:
The work will be paid for at the contract unit price each for "Traffic Control Foundation - Span Pole – Type C complete in place, which price shall include layout, cutting and removing existing pavement, excavation, drilling, temporary casing, slurry, granular fill, backfill, concrete, reinforcing, anchor rods and plates, nuts and washers, rigid metal conduit sweeps, pvc weepholes, ground rod, ground wire, clamps, bonding bushings and grounding bolts. It shall include construction access path, topsoil, grading, seeding, fertilizing, mulching, riprap, restoration of bituminous concrete sidewalk and pavement surfaces treatments to be restored, as directed by the Engineer, and all materials, equipment, labor, tools and work incidental thereto.

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

All concrete sidewalk replaced due to foundation installation shall be paid for at the Contract unit price for "Concrete Sidewalk."

When rock is encountered within the limits of excavation, its removal will be paid for at the Contract unit price per vertical foot (vertical meter) for "Rock-in-Foundation Excavation," which price includes any additional excavation to remove the rock and any additional concrete required to fill the excavation beyond the designed foundation hole dimensions. Rock-in-foundation excavation is defined as rock in definite ledge formation, boulders, or portions of boulders, cement masonry structures, concrete structures or Portland cement concrete pavement with a cross-sectional area that exceeds 50% of the cross-sectional area of the designed foundation hole.

The protection and restoration (if necessary) of existing underground wiring, conduits, drainage structures, pipes and underdrain systems within the excavation limits will not be paid for separately, but will be included as part of the work.

The removal of existing roadside barrier systems, installation and removal of temporary roadside barrier systems and resetting existing roadside barrier systems will not be paid for separately, but will be included as part of the work.

The restoration of existing surface treatments (pavement, access roads, slope protection, topsoil & seed, etc.) in all areas disturbed by the work will not be paid for separately, but will be included as part of the work. The Engineer will determine the type, thickness and horizontal limits of the surface treatments to be restored.

No direct payment will be made for the work of testing the concrete from the drilled shaft or formed top of foundation in accordance with Subarticle 6.01.05. Concrete cylinder curing boxes will be included under Item #0969062A – Construction Field Office, Medium.

Pay Item	Pay Unit
Traffic Control Foundation – Span Pole _ Type C	Ea.

ITEM #1003906A - REMOVE LIGHT STANDARD

DESCRIPTION: Under this item the Contractor shall remove an existing light standard with transformer base, bracket, and luminaire as indicated on the plans or as directed by the Engineer. The removed light standard, transformer base, bracket, and luminaire, shall remain the property of the Contractor.

CONSTRUCTION METHODS: The Contractor shall remove a light standard, transformer base, bracket, and luminaire, where required. The removed materials shall remain the property of the Contractor.

All removed materials shall be properly disposed of by the Contractor. The removed luminaire contains regulated materials. All regulated materials shall be as described and disposed of under Item No. 0101143A – Handling and Disposal of Regulated Items.

METHOD OF MEASUREMENT: This work will be measured for payment by the number of light standards with associated equipment removed and disposed of complete and accepted.

BASIS OF PAYMENT: This work will be paid for at the contract unit price each for "Remove Light Standard" complete, which price shall include the removal of a light standard with associated transformer base, bracket, luminaire, lamp, cable and hardware, delivering, disposing, hauling, and including all materials, tools, equipment, labor and work incidental thereto.

Pay Item	Pay Unit
Remove Light Standard	ea.

ITEM #1003912A - REMOVE CONCRETE LIGHT STANDARD BASE

DESCRIPTION: Under this item the contractor shall remove an existing concrete light standard base where shown on the plans or as directed. The removed concrete base shall remain the property of the contractor.

CONSTRUCTION METHODS: The contractor shall remove a concrete light standard base where indicated on the plans or as directed by the Engineer. The removed base shall be properly disposed of by the contractor. The resulting excavation shall be backfilled, top soiled, graded and seeded to match surroundings in conformance with Section M.13, unless otherwise noted on the plans.

METHOD OF MEASUREMENT: This work will be measured for payment by the number of concrete light standard bases removed and disposed of, complete and accepted.

BASIS OF PAYMENT: This work will be paid for at the contract unit price each for "Remove Concrete Light Standard Base", which price shall include all materials, equipment and work incidental thereto including removal of base, excavation, backfill, topsoil, grading, seeding, fertilizing, hauling and disposing of concrete base.

Pay Item	Pay Unit
Remove Concrete Light Standard Base	ea.

ITEM #1006001A - UNDERBRIDGE LUMINAIRE – LED (PENDANT MOUNTED)

DESCRIPTION: This item shall consist of furnishing and installing a light emitting diode (LED) luminaire to be used for underbridge lighting as specified with necessary mountings, conduit, conductors, fuses, and fuseholders, completely wired and attached to the mounting pendant in accordance with the plans and details.

MATERIALS: The LED underbridge luminaire shall be one of the following:

Holophane, Parkpak LED, catalog number: **PPSQL2-P60-40K-48-GL-T5W-STM-GYSDP-SPD,** with the following characteristics: 66 watts, 7,194 lumens, 4000k CCT, 480 volt, and Type 5 wide light distribution.

Lithonia Lighting, D-Series LED Parking Garage fixture, catalog number: **DSXPG-LED-30C-700-40K-T5W-480-SPD-DNAXD** with the following characteristics: 67 watts, 8,019 lumens, 700mA, 4000k CCT, 480 volt, and Type 5 wide light distribution.

Philips Gardco, G3 LED Garage and Canopy fixture, catalog number: **G3-5-32L-600-NW-G2-480-MGY-NP**, with the following characteristics: 64 watts, 7,895 lumens, 800mA, 4000k CCT, 480 volt, and Type 5 symmetrical light distribution.

No alternate luminaires will be accepted. A catalog cut will be required.

The luminaire housing shall be powder coated grey or natural aluminum in color.

The luminaire housing shall not have a photocontrol receptacle.

The luminaire's onboard circuitry shall include a surge protection device (SPD) to withstand high repetition noise transients as a result of utility line switching, nearby lightning strikes, and other interference. The LED luminaire shall be provided with integral 10kV surge protection which shall conform and be labeled as UL 1449 compliant. The SPD protects the luminaire from damage and failure for common and differential mode transient peak currents up to 5kA (minimum). SPD performance shall have been tested per procedures in ANSI C136.2/IEEE C62.41-2:2002 category C high exposure. The SPD shall be field replaceable.

A spare surge suppressor shall be supplied with the luminaire and turned over to the Engineer for delivery to ConnDOT District Electrical Maintenance personnel.

The LED luminaire shall carry a limited 5 year warranty on the LEDs and the Driver.

Conductors shall be #10 AWG in accordance with Article M.15.11 of the Standard Specifications. Insulation shall be THHN/THWN and rated for 600 volts. The equipment

grounding conductor shall be No. 10 AWG, THHN/THWN, rated for 600 volts. The ground wire shall be green in color.

Flexible conduit shall be LFNC-B (Liquidtight Flexible Nonmetallic Conduit) with a trade size diameter as indicated on the plans. LFNC shall be listed for UL Standard UL1660 and marked for outdoor applications. LFNC shall be flame resistant and UV/sunlight resistant. LFNC and fittings shall be wet location rated.

The 3/4" fiberglass conduit shall be standard wall type with a minimum wall thickness of 0.070 inches. The conduit shall be reinforced thermosetting resin conduit using the single circuit filament winding process and shall be free from defects including non-circularity and foreign inclusions. The conduit shall be nominally uniform (as commercially practical) in color, density, and physical properties and shall be straight with the ends cut square to the inside diameter. Each section of conduit shall be supplied with an overall length of 20'. The conduit color shall be grey. The complete conduit system shall be UL listed and shall meet or exceed the requirements of UL 2515 Above Ground Standard. All conduit, elbows and fittings shall be durably and legibly marked in accordance with and Fittings and NEMA TC 14. All conduit joints shall feature tapered buttress threads which shall be permanently bonded using a joint adhesive supplied by the conduit manufacturer. The joint adhesive shall be applied to the conduit as specified by the manufacturer. The resin system shall be epoxy anhydride-cured with no fillers.
A complete line of fittings, adapters, expansion fittings and elbows shall be available and shall be manufactured from the same materials and manufacturing process as the conduit. Expansion fittings shall be supplied by the conduit manufacturer and shall provide a minimum of 8" of lateral movement at all bridge expansion joints and 4" of lateral movement at all non-expansion locations. The conduit shall have an operating range of -40F to +250F and shall contain a ultra-violet (UV) inhibitor to meet the appropriate UL, CSA or NEMA specification. Clamps for attaching the conduit to the steel bridge structure shall be single hole strap or beam-clamp type. Clamps for attaching the conduit to the concrete bridge structure shall be two hole strap type. All clamp materials shall be rated for outdoor wet environments and shall be either hot dip galvanized or stainless steel. Threaded rods, anchor bolts, nuts and washers shall be 316 stainless steel. When clamping the fiberglass conduit to the steel bridge structure, a slip collar shall be installed at the clamp location to allow the conduit to laterally expand within the clamp. When clamping the fiberglass conduit to the concrete bridge structure, the two hole strap shall be sized to allow the conduit to laterally expand within the strap.

CONSTRUCTION METHOD: The LED underbridge luminaire with associated conduit and conductors shall be installed in conformance with Section 10.06. The luminaire shall be installed at the end of the pendant mount bracket and shall be securely fastened, properly oriented, leveled, connected to the power supply conductors, cleaned, and ready for operation. A waterproof thread sealer shall be applied to the threaded joint between the pendant and the luminaire. The exact method of attaching the luminaire to the pendant will be luminaire specific and shall maintain the luminaire's IP66/U.L. wet location rating. The Contractor shall contact the luminaire manufacturer to determine the required mounting method to maintain the IP66/U.L. wet location rating of the fixture. Mounting methods may include:

- Direct mount to 1 ¼" pendant with a ¾" NPT threaded reducer.

- Mount to 4"x4"x2" galvanized cast iron junction box with ¾" threaded backwall conduit hub threaded onto pendant with a ¾" reducer.

It is the Contractor's responsibility to verify that the mounting method retains the IP66/U.L. wet location rating of the fixture and that all connections to the pendant are watertight and suitable for outdoor locations. The mounting method shall be submitted for approval as part of the shop drawing submittal process. A waterproof thread sealer shall be applied to all threaded pendent connections including the threaded joint between the pendant and the luminaire.

The luminaire shall be properly grounded with a No. 10 AWG equipment ground connected between the system ground wire in the adjacent junction box and the grounding lug in the luminaire.

Fuse holders and fuses shall be installed in the cast iron junction box surface mounted to the bridge abutment. The cast iron Junction box shall be furnished and installed under a separate bid item.

Surface conduit and conductors shall be installed in conformance with section 10.08.03-1.
Fiberglass conduit shall be securely clamped to the structure with clamp spacing as recommended by the NEC for reinforced thermosetting resin conduit (RTRC). Support spacing shall not exceed 3'-0" as specified in N.E.C. 355.30 or as listed by the conduit manufacturer.
Clamps for attaching the conduit to the steel bridge structure shall be single hole strap or beam-clamp type. Clamps for attaching the conduit to the concrete bridge structure shall be two hole strap type. When clamping the fiberglass conduit to the steel bridge structure, a slip collar shall be installed at the clamp location to allow the conduit to laterally expand within the clamp. When clamping the fiberglass conduit to the concrete bridge structure, the two hole strap shall be sized to allow the conduit to laterally expand within the strap. Expansion Joints and conduit shall be supplied by the same manufacturer. All expansion joints shall be installed using the manufacturers recommended guidelines. For conduit lengths under 50 feet no expansion joints will be required. For conduit lengths between 50 feet to 200 feet one expansion joint (4" movement) shall be installed at the mid-point of the conduit. For conduit lengths over 200 feet an expansion joint (4" movement) shall be installed every 200 feet. At bridge expansion joints, conduit expansion joints shall be "double" type with an overall lateral movement of 8". In areas where structural movement or expansion is anticipated and a standard conduit expansion coupling cannot be properly installed, the Contractor can install a sufficient length of LFNC to account for the anticipated movement. Surface mounted conduit shall be installed where indicated on the plans; using mounting brackets and/or clamps as approved by the Department. All joints shall be glued together using the Manufacturers recommended adhesive as well as the manufactures recommended procedure. The surface of the conduit shall be dry and clean, free of dust, moisture, oil, grease, or any other contaminant. Any field cuts shall be hand sanded to remove the resin glaze and to provide mechanical adhesion. The adhesive shall be applied only within the temperature range as specified by the manufacture. The Contractor shall ensure that no adhesive has formed on the interior wall of the conduit.

The Contractor shall ensure that once installed the LED luminaire functions properly.

METHOD OF MEASUREMENT: This work will be measured for payment by the number of LED luminaires installed, complete and accepted.

BASIS OF PAYMENT: This work will be paid for at the contract unit price each for "Underbridge Luminaire - LED (Pendant Mounted)" of the type and size specified, complete and accepted in place, which price shall include all materials including luminaire, LEDs, driver, surge suppressor (with spare), conductors, fuses, conduit, pendant bracket including conduit, conduit fittings, condulets and junction box, flexible conduit, fuse holders, anchors, hardware, connections, thread sealer, leveling, mounting, grounding, drilling, and all labor, tools, equipment and work incidental thereto.

Pay Item	Pay Unit
Underbridge Luminaire-LED (Pendant Mounted)	ea.

ITEM #1006151A - REMOVE UNDERBRIDGE LUMINAIRE

DESCRIPTION: Work under this item shall consist of removal of an existing underbridge luminaire at the location shown on the plans or as directed. All removed underbridge luminaires, lamps, mountings, conduits, conductors, fuses and fuse holders shall be disposed of by the Contractor.

CONSTRUCTION METHODS: The Contractor shall remove an underbridge luminaire where required. All removed underbridge luminaires, lamps, mountings, conduits, conductors, fuses and fuse holders shall be disposed of by the Contractor.

All removed materials shall be properly disposed of by the Contractor. The removed luminaire contains regulated materials. All regulated materials shall be as described and disposed of under Item No. 0101143A – Handling and Disposal of Regulated Items.

METHOD OF MEASUREMENT: This work will be measured for payment by the number of underbridge luminaires with associated equipment, removed and disposed of, complete and accepted.

BASIS OF PAYMENT: This work will be paid for at the contract unit price each for "Remove Underbridge Luminaire" complete, which price shall include removal of materials, disposing, delivering, hauling, including all materials, tools, equipment, labor and work incidental thereto.

Pay Item	Pay Unit
Remove Underbridge Luminaire	ea.

ITEM #1008308A - 2" FIBERGLASS CONDUIT IN STRUCTURE

ITEM #1008664A - 2" FIBERGLASS CONDUIT IN TRENCH

DESCRIPTION: This item shall consist of furnishing and installing fiberglass conduit of the size and type specified with necessary fittings within a trench, or cast in concrete, at the locations shown on the plans or as directed by the Engineer and in accordance with this specification.

Work under the above items shall conform to Section 10.08 of the standard specifications, supplemented and amended as follows:

MATERIALS: The 2" fiberglass conduit shall be extra heavy wall type with a minimum wall thickness of 0.250 inches. The conduit shall be reinforced thermosetting resin conduit using the single circuit filament winding process and shall be free from defects including non-circularity and foreign inclusions. The conduit shall be nominally uniform (as commercially practical) in color, density, circularity, and physical properties and shall be straight with the ends cut square to the inside diameter. Each section of conduit shall be supplied with an overall length of 20'. The conduit color shall be black.

The complete conduit system shall be UL listed and shall meet or exceed the requirements of UL 2420 below ground standard and CSA-22.2 No. 211.3-96 standard. All conduit, elbows and fittings shall be durably and legibly marked in accordance with NEMA TC 14-2002.

All conduit joints shall be straight socket type and shall be permanently bonded using a joint adhesive supplied by the conduit manufacturer. The joint adhesive shall be applied to the conduit as specified by the manufacturer. The resin system shall be epoxy anhydride-cured with no fillers.

A complete line of fittings, adapters, and elbows shall be available and shall be manufactured from the same materials and manufacturing process as the conduit.

The conduit shall have an operating range of -40F to +250F and shall contain a ultra-violet (UV) inhibitor to meet the appropriate UL, CSA or NEMA specification.

The Contractor shall submit shop drawings to the Engineer for approval in accordance with Article 1.05.02.

CONSTRUCTION METHODS: All conduit joints shall be glued together using the Manufacturer's recommended adhesive as well as the Manufacturer's recommended procedure. The surface of the conduit shall be dry and clean, free of dust, moisture, oil, grease, or any other contaminant. Any field cuts in the conduit shall be hand sanded to remove the resin glaze and to ensure proper mechanical adhesion. The adhesive shall be applied only within the temperature range as specified by the Manufacture. The adhesive shall be applied in conformance with the Manufacturer's recommendations and in such a manner as to avoid "ponding" and voids which

will result in weak joints. The Contractor shall ensure that no adhesive has formed on the interior wall of the conduit. Once the adhesive has set, the Contractor shall hand test the joint for proper connection. Any joints which are loose, cracked, or exhibit poor adhesion shall be cut out and re-made.

For conduit in trench: Trenches shall be of the depth and cross section shown on the plans with a minimum covering of 24". Trenching and backfilling shall be paid for under a separate bid item.

For conduit in structure: It shall be the Contractor's responsibility to coordinate the setting of the conduit in the structure wall prior to pouring the concrete. Proper rodding/compaction of the concrete around the conduit where it connects to a junction box shall be carried out to prevent voids and honeycombing. The fiberglass conduit shall be securely attached to the cast iron junction box using a threaded box connector and galvanized locknuts. The free end of the fiberglass conduit sweep shall be directed into the fill area behind the adjacent guide railing and shall terminate at a depth of 24" below finished grade. The end of the conduit sweep shall be temporarily capped with a conduit cap (non-glued) to prevent entry of dirt and debris into the conduit sweep.

METHOD OF MEASUREMENT: The conduit shall be measured for payment by the actual number of linear feet of the type and size installed, complete and accepted. Fixed sweep-bends and assorted fittings will not be measured for payment but shall be included in the pay item for the conduit of the type and size specified. The measured length shall be from end to end along the centerline through all fittings.

The pull tape and conduit testing will not be measured for payment but shall be included in the pay item for the conduit of the type and size specified.

BASIS OF PAYMENT: This work shall be paid for at the contract unit price per foot for "2" Fiberglass Conduit in Structure" or "2" Fiberglass Conduit in Trench" within the limits shown on the plans and in the details. This price shall include all materials required including conduit, couplings, threaded connectors, elbows, fixed sweep-bends, conduit fittings, caps, pull-rope, adhesive, sanding, equipment, tools, labor, and all work incidental thereto.

Pay Item	Pay Unit
2" Fiberglass Conduit in Structure	l.f.
2" Fiberglass Conduit in Trench	l.f.

ITEM #1008908A - CLEAN EXISTING CONDUIT

Description:

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

Construction Methods:

Where cable is to be installed in existing conduit the conduit may have to be cleared prior to the installation. Cleaning will only be necessary if the new cable cannot be easily installed in the existing conduit. By field inspection, and with the concurrence of the Engineer, determine the sections of conduit that require cleaning.

Remove all existing cable from conduit. Install temporary cable elsewhere, as necessary, to maintain normal signalization complete with vehicle & pedestrian detection, EVPS, and coordination. Clean the conduit by one of the following methods:

1) Rodding.
2) A high pressure jet spray, or air pressure.
3) By pulling a mandrel or ball through the conduit.

Submit in writing the anticipated method of cleaning the conduit to the Engineer for approval prior to cleaning any conduit.

If the conduit is found damaged to any extent that the cleaning process will not clear the obstruction, it will be the judgment of the Engineer whether to replace the entire conduit run or excavate and replace only the damaged section.

If the existing conduit is found to be missing hardware such as bonding bushings and bond wire, the missing material shall be provided and installed under this item prior to installation of the cable.

Method of Measurement:

This work shall be measured from termination point to termination point. This work shall be measured for payment on actual number of linear feet (meters).

Basis of Payment:

The work under the Item “Clean Existing Conduit” shall be paid for at the contract unit price per linear foot (meters), which price shall include all material, tools, equipment, labor, and work incidental thereto. Work pertaining to temporary operation shall be paid for under Item 1108051A or 1108052A - Temporary Signalization (Site 1 or 2 respectively). Replacement of any damaged conduit shall be paid for under the applicable conduit item.

Pay Item	Pay Unit
Clean Existing Conduit	l.f.

ITEM #1009503A - 16" X 14" X 6" NEMA 4X NON-METALLIC JUNCTION BOX

DESCRIPTION: This item shall consist of furnishing and installing a surface mounted thermoplastic 16”x14”x6” NEMA 4X non-metallic junction box at the location as shown on the plans or as directed by the Engineer.

MATERIALS: Junction boxes and covers shall be constructed of hot compression molded fiberglass reinforced polyester, manufactured from a thermoset non-halogenated material. The enclosure shall be completely weatherproof, rated for outdoor use, and shall meet NEMA Standard 250, as well as UL/cUL 50 File E64358. The box shall be rated NEMA 4X and be supplied with stainless steel hardware. The enclosure shall have a molded in flange in order to secure the enclosure to the structural concrete.

The enclosure shall meet ASTM D1435 – *Standard Method of Outdoor Weathering of Plastics* and ASTM D4364 - *Standard Method of Accelerated Outdoor Weathering of Plastics using Concentrated Natural Sunlight*. The integral urethane gasket attached to the cover shall be constructed of elastomeric material that will meet the environmental construction and performance requirements. The cover shall be supplied with a stainless steel beaded chain attached to the enclosure in order to secure the cover after the cover bolts have been removed. All cover bolts shall be stainless steel. The enclosure shall have threaded brass inserts which shall be sized to accept the stainless steel cover bolts.

The Non-Metallic Junction box shall be warrantied to be free from defects in workmanship for a period of 10 years.

CONSTRUCTION METHODS: The Contractor shall install the junction box at the location and to the dimensions as detailed on the plans. Conduit entrance holes shall be drilled into the junction box at the required locations using a hole-saw of the minimum diameter required to accommodate the conduit connector. All conduit connections shall be glued. The non-metallic enclosure shall be attached to the structural concrete using stainless steel mechanical anchors with flat washers, lock washers, and hex nuts. The location of the junction box shall be installed between the median barrier walls of a bridge structure as indicated on the plans and details. All conduit attachments shall utilize a weatherproof sealing ring to ensure that the installation is watertight.

METHOD OF MEASUREMENT: Each junction box of the size specified shall be measured as a unit, complete and accepted in place.

BASIS OF PAYMENT: This work will be paid for at the contract unit price each for “16”x14”x6” NEMA 4X Non-Metallic Junction Box”, complete in place, which price shall include junction box, cover, attachment hardware, mechanical anchors, flat washers, lock washers, hex nuts, drilling, anchoring, and all materials, equipment, tools and labor incidental thereto.

Pay Item	Pay Unit
16” x 14” x 6” Nema 4X Non-Metallic Junction Box	ea.

ITEM #1010060A - CLEAN EXISTING CONCRETE HANDHOLE

DESCRIPTION: Under this item the Contractor shall clean all debris from an existing concrete handhole where shown on the plans or as directed.

CONSTRUCTION METHODS: The Contractor shall remove all sand, silt and other debris from within an existing concrete handhole where shown on the plans or as directed. Debris shall be removed to a level of 12" below the incoming electrical conduit. Removed debris shall be properly disposed of by the Contractor. Where new conductors are to be installed in existing rigid metal conduit entering the handhole, the Contractor shall remove the old insulated bonding bushing from the end of each conduit and install a new insulated bounding bushing.

METHOD OF MEASUREMENT: This work will be measured for payment by the number of concrete handholes cleaned, complete and accepted.

BASES OF PAYMENT: This work will be paid for at the contract unit price each for "Clean Existing Concrete Handhole", which price shall include the removal and disposal of debris from handhole, removal of existing bonding bushings, furnishing and installing new insulated bonding bushings, and all equipment and work incidental thereto.

Pay Item	Pay Unit
Clean Existing Concrete Handhole	ea.

ITEM #1010902A - REMOVE CONCRETE HANDHOLE

DESCRIPTION: Under this item the contractor shall remove an existing concrete handhole where shown on the plans or as directed by the Engineer. The removed concrete handhole with cover shall remain the property of the contractor.

CONSTRUCTION METHODS: The contractor shall remove an existing concrete handhole and cover where indicated on the plans or as directed by the engineer. The removed concrete handhole with cover shall remain the property of the contractor. The resulting excavation shall be backfilled, graded and seeded to match surroundings, unless otherwise noted on the plans.

METHOD OF MEASUREMENT: This work will be measured for payment by the number of concrete handholes removed and disposed of, complete and accepted.

BASES OF PAYMENT: This work will be paid for at the contract unit price each for "Remove Concrete Handhole", which price shall include all materials, equipment and work incidental thereto including removal, excavation, backfilling, grading, seeding, hauling and disposing of the concrete handhole and cover.

Pay Item	Pay Unit
Remove Concrete Handhole	ea.

ITEM #1014901A - REMOVE CABLE

DESCRIPTION:

The work under this item shall include the removal and legal disposal of Incident Management System (IMS) fiber optic cable, copper communications cable and electric service cable and conductors where shown on the plans or as directed by the Engineer.

MATERIALS:

The Contractor shall be responsible for damage to all equipment and materials incurred during removal, hauling and disposal. All repairs or replacements due to damage or loss by the Contractor shall be made at the Contractor's expense.

A 1/4" (6 mm) polyester rope (pull line) shall be installed in all abandoned conduits for future pulling purposes.

A detectable pull tape, NEPTCO Part No. DP1250P, shall be installed in all abandoned innerducts of multiduct conduit installations.

CONSTRUCTION METHOD:

Removal of existing IMS fiber optic cable, copper communications cable and electrical service cable/conductors shall be performed in a manner and sequence not to damage portions of the cable that shall remain or other adjacent or nearby appurtenances. The Contractor shall install a ¼-inch (6 mm) poly pull line for future use within any and all conduit where the IMS fiber optic cable has been removed. A pull rope shall be installed in communications and electrical service conduits only where noted on the plans. The pull line shall have sufficient length at each end and be neatly tied off within the nearest manhole, handhole, or pullbox.

METHOD OF MEASUREMENT:

This work will be measured for payment by the actual number of linear feet of IMS cables removed. For communications cable and electrical service cable/conductors where more than one cable or conductor is to be removed from within the same conduit, measurement shall be based on the length of conduit (and any manholes, pullboxes, handholes, etc.) from which the cables/conductors are removed.

BASIS OF PAYMENT:

This work will be paid for at the contract unit price per linear foot for "Remove Cable" as specified, which price shall include removal, storage, disposal, installation of polyester pull line, and all work, materials, tools and equipment incidental thereto.

Pay Item	Pay Unit
Remove Cable	l.f.

ITEM #1015041A - PULLBOX

Description:

Vaults and Pullboxes for IMS are defined as structures implemented to facilitate cable installation, splicing and excess cable storage. Vaults and Pullboxes are generally located at intermediate locations to facilitate cable installation. This item shall consist of furnishing and installing concrete structures of the design and dimensions indicated in the details or as ordered by the Engineer, and in conformity with these specifications. Vaults and Pullboxes installed underground may be precast or cast-in-place.

Materials:

All vaults, pullboxes and associated components shall comply with industry standards for communications applications and be of suitable construction for installation in an off-highway environment. Work in this section shall meet or exceed the applicable provisions of the following documents:

1. AASHTO HS 20-44 rating
2. AASHTO M-199.
3. ASTM C857-83, Minimum Structural Design Loading for Underground Precast Concrete Utility Structures.
4. ASTM C858-83, Underground Precast Concrete Utility Structures.

All vaults shall include the following provisions:

1. A sump 12” (300 mm) in diameter.
2. Four ¾” (19mm) diameter pulling inserts in the floor.
3. 8 Unistruts of the length indicated on the plans.
4. Knockouts located on each wall, aligned to as close to the center of the vault as possible, to facilitate cable pull-through or change in direction.
5. The galvanized steel cover with frame shall conform to Article M.08.02 of the Standard Specifications. The assembled steel covers shall include a locking mechanism that will not allow the covers to open more than 120 deg. from the closed position.
6. The steel covers shall be installed flush with the top of the concrete structure.
7. The minimum thickness of the vault walls shall be 6” (150 mm).

All pullboxes shall include the following provisions:

1. "C" Channel of length indicated.
2. Four ¾” (19mm) diameter pulling inserts in the floor.
3. Knockouts, located on each wall, aligned as close to the center of the pullbox as possible, to facilitate cable pull through or direction change.

4. The galvanized steel cover with frame shall conform to Article M.08.02 of the Standard Specifications. The assembled steel covers shall include a locking mechanism that will not allow the covers to open more than 120 deg. from the closed position.
5. The steel covers shall be installed flush with the top of the concrete structure.
6. The minimum thickness of the pullbox walls shall be 4" (100mm).

Vaults, Pullboxes and covers shall have a vertical proof-load strength of 25,000 lbf (110,000 Newtons) in accordance with Federal Specification RR-F-621e. The vaults and pullboxes shall be reinforced with a galvanized Z-bar welded frame and cover. Frames shall be anchored to the boxes by means of ¼" x 2" (6.25 mm x 51-mm) long concrete anchors. Hold down screws shall be 3/8" (9.5-mm) hex flange cap screws of Type 316 stainless steel. The nut shall be zinc plated carbon steel and shall be made vibration resistant with a wedge ramp at the root of the thread. The nut shall be spot welded to the underside of, or fabricated with, the galvanized Z-bar pull box frame.

Steel covers shall be countersunk approximately ¼" (6.35 mm) to accommodate the bolt head. The bolt head shall not extend more than 1/8" (3.2 mm) above the top of the cover when tightened down. A ¼" (6.35- mm) tapped hole and brass-bonding screw shall be provided.

After the installation of the precast units, the steel covers shall be installed and kept bolted down during periods when work is not actively in progress. When placing the steel cover for the final time, the cover and the Z-bar frame shall be cleaned of all debris and securely tightened down. Each pullbox supplied shall be secured with two bolt down locking hex bolts.

Construction Methods:

The Contractor shall contact Mr. Robert Kennedy of D.O.T. Highway Operations at (860) 594–3458 to conduct a walk through of the project limits and to stake out the proposed locations of vaults, or pullboxes prior to installation.

All dimensions and exact locations of existing underground substructures and utilities shall be field verified by the Contractor prior to committing any materials or any excavation. Following are the parameters required for the execution of work in this section:

1. Excavation shall be performed in accordance with Article 2.02 of the Standard Specifications.
2. All pre-cast units shall be installed on a level foundation of granular fill, compacted.
3. All pre-cast units shall be installed at grade in paved areas, and one (1) inch (25 mm) above grade in unpaved areas.
4. Backfill shall consist of good compactable material as prescribed in Section M.02 of the Standard Specifications. In no case shall the material be saturated soil, or contain large rocks, or chunks.
5. All pre-cast units shall be free of debris and ready for cable installation.

The Contractor shall provide the excavation into which the individual components shall be lowered. The excavation shall allow for overall assembled height plus added height of risers, manhole castings, etc., and bedding material consisting of a minimum of 6" (150 mm) of granular fill, compacted conforming to Article 2.13 of the Standard Specifications. A minimum clearance of 6" (150 mm) around the sidewalls of the manhole shall be provided. The excavation hole shall not contain water during the installation. Where found during excavation, unsuitable material shall be excavated as directed by the Engineer and replaced with granular fill, compacted.

All spare conduits and innerducts shall be sealed by means of reusable mechanical plugs. The Contractor shall use extreme care with the cables especially with regard to the minimum bending limitations.

When all cables at each pre-cast unit are securely racked, the void areas around the conduits or innerducts containing cables shall be sealed using reusable mechanical plugs.

Method of Measurement:

This work shall be measured for payment by the number of electric vaults (IMS) or pullboxes of the type specified, complete and accepted in-place.

Basis of Payment:

This work shall be paid for at the contract unit price each for "Electric Vault (IMS)" or "Pullbox", complete in-place, which price shall include all materials, concrete, steel cover, locks, pulling irons, conduit plugs, appurtenances, dewatering, any excavation, granular fill, backfilling, replacement of pavement, including grading and placing topsoil, seeding, fertilizing, mulching and all equipment, tools, labor and work incidental thereto.

Pay Item	Pay Unit
Pullbox	ea.

ITEM #1017033A - SERVICE CABINET

Description:

The work under this item shall consist of furnishing and installing a complete service cabinet of the type specified at the locations shown on the plans or as directed by the Engineer and in accordance with these specifications.

Materials:

The service cabinet shall be manufactured to NEMA type 3R requirements of an aluminum alloy wall thickness of 3 mm, with a hinged weatherproof gasketed door, stainless steel handle and tumbler-type Conn-1 lock. The pedestal mounted cabinet shall be approximately 36 inches high, 16 inches deep, and 20 inches wide in size or the equipment in volume.

The foundation shall conform to Section 10.02.

The pedestal shall conform to Section 11.02, 3' Aluminum Pedestal.

Ground rod shall conform to Article M.15.15-7.

Trenching and Backfilling shall conform to Section 10.01.

Rigid Metal Conduit shall conform to Section 10.08.

Cable shall conform to Section 11.13 and these specifications.

A meter socket shall be provided on the outside of the service cabinet and shall be paid for under its contract item.

A 3/4 inch marine-grade plywood backboard painted black shall be provided.

A neutral and ground bus bar shall be mounted in the rear of the cabinet.

The circuit breakers shall be thermal magnetic type. The number of poles, voltage rating and current ratings shall be as shown on the plans.

Construction Methods:

The Contractor shall completely install the conduit, foundation, pedestal, cabinet, wiring, circuit breakers, bus bars, backboard and required equipment as indicated on the plans or as directed by the Engineer. The Contractor shall install the service cabinet at locations shown on the plans or as directed by the Engineer. The Contractor shall install in the pedestal foundation one spare 2" RMC conduit sweep.

The service cabinet should be located behind metal beam rail, beyond fixed objects such as proposed wood poles or utility poles, abutments and beyond the travel way. The location of the service cabinet should not create an obstacle in the sight line of vehicles traveling on the adjacent roadways. The location of the service cabinet shall be adjusted with respect to roadway geometry as directed by the Engineer.

The service cabinet shall provide power to a VMS cabinet as indicated on the plans.

Method of Measurement:

This work will be measured for payment by the number of Service Cabinets installed, complete and accepted. Each service cabinet will be measured for payment regardless of single or multiple services.

Basis of Payment:

This work will be paid for at the contract unit price each for "Service Cabinet" complete and accepted in place which price shall include the cabinet, trenching and backfilling, foundation, pedestal, circuit breakers, bus bars, backboard, conduit, cable, and all equipment, tools, labor, and work incidental thereto.

Pay Item	Pay Unit
Service Cabinet	ea.

ITEM #1017034A - INSTALL SERVICE

Description:

The work under this item shall consist of the Contractor coordinating and scheduling the service installations/connections of the electrical service by the Utility Company from the utility service source to the meter socket on the service cabinet, Traffic Management System (TMS) cabinet, Traffic Management System Mini Hub (TMSMH) cabinet, Variable Message Sign (VMS) cabinet, or direct service connection from a cabinet or location with metered service to the TMS, TMSMH and VMS cabinets. This work will also entail installation of the meter by the Utility Company, installation of riser conduit, installation of utility poles, installation of primary and secondary conductors, installation of transformers and transformer pads, and installation of conductors underground between the utility service source and the meter socket on the service, TMS, TMSMH or VMS. The work shall also include energizing the metered or unmetered service connection.

The Utility Company may render a service charge to the Contractor for installation and connection of underground services. These charges are to be paid for under this item. This item will include all associated utility work to have power installed into the meter socket and energized. The IMS site plans detail in general the work that needs to be accomplished. The work detailed on the IMS site plans and specified herein will be paid for under this item.

Materials:

The materials for this work shall conform to the special provisions herein, utility specifications and the National Electrical Code.

Construction Methods:

The Contractor may install the service only after contacting and obtaining approval from the Utility Company. A representative of the Utility Company must be present for work involved with installing electric service from a manhole or pad mounted transformer/transclosure, unless otherwise directed by the Utility Company.

Under this item, the Contractor shall verify the load requirements of the system components for each TMS, TMSMH and VMS location and notify the Engineer of any potential changes in electric service that may result in inadequate service connections. The Contractor shall verify the type and size of electric service cable to be used for electric service from a cabinet or location with metered service to the TMS, TMSMH and VMS cabinets, as shown on the site plans.

The Contractor shall contact the Utility Company representatives listed in Section 1.07 – Legal Relations and Responsibilities at least 30 days in advance to coordinate the service connection work to be performed by the Contractor and the Utility Company. The date the service is connected and energized shall be recorded for billing purposes and provided to the Engineer or

his designated representative. All work performed by the Contractor under this item shall be in accordance with serving power company requirements, the Public Utilities Regulatory Authority (PURA), and the National Electrical Code. The Contractor shall obtain the necessary utility specifications prior to any service work.

The Contractor shall make all arrangements with the utility company and complete the required service request forms for all service locations.

For additional Utility Service Company requirements, refer to Notice to Contractor – Service Connections (Utilities).

Billing for the monthly energy charges shall be to the following:

State of Connecticut Department of Transportation
P.O. Box 317546
Newington, CT 06131-7546

This item shall include all required service conductors on the load side of the meter socket.

All circuit breakers in the cabinet shall be off when service is connected by the utility company.

At all locations, the new cabinet electrical service installation shall be inspected and approved by the Engineer or his designated representative prior to the service being energized. The Contractor shall contact Barry Beauvais at (860) 594-2244, ConnDOT Property and Facility Services, to schedule this inspection.

Method of Measurement:

This work will be measured for payment by the number of electric services installed, energized, complete and accepted by the Engineer and Utility Company.

Basis of Payment:

This work will be paid for at the contract unit price for each "Install Service", complete, energized and accepted in place, which shall include meter, service conductors between utility service source and meter socket, riser conduit, utility poles, primary conductors, secondary conductors, transformers, transformer pads, all Utility Company charges, and all materials, equipment, tools, labor and incidentals thereto.

Pay Item	Pay Unit
Install Service	ea.

ITEM #1019053A - AERIAL CABLE (3 NO. 2)

DESCRIPTION: This work shall consist of furnishing and installing aerial cable, with insulators and brackets, on proposed poles at the location indicated on the plans.

MATERIALS: Aerial cable shall be 7 strand aluminum containing a No. 2 AWG bare messenger with three No. 2 AWG cross-linked polyethylene insulated conductors rated at 600 volts.

CONSTRUCTION METHOD: The aerial cable shall be used as temporary circuitry to maintain nighttime roadway lighting, on the roadways within the project limits open to vehicular traffic. Aerial cable shall be attached to proposed fiberglass poles or aluminum light standards (with insulators), including all connections as indicated on the plans or as directed by the Engineer. When necessary, the aerial cable shall be relocated to maintain different illumination circuits as dictated by the construction stages. Aerial cable used for temporary lighting shall be removed once the permanent lighting is installed and operational. Removed aerial cable shall remain the property of the Contractor.

Aerial Cable (3 No. 2) shall be used for mainline circuit connections where voltage drop considerations require a large gauge cable.

METHOD OF MEASUREMENT: This work will be measured for payment by the actual number of linear feet of aerial cable installed and accepted, including attachments.

BASIS OF PAYMENT: This work will be paid for at the contract unit price per linear foot for "Aerial Cable (3 No. 2)" of the size and voltage specified, complete in place, which price shall include, insulators, entrance cap and attachment, bracket, all materials, tools, connections, equipment, labor, and work incidental thereto. The unit cost for this item is a one time only cost. The cost of removing and relocating the aerial cable to maintain different illumination circuits shall be included in the unit cost.

Pay Item	Pay Unit
Aerial Cable (3 No. 2)	l.f.

ITEM #1020030A - TEMPORARY ILLUMINATION UNIT

DESCRIPTION: Under this item the Contractor shall furnish and install a fiberglass light pole, bracket, luminaire, and associated hardware, to be used for temporary lighting during construction, as indicated on the plans or as directed by the Engineer. At the end of the project the temporary illumination unit shall become the property of the Contractor.

MATERIALS: The pole shaft shall be fiberglass reinforced composite (FRC). The pole shaft shall be constructed by the filament winding process from thermosetting polyester resin and contain a minimum of 65 percent of "E" type fiberglass by weight. The filament windings shall be continuously applied with uniform tension and shall be placed on the pole helically at low angles to provide axial strength. Additional windings shall be placed on the pole in a circular manner to provide compressive strength. The pole is to be round, tapered, hollow, and reinforced in the support arm and hardware attachment areas. The pole is to be non-conductive and chemically inert. The pole shall meet the current AASHTO LTS-2 *Street Lighting Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*, and shall be approved by FHWA for use on Federal Aid projects. A 2 ½" x 5" handhole shall be provided at the base of the pole shaft at approximately 18" above the finished grade line.

The pole exterior surface is to be grey with a natural (textured) finish. The surface of the pole will be uniform for the entire length of the pole. The laminate shall contain colored pigment, the color of the final coating, and be of uniform color throughout the entire wall thickness of the pole. A coating shall be applied to the pole to maintain surface integrity against the damaging effects of sunlight and extremes in weather. The coating is to be highly weather resistant pigmented polyurethane. The coating thickness shall have minimum dry film thickness of 1-1/2 mils.

The surface shall be tested for a minimum of 5000 hours of accelerated testing in accordance with ASTM G154 (UV-A lamp 340 NM wave length, 130° F, cycle lamp 4 hours on 4 hours off) with the following results: Fiber exposure: none, Crazing: none, Checking: none, Chalking: none, Color: may dull slightly.

The pole shall be suitable for direct burial and shall conform to the breakaway requirements of the current AASHTO *Standard Specification for Structural Supports for Highway Signs, Luminaires and Traffic Signals.* For direct buried break-away poles the butt end shall be enlarged so as to provide resistance to rotation and pull out.

Where indicated on the plans, the pole shaft shall be equipped with an anchor base of heavy duty A356-T6 aluminum which shall be permanently bonded to the outside of the fiberglass shaft. The anchor base pole shall be installed on a concrete foundation, parapet anchorage, or other fixed anchorage as called for on the plans. The anchor base pole shall be non-breakaway, but shall be attached to the anchorage using breakaway couplings as indicated on the plans or as directed by the Engineer

Each pole is to be permanently marked in characters 3/16” minimum high on a brass or stainless steel plate with the manufacturer's identification symbol, month and year of manufacture. Each pole shall be individually packaged for protection during shipping and storage. The pole shall be warranted to be free of defects in materials and workmanship for a period of three years from the date of purchase.

The top of the pole is to be pre-drilled for two 5/8" thru bolts on 9-1/2" centers starting 4” below the top of the pole. A 1-1/2" wire exit hole shall be centered 1/2 the distance between the two holes.

A cast aluminum removable cap shall be securely mounted to the top of the pole. The cap shall be corrosion resistant and must remain in place when subjected to the maximum wind loading for which the pole is designed.

The luminaire bracket arm shall be 12' in length (single member) of an upsweep design fabricated from tubular aluminum. The luminaire end shall have a 2-3/8" outside diameter.

Anchors shall conform to the pertinent requirements of Article M.16.04-2b, c, d, and e.

The luminaire shall conform to the pertinent requirements of Article M.15.05, and shall be high pressure sodium. The luminaire wattage shall be 250 watt or as called for on the plans. The socket shall be adjustable to provide I.E.S. light distribution type M-C-II. The ballast shall be under guarantee of the manufacturer for a period of one year commencing when the unit is installed and accepted

The contractor may re-use a temporary illumination unit which was salvaged from another Connecticut DOT project provided the unit meets the requirements of the current project, is in excellent structural condition, and retains full breakaway and operational performance. The contractor shall submit a shop drawing, Materials Certificate, and Certified Test Report for the salvaged temporary illumination unit. The Materials Certificate and Certified Test Report shall be in full compliance with the requirements of Section 1.06.07.

CONSTRUCTION METHODS: The fiberglass pole shall be set in the earth to the required depth and proper compaction of backfill provided around the pole and then attached to the anchors with guys as necessary. For anchor base poles the pole base shall be securely bolted to the anchor bolts of the fixed anchorage (breakaway couplings shall be used where directed). The bracket shall be attached to the pole and shall provide a luminaire mounting height over the roadway of 35’. The bracket and luminaire assembly shall be installed perpendicular to the center line of the roadway. When necessary, the temporary light pole and luminaire shall be relocated to maintain different illumination circuits as dictated by the construction stages.

Upon completion of the project the temporary illumination unit shall be removed and shall remain the property of the Contractor.

Upon removal of the pole, the resulting excavation shall be properly backfilled to match the surrounding area.

METHOD OF MEASUREMENT: This work will be measured for payment by the number of temporary illumination units installed and accepted.

BASIS OF PAYMENT: This work will be paid for at the contract unit price each for "TEMPORARY ILLUMINATION UNIT" complete in place, which price shall include all materials, fiberglass poles, breakaway base, anchor base (when required), anchors, guys, brackets, luminaires, lamps, ballasts, hardware, connections, hauling, and all equipment, tools, labor and all work incidental thereto including excavating, auguring, removal of bituminous overlay, backfilling, removal, hauling, relocation, and disposal. The unit cost for this item is a one-time only cost. The cost of removing and relocating the temporary illumination unit to maintain different illumination circuits shall be included in the unit cost.

Pay Item	Pay Unit
Temporary Illumination Unit	ea.

ITEM #1020998A - TEMPORARY LIGHT STANDARD ATTACHMENT BRACKET

DESCRIPTION: Under this item the contractor shall install a light standard support bracket to a temporary pre-cast concrete barrier curb as specified on the plans or as directed by the Engineer, and in accordance with these specifications. The bracket shall remain the property of the Contractor.

MATERIALS: The Contractor shall supply the required steel plates, steel rods and bolts and a CDOT pre-approved chemical anchoring system. The contractor shall also supply a junction box and necessary flexible conduit to facilitate the installation of a temporary illumination unit.

Steel plate used for temporary support brackets shall conform to the requirements of ASTM A36.

Expansion anchors shall be Hilti HSL Expansion Anchor, Rawl-Bolt or other similar type of expansion anchor which uses a hexagon headed bolt for expanding the anchor.

Anchor bolts shall conform to the requirements of Subarticle M.15.02.

Non-shrink grout shall confirm to Subarticle M.03.01-12.

Class “A” Concrete shall conform to the requirements of Article M.03.01.

Reinforcing steel shall conform to ASTM A615, and shall be deformed Grade 420.

CONSTRUCTION METHOD: The Contractor shall install a temporary light standard support bracket where indicated on the plans, or as directed by the Engineer. The Contractor shall submit to the Engineer for approval all necessary calculations and supporting drawings and documentation necessary for the design and installation of the of the temporary light standard support bracket. The temporary light standard attachment bracket calculations submitted by the Contractor for the bracket shall have a Connecticut Professional Engineers stamp of approval. The support bracket shall remain the property of the Contractor.

The attachment calculations of loadings shall clearly identify the light standard(s) with luminaire that designed for. The top plate shall be fabricated to accept multiple light standard bolt circle diameters by drilling a slotted anchor bolt hole. All hardware shall be ASTM 325 and shall be galvanized. The threaded rod shall be chemically anchored from a list of products pre-approved by CDOT. The hole diameter through the barrier for the threaded rod is to be determined by the manufacturer.

The temporary light standard attachment bracket shall be relocated as required by the contract temporary illumination drawings for subsequent construction stages. Upon removal of the support bracket from the temporary pre-cast concrete barrier curb the Contractor shall fill the holes with non-shrink grout.

Temporary light standard attachment bracket shall be secured to the non-traffic side of concrete barrier curbs and parapets. No part of the support bracket shall extend into or beyond the traffic side face of the concrete barrier curb or parapet.

The temporary illumination plans depict a schematic of the temporary light standard attachment bracket to be installed on the temporary pre-cast concrete barrier curb.

METHOD OF MEASUREMENT: This work will be measured for payment by the number of light standard attachment brackets, designed, fabricated, installed and all associated equipment including junction box, flexible conduit, removed and delivered, complete and accepted.

BASIS OF PAYMENT: This work will be paid for at the contract unit price each for "Temporary Light Standard Attachment Bracket", which price shall include steel, fabrication, drilling, anchors & anchoring, grouting, and all associated equipment including junction box, flexible conduit, hauling, delivering and unloading, and all materials, tools, equipment and labor incidental thereto to install the attachment onto the temporary pre-cast concrete barrier curb. Payment for the relocation of the "Temporary Light Standard Attachment Bracket" will be included in the unit cost for "Relocated Temporary Precast Concrete Barrier" pay item.

ITEM #1108163A - MODIFY EXISTING CONTROLLER

This item shall consist of modifying the existing traffic controller assembly to provide the revised operation as shown on the plans or as directed by the Engineer. The modification shall include, but not be limited to, revisions to the timing and sequence, cabinet wiring, coordination, pre-emption, field wiring and cabinet wiring diagrams.

MATERIAL

The material for this work shall conform to the requirements of the current edition of the Connecticut Department of Transportation Functional Specifications for Traffic Control Equipment. The material shall be compatible with the existing equipment. Any material in question shall be approved prior to installation by the Engineer or the Department of Transportation Signal Lab, 280 West Street, Rocky Hill. Contact Mr. Don Assard at (860) 258-0346 or Mr. Mark Zampini at (860) 258-0349 for approval.

CONSTRUCTION METHODS

All revisions to the cabinet wiring shall be neat and orderly. All additional wiring shall be from terminal to terminal. Splices will not be allowed. All changes, additions and deletions shall be documented, dated and drawn on the reproducible original or a reproducible copy of the original cabinet wiring diagram. Four paper copies shall be furnished to the Engineer upon completion of the revision.

METHOD OF MEASUREMENT

This item will be measured for payment as an "Each" item.

BASIS OF PAYMENT

This item will be paid for at the contract price each, for "Modify Existing Controller" which price shall include all necessary load switches, relays, components, hardware, tools, equipment, engineering and labor required to modify the existing controller as shown on the plan. This price shall also include four updated cabinet wiring diagrams.

Pay Item	Pay Unit
Modify Existing Controller	ea.

ITEM #1111201A - TEMPORARY DETECTION (SITE NO. 1)

ITEM #1111202A - TEMPORARY DETECTION (SITE NO. 2)

ITEM #1111203A - TEMPORARY DETECTION (SITE NO. 3)

ITEM #1111204A - TEMPORARY DETECTION (SITE NO. 4)

Description:

Provide a Temporary Detection (TD) system at signalized intersections throughout the duration of construction, as noted on the contract plans or directed by the Engineer. TD is intended to provide an efficient traffic-responsive operation which will reduce unused time for motorists travelling through the intersection. A TD system shall consist of all material, such as pedestrian pushbutton, accessible pedestrian signal, conduit, handholes, cable, messenger, sawcut, loop amplifier, microwave detector, Video Image Detection System (VIDS), Self-Powered Vehicle Detector (SPVD), and any additional components needed to achieve an actuated traffic signal operation.

Materials:

Material used for TD is either owned by the Contractor and in good working condition, or existing material that will be removed upon completion of the contract. Approval by the Engineer is needed prior to using existing material that will be incorporated into the permanent installation. New material that will become part of the permanent installation is not included or paid for under TD.

Construction Methods:

The work for this item includes furnishing, installation, relocating, realigning, and maintaining the necessary detection systems as to provide vehicle and pedestrian detection during each phase of construction. If not shown on the plan, program the TD modes (pulse or presence) as the existing detectors or as directed by the Engineer. If the TD method is not specified elsewhere in the Contract, (loops, SPVD, microwave, VIDS, pushbutton, or other) it may be the Contractor's choice. The method chosen for TD must be indicated on the TD Plan submission.

The traffic signal plan-of-record, if not in the controller cabinet will be provided upon request. Ensure the controller phase mode (recall, lock, non-lock) and phase timing are correct for the TD. Adjust these settings as needed or as directed by the Engineer.

At least 30 days prior to implementation of each phase of construction submit a TD proposal to the Engineer for approval. Submit the TD proposal at the same time as the Temporary Signalization plan. Indicate the following information for each intersection approach:

- Phase Mode
- Temporary Detection Method

- Area of Detection
- Detector Mode

Submit the proposed temporary phase timing settings and the TD installation schedule with the TD proposal. See the example below.

Example Proposed Temporary Detection and Timing

Site 1

Warren, Rt. 45 at Rt. 341, Location #149-201

Approach	Phase	Phase Mode	TD Method	Area of Detection	Det Mode
Rt. 45 NB	***2***	***Min Recall***	***VIDS***	***150' from Stop Bar***	***Presence***
Rt. 45 SB	***2***	***Min Recall***	***SPVD***	***150' from Stop Bar***	***Pulse***
Rt. 341	***4***	***Lock***	***Microwave***	***30' from Stop Bar***	***Pulse***
Rt. 341	***4***	***Lock***	***Pushbutton***	***At SE & SW corners***	***n/a***

Temporary Phase Timing Settings:

Phase	Min	Ped	Ped Clr	Ext	Max 1	Max2	Yel	Red
2	***20***	***0***	***0***	***6***	***45***	***60***	***4***	***1***
4	***14***	***7***	***9***	***3***	***27***	***35***	***3***	***1***

Scheduled TD: ***July 4, 2011***

Site 2

Scotland, Rt. 14 at Rt. 97, Location #123-201

Approach	Phase	Phase Mode	TD Method	Area of Detection	Det Mode
Rt. 15 WB Left Turn	***1***	***Non-Lock***	***VIDS***	***5' in front to 10' Behind Stop Bar***	***Presence***
Rt. 14 EB	***2***	***Min Recall***	***Existing Loop***	***150' from Stop Bar***	***Pulse***
Ped Phase	***3***	***Non-Lock***	***Pushbutton***	***At all corners***	***n/a***
Rt. 14 WB	***6***	***Min Recall***	***VIDS***	***150' from Stop Bar***	***Presence***
Rt. 97	***4***	***Lock***	***Loop, Pre-formed***	***20' from Stop Bar***	***Pulse***

Temporary Phase Timing Settings:

Phase	Min	Ped	Ped Clr	Ext	Max 1	Max2	Yel	Red
1	***5***	***0***	***0***	***2***	***12***	***18***	***3***	***1***
2 & 6	***24***	***0***	***4***	***4***	***26***	***36***	***4***	***1***
3	***16***	***7***	***9***	***0***	***16***	***16***	***4***	***1***
4	***14***	***7***	***9***	***3***	***27***	***35***	***3***	***1***

Scheduled TD: ***July 4, 2011***

When at any time during construction the existing vehicle or pushbutton detection becomes damaged, removed, or disconnected, install TD to actuate the affected approaches. Install and make TD operational prior to removing existing detection. TD must be operational throughout all construction phases.

Provide a list of telephone numbers of personnel who will be responsible for the TD to the Engineer. If the TD malfunctions or is damaged, notify the Engineer and place the associated phase on max recall. Respond to TD malfunctions by having a qualified representative at the site within three (3) hours. Restore detection to the condition prior to the malfunction within twenty-four (24) hours.

If the Engineer determines that the nature of a malfunction requires immediate attention and the Contractor does not respond within three (3) hours following the initial contact, then an alternative maintenance service will be called to restore TD. Expenses incurred by the State for alternative service will be deducted from monies due to the Contractor with a minimum deduction of $500.00 for each service call. The alternate maintenance service may be the traffic signal owner or another qualified Contractor.

TD shall be terminated when the detection is no longer required. This may be either when the temporary signal is taken out of service or when the permanent detectors are in place and fully operational.

Any material and equipment supplied by the Contractor specifically for TD shall remain the Contractor's property. Existing material not designated as scrap or salvage shall become the property of the Contractor. Return and deliver to the owner all existing equipment used as TD that is removed and designated as salvage.

Method of Measurement:

Temporary Signalization (TS) shall be measured for payment as follows:

Fifty percent (50%) will be paid when Temporary Detection is initially set up, approved, and becomes fully operational.

Fifty percent (50%) will be paid when Temporary Detection terminates and all temporary equipment is removed to the satisfaction of the Engineer.

Basis of Payment:

This work will be paid at the contract Lump Sum price for "Temporary Detection (Site No.)". The price includes furnishing, installing, relocating, realigning, maintaining, and removing, the necessary detection systems and all incidental material, labor, tools, and equipment. This price also includes any detector mode setting changes, timing or program modifications to the controller that are associated with TD. All Contractor supplied material that will remain the Contractor's property will be included in the contract Lump Sum price for "Temporary Detection (Site No.)." Any items installed for TD that will become part of the permanent installation will not be paid for under this item but are paid for under the bid item for that work.

Pay Item	Pay Unit
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 (25º C).
   - Form a tack-free skin within 25 minutes and full-cure within 60 minutes at 77 degrees Fahrenheit (25º 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) Elasotmeric 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 (24º 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 (4º and 38º 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 ⅜ inch (9.5mm) wide. Dry-cut is not allowed.
- Ensure slot depth is between 1 ¾ 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) ± 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.

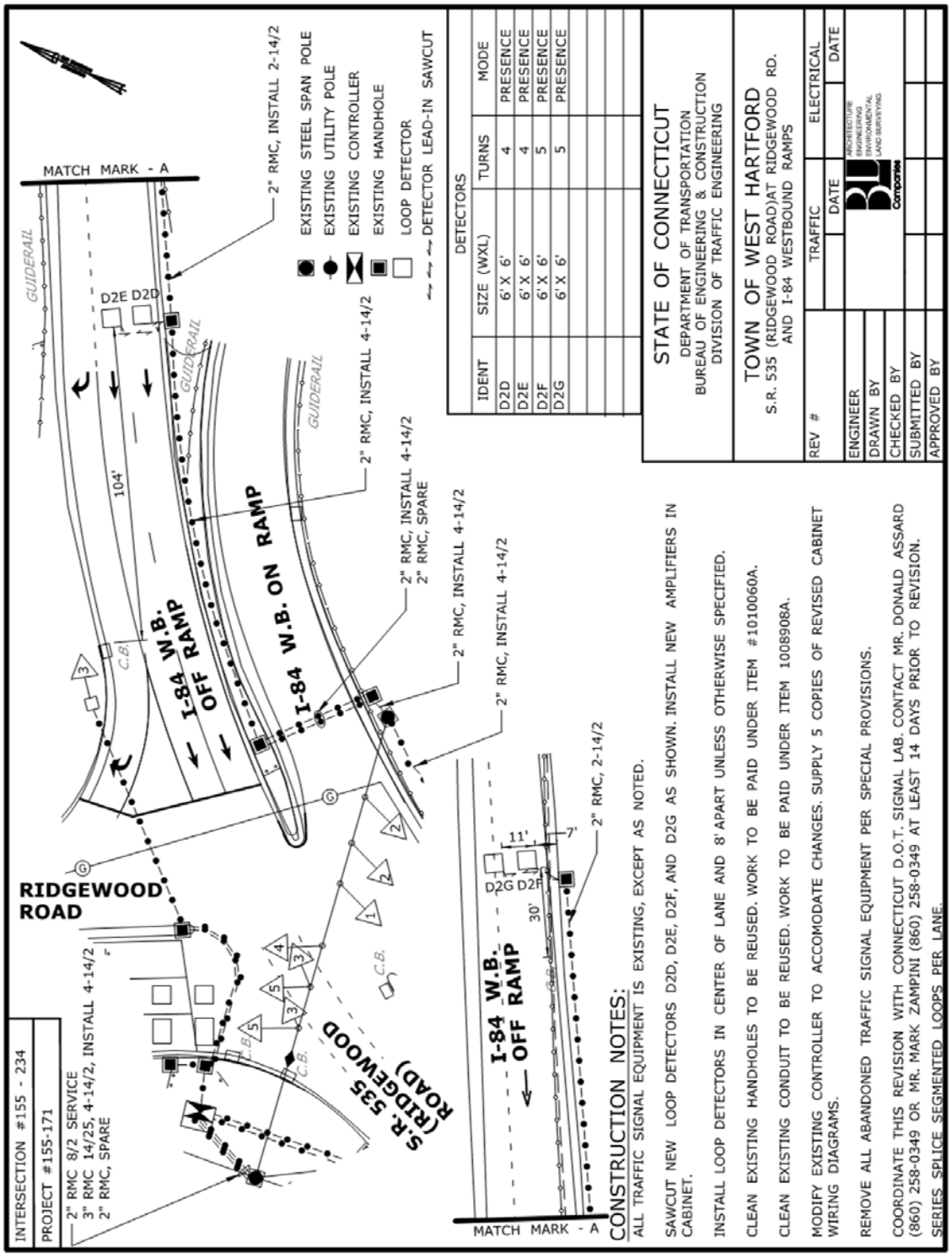
- Ensure wires are held in place at bottom of slot by inserting at 2 foot (0.6 m) intervals, 1 inch sections of foam backer rod or wedges formed from 1 inch (25mm) sections of the polyethylene tubing. Loop detectors with wires that have floated to the top of the sealant will not be accepted.
- To create 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.

INTERSECTION #155 - 229
PROJECT #155-171
CONSTRUCTION NOTES:
ALL TRAFFIC SIGNAL EQUIPMENT IS EXISTING, EXCEPT AS NOTED.
SAWCUT NEW LOOP DECTECTORS D4, D4A, D4B, AND D4C AS SHOWN. INSTALL NEW AMPLIFIERS IN CABINET.
INSTALL LOOP DECTECTORS IN THE CENTER OF LANE AND 8' APART UNLESS OTHERWISE SPECIFIED.
CLEAN EXISTING HANDHOLES TO BE REUSED. WORK TO BE PAID UNDER ITEM #1010060A.
CLEAN EXISTING CONDUIT TO BE REUSED. WORK TO BE PAID UNDER ITEM #1008908A.
MODIFY EXISTING CONTROLLER TO ACCOMMODATE CHANGES. SUPPLY 5 COPIES OF REVISED CABINET WIRING DIAGRAMS.
REMOVE ALL ABBANDONED TRAFFIC SIGNAL EQUIPMENT PER SPECIAL PROVISIONS.
COORDINATE THIS REVISION WITH CONNECTICUT D.O.T. SIGNAL LAB. CONTACT MR. DONALD ASSARD (860) 258-0346 OR MR. MARK ZAMPINI (860) 258-0349 AT LEAST 14 DAYS PRIOR TO REVISION.
SERIES SPLICE SEGMENTED LOOPS PER LANE.
DETECTORS
IDENT | SIZE (WXL) | TURNS | MODE
D4 | 8' X 6' | 3 | PRESENCE
D4A | 6' X 6' | 3 | PRESENCE
D4B | 17' X 6' | 3 | PRESENCE
D4C | 25' X 6' | 3 | PRESENCE
STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION
DIVISION OF TRAFFIC ENGINEERING
TOWN OF WEST HARTFORD
ROUTE 173 (SOUTH MAIN STREET) AT
I-84 E.B. RAMPS & WINTHROP ROAD
REV #
TRAFFIC
ELECTRICAL
DATE
DATE
ENGINEER
DRAWN BY
CHECKED BY
SUBMITTED BY
APPROVED BY
BL Companies
ARCHITECTURE
ENGINEERING
ENVIRONMENTAL
LAND SURVEYING
2" RMC, INSTALL 6-14/2
2" RMC SPARE
2" RMC 2-16/12 PAIR INTERCONNECT
2" RMC, INSTALL 6-14/2
2" RMC SPARE
2" RMC 16/12 PAIR INTERCONNECT
2" RMC, INSTALL 6-14/2
2" RMC, INSTALL 5-14/2
2" RMC 16/12 PAIR INTERCONNECT
2" RMC, INSTALL 3-14/2
2" RMC, SPARE
2" RMC 16/12 PAIR INTERCONNECT
2" RMC, SPARE
2" RMC 16/12 PAIR INTERCONNECT
EXISTING STEEL SPAN POLE
EXISTING UTILITY POLE
EXISTING CONTROLLER
EXISTING HANDHOLE
LOOP DETECTOR
DETECTOR LEAD-IN SAWCUT
WINTHROP ROAD
RTE 173 (SOUTH MAIN STREET)
I-84 E.B. OFF RAMP
D4
D4A
D4B
D4C

INTERSECTION #155 - 230
PROJECT #155-171
EXISTING STEEL SPAN POLE
EXISTING UTILITY POLE
EXISTING CONTROLLER
EXISTING HANDHOLE
LOOP DETECTOR
DETECTOR LEAD-IN SAWCUT
CONSTRUCTION NOTES:
ALL TRAFFIC SIGNAL EQUIPMENT IS EXISTING EXCEPT AS NOTED.
SAWCUT NEW LOOP DECTECTORS D4, D4A, D4B, D4C, AND D4D AS SHOWN. INSTALL NEW AMPLIFIERS IN CABINET.
INSTALL LOOP DETECTORS IN CENTER OF LANE AND 8' APART UNLESS OTHERWISE SPECIFIED.
CLEAN EXISTING HANDHOLES TO BE REUSED. WORK TO PAID UNDER ITEM #1010060A.
CLEAN EXISTING CONDUIT TO BE REUSED. TO BE PAID UNDER ITEM #1008908A.
MODIFY EXISTING CONTROLLER TO ACCOMODATE CHANGES. SUPPLY 5 COPIES OF REVISED CABINET WIRING DIAGRAMS.
REMOVE ALL ABANDONED TRAFFIC SIGNAL EQUIPMENT PER SPECIAL PROVISIONS.
COORDINATE THIS REVISION WITH CONNECTICUT D.O.T. SIGNAL LAB. CONTACT DARNOLD ASSARD (860) 258-0346 OR MR. ZAMPINI (860) 258-0349 AT LEAST 14 DAYS PRIOR TO REVISION. SERIES SPLICE SEGMENTED LOOPS PER LANE.
DETECTORS
IDENT | SIZE (WXL) | TURNS | MODE
D4 | 9' X 6' | 3 | PRESENCE
D4A | 6' X 6' | 3 | PRESENCE
D4B,D4C | 11' X 6' | 3 | PRESENCE
D4D | 13' X 6' | 3 | PRESENCE
2" RMC, INSTALL 6-14/2
2" RMC, EXISTING
2" RMC SPARE
2" RMC, EXISTING
I-84 W.B. OFF RAMP
RTE 173 (S. MAIN STREET)
I-84 W.B. ON RAMP
D4
D4A
D4B
D4C
D4D
21
STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION
DIVISION OF TRAFFIC ENGINEERING
TOWN OF WEST HARTFORD
ROUTE 173 (SOUTH MAIN STREET) AT
I-84 WESTBOUND RAMPS
REV #
TRAFFIC
ELECTRICAL
DATE
DATE
ENGINEER
DRAWN BY
CHECKED BY
SUBMITTED BY
APPROVED BY
BL Companies
ARCHITECTURE
ENGINEERING
ENVIRONMENTAL
LAND SURVEYING



DETECTORS			
IDENT	SIZE (WXL)	TURNS	MODE
D2D	6'X 6'	4	PRESENCE
D2E	6'X 6'	4	PRESENCE
D2F	6'X 6'	5	PRESENCE
D2G	6'X 6'	5	PRESENCE

CONSTRUCTION NOTES:

ALL TRAFFIC SIGNAL EQUIPMENT IS EXISTING, EXCEPT AS NOTED.

SAWCUT NEW LOOP DETECTORS D2D, D2E, D2F, AND D2G AS SHOWN. INSTALL NEW AMPLIFIERS IN CABINET.

INSTALL LOOP DETECTORS IN CENTER OF LANE AND 8' APART UNLESS OTHERWISE SPECIFIED.

CLEAN EXISTING HANDHOLES TO BE REUSED. WORK TO BE PAID UNDER ITEM #1010060A.

CLEAN EXISTING CONDUIT TO BE REUSED. WORK TO BE PAID UNDER ITEM 1008908A.

MODIFY EXISTING CONTROLLER TO ACCOMODATE CHANGES. SUPPLY 5 COPIES OF REVISED CABINET WIRING DIAGRAMS.

REMOVE ALL ABANDONED TRAFFIC SIGNAL EQUIPMENT PER SPECIAL PROVISIONS.

COORDINATE THIS REVISION WITH CONNECTICUT D.O.T. SIGNAL LAB. CONTACT MR. DONALD ASSARD (860) 258-0349 OR MR. MARK ZAMPINI (860) 258-0349 AT LEAST 14 DAYS PRIOR TO REVISION.

SERIES SPLICE SEGMENTED LOOPS PER LANE.

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION
DIVISION OF TRAFFIC ENGINEERING

TOWN OF WEST HARTFORD
S.R. 535 (RIDGEWOOD ROAD)AT RIDGEWOOD RD.
AND I-84 WESTBOUND RAMPS

REV #	TRAFFIC		ELECTRICAL	
		DATE		DATE
ENGINEER				
DRAWN BY				
CHECKED BY				
SUBMITTED BY				
APPROVED BY				

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.

Pay Item	Pay Unit
Loop Vehicle Detector	ea.
Loop Detector Sawcut	l.f.

ITEM #1112210A - CAMERA ASSEMBLY

Description: The "camera assembly" item shall consist of furnishing and installing an outdoor dome assembly with integral CCTV color camera and motorized lens, receiver/driver (if required), local camera control at the TMSC (Traffic Management System Cabinet)/TMSMHC (Traffic Management System Mini-Hub Cabinet) appropriate interconnect wiring, at the locations shown on the plans. The equipment to be provided shall include any ancillary or incidental items including any code-translators, code-distributors, data converter units, camera controller units, cables, connectors and power supplies required at each video switcher site or camera location to make a complete and fully operating video surveillance system with the approved camera manufacturer.

Materials:

Manufacturer Requirements:

The Contractor shall ensure that all specified camera features, functions and performance requirements are supported by the American Dynamics 1024 video switcher and American Dynamics 2089 keyboard without loss of camera features, functions, performance and response time (except alarm returns). The camera assembly shall be a unit that has been tested and working with the American Dynamics 1024 video switcher at the Department's Operation Center at 2800 Berlin Turnpike Newington CT. The Contractor will not be allowed to submit a camera manufacturer other than the manufacturers listed herein. **All camera assemblies shall be manufactured by Sensormatic - SpeedDome Ultra 8E day/night or latest equivalent model.** The catalog cut submittal shall clearly document any camera functions that do not meet the item specifications.

1.0 Materials

- High-speed, programmable dome with a high-resolution DSP7 camera incorporating programmable Day and Night camera modes
- Day and Night mode control by removal of an infrared (IR) cut filter
- Wide Dynamic Range (WDR) for viewing of detailed images when observing scenes with widely varying degrees of light
- Digital Slow Shutter (DSS) allowing more light accumulation within the CCD imager
- Electronic Image Stabilization (EIS) to compensate for physical movement and vibration of the dome with a user-selectable bandwidth of 5 or 10Hz
- Dome to conform to RoHS initiative standards.
- Outdoor enclosure
- Local camera controller
- Camera power, video and data cables.
- Code Distributors, Code Translators and Date Converters
- Spare equipment

- Power supply transformer

2.0 Performance Specifications

- The dome assembly must be comprised of a high-speed, pan/tilt assembly and a high-resolution Day or Night mode camera with 35X optical zoom, 12X digital zoom permitting up to 420X total zoom, and a horizontal resolution of 540TVL. The camera/lens assembly must provide continuous, full-time, auto focus capabilities.
- The pan/tilt mechanism must incorporate a sealed, precision slip-ring to provide 360° of continuous rotation.
- The tilt mechanism must provide for 110° of travel.
- Precise manual panning and tilting must be achievable through a combination of variable-speed operator control (speed ranges) and automatic adjustment of these speed ranges dependent upon zoom factor. Manual pan and tilt speeds must range from 0.25° to 100° per second. Preset pan speeds must range from 1° to 360° per second, and preset tilt operating speeds must be from 1° to 220° per second. Pan and tilt speeds will be automatically adjusted by the zoom factor to allow the user the same ease of control, regardless of the field of view.
- High-speed, DC direct-drive motors must be used to maintain high torque through the entire operating range. These motors must use pulse-width modulation and encoder feedback to control the acceleration, speed, and deceleration of the motors to ensure smooth, precise, accurate, and fluid movement. The design shall use DC direct-drive motors and no belt to ensure long-term, reliable operation.
- The dome assembly shall contain a built-in, multi-protocol receiver/driver for use with matrix switching systems using one or more of the following protocols:
- AD Manchester control code and a single 18AWG shielded twisted pair (STP) to support up to three daisy-chained domes a maximum of 1500m (5000ft)
- SensorNet control code and a single 22AWG unshielded twisted pair (UTP) to support up to 32 daisy-chained domes a maximum of 1000m (3000ft)
- RS-422/RS-485 control code and two pairs of 22AWG STP cabling to support up to 10 daisy-chained domes a maximum of 1000m (3000ft)
- AD-UTC and a 20AWG RG–59U video cable to control a dome a maximum of 700m (2,300ft)
- The receiver/driver will provide all voltages for camera controls, pan and tilt functions, and all motorized lens functions. In addition, the dome shall support selected third-party protocols for integration to other systems without the need for optional translator boards.
- The dome must natively support the National Transportation Communications for ITS Protocol (NTCIP) version 1205:2001 v01.08, implemented via the RS–422 communication interface.
- The dome must include standard support for UTP dome connections, which allow the use of separate cabling for transmission of video and dome control signals up to 300m (1000ft).
- The dome shall support 96 Presets, 16 Patterns, and 16 Preset Sequences depending upon protocol and controller used. The dome shall also support a Home Position that automatically returns the dome to a Preset, Pattern or Preset Sequence after a specified

period of inactivity: 1-60 minutes. A freeze frame function must be available that maintains a static image on-screen during dome movement and lens adjustment when presets and patterns are called. This freeze frame function helps to preserve hard-drive space when a digital video recorder is used.

- The dome must support a minimum of eight privacy zones to prevent users from viewing sensitive or secured areas. So as not to interfere with normal surveillance operations, these on-screen "shields" must block out only the area that has been defined as sensitive. The privacy zones should not cause the screen to blank out when the sensitive area is within the camera's field of view. On the monitor, the privacy zones should appear larger or smaller depending on the camera's zoom factor.
- The dome must support on-screen programming of dome parameters, including proportional flip, direction indicators and azimuth, maximum zoom stop, line-lock or internal crystal synchronization, AGC, white balance, Wide Dynamic Range selection, alarm actions and default states, infrared filter removal threshold, and home position. On-screen programming of dome name, 16 Area names, 96 Preset names, 16 Pattern names and four alarm names must also be provided. All of this on-screen programming, as well as the rest of the on-screen displays, must be available in the following languages: English, French, Italian, German, Spanish, and Portuguese.
- A DirectSet menu must be used to provide easy access to common dome settings when installed with compatible controllers. This DirectSet menu must provide access to the following features:
    a. dome configuration menu
    b. auto iris/autofocus resume
    c. flip
    d. default apple peel pattern
    e. set North position
    f. line lock off
    g. line lock on
    h. night mode, day mode
    i. auto day/night mode
    j. WDR on
    k. WDR off
    l. enable/disable wide dynamic range
    m. activate smooth scan
    n. activate stepped scan
    o. activate random scan
    p. activate a preset sequence
    q. display the dome information screen
    r. Password protection must be provided to prevent unauthorized access.

- Dome direction indicators and azimuth reading; Dome, Area, Preset, Pattern, Preset Sequence and alarm names; and zoom, focus, and iris status must be displayable on the monitor. All on-screen text character attributes must be user-selectable solid or translucent white, with or without black outline.

- On-screen display of dome usage statistics must be available. This usage information must provide a record of the number of pan, tilt, and zoom commands issued by the dome; operating time, time from last reset in seconds, and total reset count.
- The dome assembly design shall contain four alarm inputs and be field programmable to receive “normally open” or “normally closed” contacts. If operating on a SensorNet or RS–422 network, the dome shall be capable of receiving the alarm and transmitting the alarm back to the switching system and/or reacting to the alarm event independent of the switching system. If operating on a Manchester network, the dome must be able to process the alarm internally and automatically activate a Preset, Pattern or Preset Sequence.
- The dome assembly shall contain a single auxiliary output (outdoor dome) or three independent auxiliary outputs (indoor dome). The outdoor dome single auxiliary output shall be a form C relay contact. Each open collector auxiliary output must respond as momentary or latching (depending on system capability).
- The open collector of each auxiliary shall be required to handle +12Vdc at a maximum of 40mA.
- The complete dome assembly must be capable of operating to full specification with an applied voltage of 18 to 30Vac at a frequency of 50 or 60Hz and meet Class 2 standards. The power consumption cannot exceed 11W with all functions operating. The dome assembly shall have surge protection for the video, communications, power, and alarm connections.
- The camera shall have a 35X optical zoom and be a ¼-inch CCD interline transfer device. Day mode shall provide a minimum horizontal resolution of 540 lines with a usable video signal with a scene illumination of better than 0.24 Lux (20 IRE with AGC on) and 0.028 Lux (with an open shutter selection of 1/4sec).
- Night mode shall provide a minimum horizontal resolution of 540 lines with a usable video signal with a scene illumination of 0.021 Lux (20 IRE with AGC on) and 0.00041 Lux (IR mode with an open shutter selection of 1/2sec).
- The video output synchronization shall be 2:1 interlace and will observe the NTSC or PAL standards. Line-lock with an adjustable vertical phase must also be provided.
- The lens must be color-corrected, 3.4-119mm, f1.4, and must have continuous autofocus with manual override. The lens must also have auto-iris with manual iris override. The autofocus and auto-iris resume settings shall be configurable via on-screen menu settings.
- The dome shall incorporate a twist-lock release base for ease of installation and service. This base enables the installer to wire the appropriate cables onto an I/O board contained within the twist-lock base. The I/O base enables wiring to be completed once and for the housing/eyeball assembly to be connected and disconnected to the twist-lock base without disturbing the wires or connections. This I/O base option shall support four alarm inputs and three auxiliary outputs. In the event that the camera assembly must be replaced, the I/O base shall store presets, patterns, and other selected programming information. Each base will include diagnostic LEDs to indicate power and proper communications to and from the matrix.
- An installation tool that enables service personnel to connect and disconnect the housing/eyeball assembly without the use of a ladder or lift must be available. The dome

and base must be available separately so installation of the base can be accomplished by qualified personnel prior to the purchase of the dome or housing/eyeball assembly. An outdoor housing must also be available and shall provide for the same ease of installation and service.

- Upon initial power up and after dome resets, diagnostic tests must be run, including communication loopback, camera loopback, and motor circuit tests. The results of these tests must be displayable on the monitor. After initialization, the dome shall automatically pan, tilt, and zoom to its previous position.

3.0 Camera Assembly

3.1 Each camera assembly shall include, but not be limited to, the following equipment:

- Pendant mounted dome camera housing, mountings, pan and tilt unit, and other camera accessories as specified.
- ¼" CCD Integral color television camera with motorized lens.
- Integral receiver/driver installed in the dome housing.
- Local camera controller capabilities located in the traffic management system cabinet or portable variable message sign cabinet.
- Data Transmission RS-422. Data transmission shall use a dedicated data cable. The selected data transmission protocol shall require prior approval by the Engineer.
- All required wiring and connections to related equipment.

3.2 The dome camera, zoom lens, domed pressurized enclosure and control receiver shall be assembled and tested in accordance with these Technical Special Provisions prior to delivery to the job site. All equipment shall be UL listed. These assemblies shall be delivered to the job site as complete units, and installed on poles and camera lowering devices as shown on the plans and specified herein.

3.3 The operation of CCTV equipment dome type shall not be affected by transient voltages, surges, and sags normally experienced on commercial power lines. CCTV field hardware and related electronic components shall not be adversely affected by wind driven rain, salt in the air or ice buildup. The camera assembly shall have the capability to turn on or off the heater and blower systems by manual override from the operations center as specified and elsewhere in these provisions.

4.0 Camera Assembly Items

4.1 The camera shall be capable of automatically reestablishing video and data communications upon the restoration of communications or power to the cameras. The maximum lux level requirements shall be considered using a resulting image

on the video monitors at the Department's Newington Operations Center. The cameras shall meet or exceed the following requirements:

Note: Due to the market changes in the CCTV industry, the Contractor should contact the Department to verify camera features and performance.

Operational

Manual Pan/Tilt Speed:	0.25° to 100° per second (based on zoom position)
Preset Pan/Tilt Speed:	360° per second maximum (Pan) 220° per second maximum (Tilt)
Pan Travel:	360° continuous
Tilt Travel:	110°
Pan/Tilt Accuracy:	± 0.5°
Zoom/Focus Accuracy:	± 0.5%
Programmable Patterns/Sequences/Areas/ Privacy Zones:	16/16/16/8
Direction Indicators:	Yes
Presets:	96 max, system-capability dependent
Auto Synchronization:	
Line-Locked:	Remote V-phase adjustment
Internal:	Built-in sync generator
Address Range:	
RS-422/RS-485:	1 to 99
Manchester:	1 to 64
SensorNet:	1 to 255
AD-UTC:	Based on number of inputs
Alarm Inputs with I/O board (indoor only):	4 dry contacts with optical isolation/3.5mA sink
Alarm Outputs with I/O board (indoor only):	3 open collector drivers at 12Vdc, 40mA

Integral Receiver / Driver

Control Code:	AD Manchester, SensorNet, RS-422, or UTC
Maximum Daisy-Chain Devices:	
RS-422/RS-485:	10 Domes up to 1000m (3000ft)
SensorNet:	32 Devices up to 1000m (3000ft)
AD Manchester:	3 Domes, up to 1500m (5000ft)
Controllable Functions:	Pan, Tilt, Zoom, Focus (Manual/Auto), Iris (Manual/Auto)

Camera

Imager:	Interline transfer ¼-inch CCD array
Scanning System:	.2:1 interlace
Optical Zoom:	35X
Digital Zoom:	12X
Maximum Zoom:	420X
Video Output:	1.0Vp-p, 75Ω composite
S/N Ratio:	–50dB (typical)
Horizontal Resolution:	540 lines at center
Minimum Illumination (20 IRE, AGC on):	0.24 Lux (color) 0.028 Lux (color with 1/4sec open shutter) 0.021 Lux (B/W IR mode) 0.00041 Lux (B/W IR mode with 1/2sec open shutter)
Gain Control:	Automatic (AGC)
White Balance:	Through-the-Lens (TTL) Automatic Tracing White Balance (ATW)
Day/Night	Auto (Med., Low, High) On, or Off
Wide Dynamic Range (WDR)	On or Off
Electronic Image Stabilization (EIS)	On (5 or 10Hz) or Off

NTSC:

Effective Pixels:	768 (H) x 494 (V)
Scanning:	525 lines, 60 fields, 30 frames
Horizontal:	15.734kHz
Vertical:	59.94Hz
Shutter Speed (Auto/Manual):	1/2 to 1/30,000

Lens

Design:	Aspherical
Aperture:	f1.4
Focal Length:	3.4 to 119mm
3.4mm field of view:	55.8° (H) x 41.8° (V)
119mm field of view:	1.7° (H) x 1.3° (V)

Features

Automatic Gain Control:	Off, On with adjustable max. dB, Open Shutter
White Balance:	Auto, Manual
Line Lock:	Off, On with adjustable vertical phase
Freeze Frame:	Maintains static image on-screen during call up of Preset or Pattern

Home Position: ..... Dome assumes a specified Preset or Pattern after a time-out period (1 to 60 minutes)
Alarm Processing: ..... External (by controller)
Alarm Input States: ..... Normally Open or Normally Closed
Alarm Input: ..... 4 Normally Open (NO) or Normally Closed (NC)
Auxiliary Output: ..... 3 Normally Open (NO) or Normally Closed (NC)
Diagnostic LEDs: ..... Power, communication, network type, and failure mode

On-Screen Text:

- Appearance: ..... Choice of outline or no outline for text overlay; solid, or translucent white characters
- Language: ..... English, French, German, Italian, Portuguese, and Spanish

Password Protection: ..... 3 to 8 character, user-programmable, to prevent unauthorized access to programmable features
DirectSet Menu: ..... provides access to commonly used dome features when used with compatible controllers

Overexposure Protection — The camera shall have built-in circuitry to signal the lens to appropriately adjust the iris opening to prevent any damage to the camera when pointed directly at strong light sources, including the sun.

Electrical

Input Voltage: ..... 18 to 30Vac, Class 2 LPS
Design Tolerance: ..... 16 to 36Vac
Line Frequency: 50/60Hz
Power Consumption: ..... 11W maximum

- Power-on In-rush current: 1.5A
- Allowable Drop-out: 100µs

Surge Protection:

- Video: ..... Low-capacitance Zener suppressor of 6.5V, 1500W
- SensorNet/Manchester: ..... Isolation transformer coupled, 2000Vrms; PTC resettable fuse protects transformer; 9.8V, 1A, 500W; 8/20µs impulse
- RS–422/RS–485: ..... 10kA impulse rated gas tube

Alarm Input/ Auxiliary Output:	TVS rated at 9.8V, 1A, 500W, 8/20µs impulse
Power Line:	TVS rated at 60V, 250A, 1.5 joules; 8/20µs impulse

Data and video shall utilize separate cables

Mechanical

Dimensions (includes base) (H x D):	205mm x 120mm (8in x 4.7in)
Mounting :	pendant mounts for outdoor housing
Bubble (for Top Hat Mount):	Clear (f0)
Weight (Housing and Eyeball):	1.09kg (2.40 lbs)
Weight (Base with I/O board):	0.16kg (0.35 lbs)

Pan – Tilt Drive

Pan-Tilt Drive	Internal, powered by DC servo motors Or AC micro stepping motors

Environmental

Operating Temperature	-10° to 50°C (14° to 122°F)
Humidity	0 to 95% RH (non-condensing)
Storage Temperature	-20° to 65°C (-4° to 149°F)

Regulatory

Emissions	FCC: 47 CFR Part 15, Subpart B Class A CE: EN55022 Class B CE: EN61000-3-2 CE: EN61000-3-3 AS/NZS 3548, Class A CISPR22 ICES-003
Immunity	CE: EN50130-4
Safety	UL: UL1950 CUL: CSA 22.2.950 CE: EN60950-1 IEC 60950-1

5.0 Camera Assembly Dome Enclosure

A dome enclosure supplied and produced by the same manufacturer of the camera assemblies shall be supplied as part of each item. The enclosure shall be an American Dynamics SpeedDome Ultra Outdoor Dome Housing Model ADSDUHOC. The enclosure shall be rated for outdoor environment use and meet or exceed NEMA 4

rating. The dome enclosure shall meet or exceed IP66 rating. Each camera assembly shall be installed within the dome enclosure. The enclosure shall be pendant mounted and provided with a 1 ½" (38mm) diameter pipe fitting with NPT threads and all hardware required for attachment to the camera lower device and as shown on the plans. The dome housing shall be suitable for use in outdoor locations subject to extreme temperatures and wet conditions. The housing will incorporate a "twist-lock" mounting base to facilitate quick connection and disconnection of the dome housing/eyeball assembly.

5.1 Performance Specifications

- The outdoor dome housing will protect against water and dust intrusion and meet a minimum of NEMA-4 and IP66 ratings.
- The housing must include an outer sunshade and an inner aluminum housing with thermostat, heater, and fans to ensure protection and safe operation of the dome in temperatures of -40 °C to 50 °C (-40 °F to 122 °F) with a humidity range of 0–95% (non-condensing). The housing shall be constructed of reinforced fiberglass high impact polycarbonate material along with a UV stabilized sun shade trim ring and top cover.
- The housing must prevent the buildup of ice on the exterior bubble and be able to melt ice that has formed on the bubble during a power outage or other event within one hour of power being restored. The heater must be controllable via auxiliary outputs to aid in the clearing of moisture accumulation. The heater must be of a modular design, easily removable for servicing.
- The housing shall operate in sustained winds of up to 240 kph (150 mph) when properly mounted and installed on the pole.
- The housing and bubble shall have an Effective Projected Area (EPA) of approximately 125 square inches.
- The entire dome and housing will operate from a Class 2 power source requiring no more than 80 VA of power. The dome and housing shall be tolerant of 24 VAC supply voltages from 20 VAC to 36 VAC at 50/60Hz and be installed in accordance with Class 2 requirements.
- The housing must include an integral twist-lock I/O board to facilitate quick connect/disconnect of the dome from the housing. The housing shall incorporate "Euro-style" terminal screw connectors for ease of connection, and internal LEDs to verify proper power and communication status. The housing must provide four alarm inputs for use as alarm contacts and a Form C output rated at 30 volts AC or DC, 1 amp. The housing must provide for lightning and surge protection of the video, power, and communication lines.
- The housing shall include a clear bubble with no light loss. The bubble must be sealed with a gasket and secured with tamperproof screws. The appropriate security screwdriver bit must be provided with the housing.

<u>Mechanical</u>

Construction:

Enclosure	Aluminum
Sun Shade/	
Trim Ring/Top Cover	UV stabilized, polycarbonate
Color	Light gray
Height:	321 mm (12.64 in)
Diameter:	244 mm (9.61 in)
Bubble:	Acrylic
Bubble Diameter:	75.3 mm (6.93 in)
Weight:	
Without Dome	2.6 kg (5.72 lbs)
With Dome	3.8 kg (8.36 lbs)
Shipping Weight:	3.3 kg (7.26 lbs)
Mechanical Connection	1.5 in NPT
Mounting :	Outdoor Pole Mount

Electrical

Voltage	20–36 VAC, 50/60 Hz
Power	80 watts, maximum
Power-on In-rush Current	3 A
Surge Protection:	
Video	Series resistor of 3.9 Ω; low-capacitance Zener suppressor of 6.5 V, 1500 watts, 500 watts, 8/20 µsec impulse, 500 watts, 10 kA impulse rated gas tube
Manchester/SensorNet	Isolation transformer coupled, 2000 Vrms; PTC resettable fuse protects transformer; TVS rated at 5.6 V, 40 A, 0.1 joules, 8/20 µsec impulse, 500 watts, 10 kA impulse rated gas tube
RS-422	Series resistors of 33 Ω; TVS rated at 5.6 V, 40 A, 0.1 joules, 8/20 µsec impulse, 500 watts, 10 kA impulse rated gas tube
Alarm Inputs (4)	series resistors of 33 Ω; TVS rated at 5.6 V, 40 A, 0.1 joules, 8/20 µsec impulse, 500 watts, 10 kA impulse rated gas tube
Power Line	TVS rated at 60 V, 250 A, 1.5 joules, 8/20 µsec impulse, 500 watts, 10 kA impulse rated gas tube
Auxiliary Output	1000 V isolation Form 1-C relay
Allowable drop out:	150 ms

Environmental

Weatherproof Standard	NEMA 4/IP66
Operating Temperature	-40 °C to 50 °C (-40 °F to 122 °F)
Humidity	0–95% RH (non-condensing)
Storage Temperature	-10 °C to 50 °C (14 °F to 122 °F)
Wind Loading	Sustained winds of 240 km/hour (150 miles/hour) when properly installed and mounted (wall, pole, ceiling, and over-the-roof mount with proper support)
Effective Projected Area (EPA)	~125 square in (~317.5 square cm)

Regulatory

Emissions	FCC: 47 CFR Part 15, Subpart B Class A CE: EN55022 Class B CE: EN61000-3-2 CE: EN61000-3-3 AS/NZS 3548, Class A CISPR22 ICES-003
Immunity	CE: EN50130-4
Safety	UL: UL1950 cUL: CSA 22.2 No. 950 CE: EN60950 IEC950

5.2 The dome environmental enclosure shall be manufactured from high-quality acrylic substrate, aluminum, cell-cast or an approved equal. The enclosure shall be coated with an off-white, beige or gray finish, and outfitted with a sunshield to reflect direct rays from the sun from the control equipment within the housing without adversely effecting the optical qualities of the camera and lens. The sunshield shall have a means for dissipating heat to protect the camera from failing due to excessive sun exposure. The enclosure shall not allow external moisture to intrude the bubble of camera.

5.3 The bubble shall be constructed from high quality, clear, optically graded, thermoformed acrylic or approved equal. The bubbles shall be free of imperfections, scratches and blemishes. Tamper-proof hardware and a safety strap or lanyard shall be provided to attach the bubble assembly to the dome enclosure. A gasket seal shall be provided between the bubble and dome enclosure to prevent water and dust entry. All external connections shall be environmentally sealed. The dome and bubble enclosure shall not exceed 380

mm. in height. Sufficient protective packing material shall be provided by the manufacturer to prevent damage to any enclosure surfaces during shipping and handling.

5.4 A thermostatically controlled heater/defroster and blower circulation system shall be provided to maintain the temperature in the specified range and ensure clear viewing during cold weather operation. The heater shall turn on at a minimum 4°C and off at a maximum of 15°C (+ or -2.8°C) to maintain the specified range defined in Section 2.0. The blower shall operate continuously. The blower shall be rated for continuous operation. All heater and blowers shall be mounted to the non-rotating housing of the dome. The enclosure shall prevent ice formation on the exterior of the enclosure. The camera assembly shall capabilities to turn on or off the heater and blower systems by manual override from the operations center.

5.5 The enclosure shall provide easy access to the camera and pan-tilt unit and a quick release option to allow removal of the assembly.

5.6 The dome enclosure shall automatically restart camera operation upon restoration of power, video and data communications.

5.7 The camera and enclosure shall not experience any adverse operation during power fluctuations within the specified range.

6.0 Local Camera Controller

6.1 Means shall be provided to perform all camera control functions locally within the field equipment cabinet for each dome camera. Activation of local camera control shall disable remote camera control. The following shall be included to provide local camera control:

- A special purpose, RJ45 jack located in the input wiring panel within the traffic controller cabinet. The jack shall be wired for a minimum of three 3 pairs to provide for local control within the cabinet.

7.0 Camera Cable Assemblies

7.1 The Contractor shall furnish and install all cable and connectors, and make all connections between equipment as required to provide the specified operation. A camera cable assembly shall consist of a camera control cable carrying power for the camera and control lines for the lens and pan-tilt operations, and a video cable

that carries the video signal generated by the camera. Specifications of all cable assemblies, including connectors, shall be submitted to the Engineer as part of the shop drawings for review and approval.

7.2 The Contractor shall supply and install interconnection wiring between the camera assembly/Lowering Device and the equipment installed at the termination point in the traffic management system cabinet and Mini-hub.

7.3 The Contractor shall supply and install interconnection wiring between the camera assembly and the wiring panel assembly installed in the traffic management system cabinet. The twisted pair cable shall be Belden Part Number 9734. The twisted pair cable shall be an eleven- (11) pair 7x32 stranded conductor. The conductor shall be a 24 AWG with the wires made of TC – Tinned Copper. The insulation shall be Foam Polyethylene with an insulator diameter of 0.061 in. The cable shall meet operating temperature of –20 C to + 80 C with a maximum pulling tension of 180lbs. and a min. bending radius of 5.75 in. The cable shall meet NEC/UL CM, with UL flame test UL 1685 UL Loading.

7.3 The coax cable shall be Belden Part Number 7915A. The conductor shall be a Series 6 conductor with a solid stranding. The cable shall be 18 AWG with the conductor material being made of BC – Bare Copper. The conductor diameter shall be 0.040 in. The insulation shall be a gas injected Foam Polyethylene with an insulator diameter of 0.180 in. The outer shield shall be Duobond Plus™). The outer shield type shall be Tape/Braid/Tape. The tape shall be bonded aluminum foil-polyester tape – aluminum foil. The braid shall be aluminum. The tape shall cover 100% of the cable. The braid shall cover 77% of the cable. The outer jacket material shall be PVC – polyvinyl chloride. The overall nominal diameter shall be 0.275 in. The cable shall meet operating temperature of –40 C to + 80 C with a maximum pulling tension of 91lbs. with a min. bending radius of 5.75 in. The cable shall meet NEC/UL CM, with UL flame test UL 1685 UL Loading.

7.4 The Category 6 cable shall be an OSP Broadband branded cable part number BBDN6. The cable shall be 23 AWG with a Aluminum tape shield. The cable shall be suitable for direct buried applications. The Category 6 cable shall be run between the traffic management System cabinet to the camera lowering device.

7.5 The Camera assembly power cable shall be Belden Part Number 8628 7 conductor 14 AWG. The power cable shall be run between the Traffic management system cabinet to the camera lowering device.

7.5 All wiring shall conform to the camera assembly manufacturer's requirements. All DC logic control conductors shall be shielded from conductors carrying AC power to prevent electrical noise from interfering with control. The interconnect wiring shall be protected with surge suppression.

8.0 Spare Equipment

9.1 A minimum of one spare camera assembly shall be included for every three (3) camera assemblies provided. For example: If 3 cameras are installed, one (1) spare is provided. If 6 cameras are installed, two (2) spares are provided, etc.

9.2 The spare camera assembly shall be the same manufacturer and model provided for the camera assemblies installed on the poles.

9.3 The spare camera assembly shall include all necessary materials including but not limited to camera, enclosure, code converters, cables, power supply transformer etc. to replace any camera assembly requiring service.

9.4 The Contractor is allowed to use the spare camera assembly to replace defective camera assemblies during the equipment operations period. The Contractor shall replace the defective camera assembly at no additional cost to the Department.

9.5 The Contractor shall provide to the Department a properly operating spare camera assembly(ies) at the end of the equipment operations item.

10. Power Supply

10.1 The Contractor shall furnish and install power supply transformer for each camera assembly in the traffic management system cabinet and or traffic management system mini-hub cabinet rated for outdoor use and environmental.

10.2 Each power supply transformer shall be from the same manufacturer for each camera assembly item and certified by the manufacturer for compatibility with the camera assembly.

10.3 The power supply transformer shall be a variable voltage power supply providing a range between 18 VAC and 36 VAC to provide the correct operating voltage for each camera assembly installed to meet the camera manufacturer's specifications, camera assembly cabling and voltage drop from the camera assembly and the input wiring panel. The Contractor shall be responsible for adjusting the voltage output of the power supply transformer to each camera assembly to meet the camera manufacturer's operating voltage specifications.

10.4 The power supply transformer shall be UL rated and capable of being install in the wiring panel assembly in the traffic management system cabinet or traffic management system mini-hub cabinet as shown on the plans.

10.5 The power supply transformer shall be manufactured to prevent incidental shock in the event contact is made while installed and fully powered in the traffic management system cabinet or traffic management system mini-hub cabinet.

Construction Methods:

1.0 Camera Assembly

1.1 All assemblies, including camera, lens, pan-tilt unit, enclosures and receiver/drivers, shall be assembled and factory tested prior to delivery to the job site.

1.2 The assemblies shall be delivered to the job site as complete units, and installed on the lowering device mount as shown on the plans or as directed by the Engineer. The camera assembly shall be mounted in such a way that all designated areas are available for viewing by operating the pan, tilt and zoom functions. The Contractor shall contact the Engineer to confirm mount for maximum or preferred view.

1.3 The Contractor shall provide the required mounting adapters and hardware required to attach the camera assembly to the lowering device. Pole-mounted adapters shall be electrically bonded to the support bracket and pole. Camera assemblies shall be electrically bonded to the mounting adapter.

1.4 The Contractor shall pay particular attention to protection of the camera assembly dome enclosure glass face during installation. It is important that any clear surfaces not be scratched or marred. If any damage is observed by the Engineer, the Contractor will be required to replace the affected equipment at no cost to the State.

1.5 The qualified integrator shall furnish and install the camera cables between the camera lowering device through the camera pole to the traffic management system cabinet.

1.6 The Contractor shall connect cables for each camera assembly to the appropriate power and data connections as shown on the plans and as required by the camera manufacturer.

1.7 The Contractor shall clean all equipment during installation as required by the manufacturer. This is especially important for clear surfaces which must be free of any static electricity that can attract dust. The Contractor shall coat the exterior side of any clear surfaces with a water-resistant chemical, if use of such chemical is approved by the manufacturer.

1.8 All programming for all camera assemblies shall be conducted by an Integrator that is certified by the camera manufacturer**.** The Contractor shall submit certified integrator qualifications, including contact names and previous experience, to the Engineer as part of the catalog cut submittal.

1.9 The Integrator shall program each camera to fully utilize the capabilities of all programmable features to the satisfaction of the Engineer, including night time and other varying light conditions. The Integrator shall be responsible for coordinating the integration dates and times with the Engineer. The Integrator shall demonstrate to the Engineer that all programming features are included as specified.

1.10 The Contractor shall complete all camera programming at least two working days after the successful establishment of video and data communications between the camera site and the DOT Newington Highway Operations Center. The Contractor/Integrator shall contact the Engineer to coordinate the completion of all programmable features. Upon completion of the program features, the Contractor/Integrator shall record the program settings for each camera assembly and submit two copies to the Engineer for review and approval.

2.0 Local Camera Controller Installation

3.1 If a shelf-mounted local camera controller is used, the Contractor shall install the controller in the traffic cabinet and furnish and install all necessary cables to interface the camera controller with the junction box, video camera output signal and power source.

3.2 If a manufacturer's keyboard is used for local camera control, the Contractor shall be responsible for purchasing a keyboard that is utilized for programming and configuring camera operation. Use of the keyboards provided as part of this contract item will not be allowed.

3.3 The Contractor is responsible for the purchase and supply of a video monitor and any other equipment required for on-site programming, configuration and testing at no additional cost to the Department.

3.0 Camera Cable Assembly Installation

3.1 The Contractor shall supply and install all required interface cables between the camera assembly, lowering device, local camera controller, input panel and the power source. All cables shall be routed between the camera assembly via the inside of the camera pole or in a conduit as described in the lowering device and pole specifications. A ground wire shall be provided between the camera assembly and the traffic controller cabinet.

3.2 Wiring shall run continuous from source to destination. No splices will be allowed. Coaxial cables shall be installed without damaging the connectors, insulation or jacket. The coaxial cables shall not be kinked or bent tighter than the manufacturer's recommended bending radius. Sufficient slack cable shall be

provided for equipment movement. All cabling shall be secured with tie-wraps and protected from physical damage. All interconnecting wiring and connectors shall meet all necessary standards with regard to voltage, current and environmental ratings. All electrical cable shall meet the requirements of the National Electrical Code. All communication terminations shall be terminated by the approved ITS integrator. A coax pigtail with copper conductors on one end and a BNC connector on the opposite end shall be supplied for connection to the camera lowering device.

4.0 Camera Assembly Tests

4.1 The Contractor shall be responsible for the provision of all testing and documentation required to obtain approval and acceptance of the production, installation and operation of these materials, equipment and the overall system. The Contractor shall test each camera assembly as shown on the plans as described herein or as directed by the Engineer.

4.2 The Contractor shall test all cables for continuity, short circuits or grounds. Tests on cables with connectors attached (connectorized) shall be performed after installation. The Contractor shall perform system integration testing to ensure that the video interface and camera interconnect wiring functions properly and complies with all relevant standards when used in operation with all other devices installed under this contract or the procurement contract.

- Verification of installation of specified cables and connections between camera assembly and the traffic controller cabinet.
- Local operation of all CCTV equipment, exercising the pan, tilt, zoom, focus, iris opening, shutter control, power on/off and all other functions described herein this specification while observing the video picture on a portable monitor.
- Demonstration of camera sensitivity at low light levels to meet the specified requirements.
- Demonstration of pan/tilt speed and extent of movement to meet the specified requirements.
- Measurement of video signal level at the field equipment cabinet with VM700 video testing equipment.
- Verify that video output from the camera is a 1-volt peak-to-peak, composite NTSC signal.
- Random test of at least two installed camera to verify camera enclosure environmental resistance.
- Preset test to ensure camera consistently goes to the proper preset position.

4.3 The integrator shall provide test reports for the category 6 cable and RG-6 coax cable installed to the top of the camera pole. The tests shall be done through the lowering device connections down to the TMSC or TMSMHC. Category 6 cable tests shall include length, Attenuation, Crosstalk (NEXT), Delay Skew, and Return Loss. RG-6 coax tests shall include HDTDR, Resistance, Length, Impedance, and insertion Loss. Any tests found to be outside RG-6 and CAT 6 standards will need to be remediated. Test results shall be submitted to the department before the start of the 30 day operational test.

4.4 Whenever any unit of equipment fails to pass the assembly tests, the Contractor shall correct the deficiencies, either by repair or replacement, at his expense (including freight costs) as required to comply with the testing requirements. Upon notification by the Contractor that the deficiencies have been corrected, the equipment shall be re-tested. All camera assembly testing and any re-testing shall be performed in the presence of the Engineer or his designated representative. The Contractor shall provide all test results to the Engineer in writing seven working days after the completion of each individual camera assembly test.

5.0 Factory Tests

5.1 All camera equipment furnished by the Contractor shall be tested and subjected to a nominal 72-hour burn-in period at the factory. The factory tests shall be in accordance with the manufacturer's standard procedures and quality assurance program.

5.2 The Contractor shall provide the Engineer with a copy of the manufacturer's test procedures and quality assurance procedures for information. If the Engineer determines that these procedures are not adequate, the Engineer may require that the Contractor conduct additional tests prior to installation. The Contractor shall provide documentation certifying and showing that each item supplied has passed factory inspection, burn-in and testing.

6.0 Central Control Tests

6.1 The central control tests shall demonstrate that all equipment furnished by the Contractor has been installed properly and operates as a fully functional CCTV surveillance system using the existing ConnDOT video camera control system. Prior to initiating the central control tests, all camera assembly tests specified in (a) herein shall have been successfully conducted by the Contractor in the presence of the Engineer or his designated representative.

6.2 In the event that any Contractor-provided component of the CCTV surveillance system malfunctions or operates below the level specified, the Contractor shall be required to determine and correct the problems, including repair or replacement of equipment, at no cost to the Department. The Contractor shall respond with a

qualified technical representative on site to determine and correct any problems within 24 hours following notification by the Engineer. The central control tests shall resume upon correction of the problem. In the event a malfunction is the result of equipment not installed by the Contractor (e.g., power service, etc.), the central control tests will be suspended until these problems are corrected by others.

7.0 Daytime Tests

7.1 All central control and monitoring equipment shall be tested from the ConnDOT Newington Highway Operations Center facility during daytime hours. The Contractor shall contact the Engineer to arrange and coordinate the testing procedure. The tests shall include, but not be limited to the following:

- Operation of all newly installed camera assemblies from the central controller, exercising the pan, tilt, zoom, focus, presets, iris opening and all other functions and features described herein this specification while observing the video picture on the local monitor.

- Display of each camera on a designated video monitor to verify proper operation and picture quality from each camera.

7.2 The Contractor shall correct any operational problems encountered with the video camera system during this test.

8.0 Nighttime Tests

8.1 A second central control test shall be performed during the hours of darkness to verify proper operation of the auto iris lenses, shutter control and the absence of video signal noise. This test shall be conducted in the presence of the Engineer or his designated representative at the Highway Operations Center. The test shall include the following as a minimum:

- Operation of all newly installed camera assemblies from the central controller, exercising the pan, tilt, zoom, focus, presets, iris opening and shutter control functions while observing the video picture on the local monitor.

- Display of each camera on a designated video monitor to observe both the brightest and darkest scenes available from each camera location.

8.2 The Contractor shall correct any operational problems encountered with the video camera system during this test.

9.0 Additional Tests

9.1 Upon successful completion of the installation test and approval by the Engineer, a 30-day System Operational Test for each TMSC site shall commence. During the course of this test, the system must function continuously in accordance with the specifications for the duration of the test. If a malfunction occurs within the stated time frame, the Contractor shall make all necessary repairs to the system and re-establish proper operation. Upon approval of the Engineer, the 30-day test will begin anew. The system must operate for a full thirty (30) consecutive days without malfunction before the system will be accepted by the Engineer. The Contractor shall refer to "Notice To Contractor – 30 Day System Operational Test" for additional testing requirements. The Contractor shall coordinate the 30-day System Operational Test with other pertinent items in this contract.

10.0 Warranty

10.1 All equipment supplied under these items shall be warranted for parts by the manufacturer against defects and failures, which may occur through normal use for a period of one (1) year from the date of installation. A copy of the warranty shall be presented to the Engineer before installation of the equipment.

Method of Measurement: The work to be measured for payment under this item shall be the number of Camera Assemblies of the type specified, installed, completed, tested and accepted.

Basis of Payment: This work shall be paid for at the contract unit price for each "Camera Assembly" of the type specified, which price shall include all equipment including camera, lens, dome pan-tilt mechanism, enclosures, receiver/drivers, local camera controller, power supply, spare camera equipment, interconnect wiring, mountings, cabling and connectors, testing, testing equipment and all labor, materials, tools, equipment, transportation, storage and other incidentals necessary to complete the work.

Pay Item	Pay Unit
Camera Assembly	ea.

ITEM #1112217A - CAMERA LOWERING DEVICE ASSEMBLY – TYPE B

Description:

Work under this item shall consist of furnishing and installing a camera lowering system on a steel pole of the height specified on the plans. The camera lowering device and camera pole shall be fabricated in accordance with the details shown on the plans, in accordance with these specifications and as ordered by the Engineer and shall be mounted on a prepared foundation.

Materials:

The camera lowering system shall be designed to support and lower a simultaneous Dual analog and IP closed circuit television camera, lens, housing, PTZ mechanism, cabling, connectors and other supporting field components without damage or causing degradation of camera operations. The lowering system shall consist of a 70' camera pole, suspension contact unit, divided support arm, and a pole adapter for attachment to a pole top tenon, conduit mount adapter, pole top junction box, and camera connection box. **The construction of the camera lowering device shall be the [MG]² Model CLDMG2-HYPIP+7**

CAMERA POLE

The pole may be round or may have 16 or more sides. It shall be of the diameter specified on the plans. If a multi-sided pole is chosen, the distance between outside faces of parallel sides shall be the same dimension as the specified outside diameter of the round pole. Both shall be tapered from top to bottom as shown on the plans.

The pole, base plate, top plate, tenon, tenon plate and handhole frames and covers shall be made of steel with minimum yield strength of 36,000 psi. All steel pole sections shall be of the same grade. The yield strengths of the plates welded to the pole at the top and bottom may be different than the yield strength of the pole.

Charpy V-notch sampling is required for the pole and base plate regardless of material thickness. The testing shall conform to AASHTO T 266 (ASTM E23). The minimum energy absorbed shall be as follows:

- 15 ft-lb at +40 degrees F for steel with a specified yield strength of 50 ksi and lower
- 15 ft-lb at -20 degrees F for steel with a specified yield strength greater than 50 ksi and equal to or less than 70 ksi

High strength bolts shall conform to ASTM F3125 Grade A325. Nuts shall conform to ASTM A563-DH, zinc coated or ASTM A194, Grade 2H, zinc coated as specified in ASTM F3125 Grade A325. Washers shall conform to ASTM F436, zinc coated. Compressible washer-type direct tension indicators may be used and shall conform to ASTM F959 Type 325.

Stainless steel bolts shall conform to ASTM A193, series 300.

Chain for connecting the handhole cover to the handhole shall be stainless steel of sufficient strength to support the weight of the cover.

Where "Silicone Joint Sealant" is specified on the plans, a primer will also be required for proper adhesion of the joint sealant to the steel. The following Primer and Silicone Joint Sealant or approved equals shall be used:

> Dow Corning 1200 Prime Coat and Dow Corning 790 Silicone Building Sealant, manufactured by the Dow Corning Corporation, Midland, Michigan 48686-0994.

All steel components shall be completely hot-dip galvanized, after fabrication, in accordance with AASHTO M111 (ASTM A123) and AASHTO M232 (ASTM A153) as applicable.

Mechanical galvanizing of bolts shall conform to ASTM B695, Class 50.

Zinc-rich field primer for touch up shall conform to the requirements of ASTM A780. The use of aerosol spray cans will not be permitted. The color of the primer shall match the color of the galvanized surface as nearly as possible. Areas that do not match shall be recoated with the correct color primer at no additional expense to the State. Aluminum paint will not be allowed.

Closed cell elastomer for sealing handhole covers and for sealing the space between the foundation and base plate shall conform to ASTM D1056, Grade 2A2 or 2A3 and shall have a pressure-sensitive adhesive backing on one side for adhesion to steel. Closed cell elastomer contained within the anchor bolt pattern shall not interfere with the anchor rod leveling nuts and shall not block the opening in the base plate.

Certified test reports and Material Certificates will be required in accordance with Article 1.03.07 for hot-dip galvanizing to specify galvanizing has been tested and performed in accordance with AASHTO M111 (ASTM A123). Certified test reports and Material Certificates will be required for all structural steel components.

Tenon Design Requirements:

The Contractor is responsible for the design and details of the tenon and tenon plate at the top of the camera pole, the connection of the tenon plate to the pole top plate and all connections and openings required to attach and operate the lowering device. He shall coordinate the design of the tenon and tenon plate with Section - 2 Camera Lowering Device Assembly, of this specification. Dimensions and details shown on the plans are for the purpose of establishing a detailing concept for the connection of the tenon plate to the pole.

The design and fabrication of the tenon and tenon plate, shall conform to the requirements of AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals – 2001 (Fourth Edition), including the latest interim specifications. The Contractor shall incorporate the following information into the design:

- The design wind speed shall be 120 mph. The computation of wind pressures in accordance with Appendix C is not permitted.
- The minimum design life shall be 50 years.
- The structure shall be designed for fatigue category I and for the wind load effects due to natural wind gusts. Vibration mitigation devices are not permitted.
- The minimum thickness of the pole tenon shall be ¼".
- The minimum thickness of the tenon plate shall be 3/8".

Shop Drawings:
Prior to fabrication, the Contractor shall submit shop drawings to the Engineer for review in accordance with Article 1.05.02. Drawings shall be submitted for each camera pole to be installed. **Data for multiple sites may not be presented in a table and submitted along with "typical" details.** An identifier for each pole is noted on Site Plans or Location Plans and shall be used to identify each set of drawings and computations.

Shop drawings shall be submitted on 11" x 17" (Ledger/Tabloid) sheets with an appropriate border and title block. Procedures and other supporting data shall be submitted on 8 ½" x 11" (Letter) sheets. Electronic submissions of portable document files (.pdf) are acceptable.

Deviations from any criteria noted on the plans or in this specification will not be considered for approval unless a request for change is submitted in writing to the District Engineer. Requests for change should be submitted and approved before preparing shop drawings. The request should include a reason for the proposed change. Shop drawings that do not conform to the contract plans and special provisions and prepared without written permission for the change may be rejected. Such a rejection gives no cause for a delay claim.

The shop drawings for each site shall contain the following information:

- The project number, town and camera pole identification number or Site Number
- Overall pole height and height of each pole section
- Cross sectional shape of pole (round or specify number of sides)
- Outside distance between parallel faces and width of flats at the top and bottom of each pole section (if member is multi-sided)
- Inside bend radius at angle points, if multi-sided member
- Wall thickness of each pole section
- Connection of pole to base plate (fillet welded socket connection or full penetration groove weld with a continuously welded backer bar). The following criteria shall be addressed:
    - The fabricator shall cut inside the specified opening in the base plate and grind to match the outside dimension of the pole.
    - The separation between the base plate and the pole within the socket shall not exceed 1/16" in order to assure sufficient fillet weld as specified in AWS D1.1, Section 5.22, "Tolerance of Joint Dimensions."

- Groove welds at the base of poles less than 5/16" thick shall be ultrasonically tested in accordance with AWS D1.1, Annex K, as specified in Article 6.20.1. A 5/16" thick wall thickness may be substituted at no extra charge to avoid the need to use Annex K for full penetration weld inspection procedures
- Details and location(s) of the longitudinal seam welds in the pole, including designation of the penetration depth of the welds at the pole ends and within the length of the pole
- Welding process, electrodes, weld designations and non-destructive testing requirements
- Length of slip type field splice
- Diameter or distance across flats at the top and bottom of each pole section. Adequate tolerance should be allowed for the thickness of galvanizing, so the slip type field splice is adequate.
- Details of reinforced handholes and covers and their location on the pole (both vertical and angular orientation)
- Locations and diameters of holes in the pole wall for traffic flow monitor cables
- Tie-offs, grounding lug hole and other attachments
- Base plate details, including length, width and thickness, as well as anchor rod holes and other openings.
- A plan view of the pole and base plate showing the orientation of the anchor rod holes in relation to the hand hole at the base of the pole
- Pole top plate details, including length, width and thickness, as well as bolt holes and other openings
- Tenon and tenon plate, including length, width and thickness of tenon plate, as well as tie-offs, bolt holes and other openings. Coordinate dimensions with the manufacturer of the lowering device
- A copy of camera lowering device assembly support arm and pole connection details (to show compatibility with tenon)
- Material specifications for all components
- Minimum Charpy impact values for the steel pole and base plate
- Fabrication details of all components, including method of fabrication, when applicable
- Galvanizing requirements

Working Drawings:
Prior to fabrication, the Contractor shall submit erection drawings to the Engineer for review in accordance with Article 1.05.02. An individual set of drawings shall be prepared for each height camera pole.

Working drawings shall be submitted on 11" x 17" (Ledger/Tabloid) sheets with an appropriate border and title block. Design computations, procedures and other supporting data shall be submitted on 8 ½" x 11" (Letter) sheets.

The working drawings and design computations shall be sealed by a Professional Engineer, licensed 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 the work. Please note that each working drawing must be sealed.

Erection drawings shall include the following:

- The project number, town and camera pole identification number
- Overall pole height and location of slip type field splice
- Pole installation and erection procedure, including
  - lifting weight
  - crane size and placement
  - location where pole will be assembled
  - method of pulling pole sections together
  - proposed sequence of conduit and cable installation in pole, cable tie-off, etc.
  - method of lifting pole (including strongbacks, if required)
  - method of securing the base during tilt-up
  - proposed orientation of arm and handhole relative to traffic
  - method of turning pole to the proposed orientation
  - placement of elastomeric seal inside anchor rod circle
  - method of positioning leveling nuts in preparation for setting the pole (include minimum and maximum clear space between leveling nuts and foundation)
  - anchor rod and nut lubrication requirements
  - anchor rod nut tightening sequence, including degree of tightening

Bolting pole sections together to secure them during erection and lifting holes in the steel pole will not be permitted and may be cause for rejection of the pole. A suggested pole erection sequence is included in the camera pole plans.

CAMERA LOWERING DEVICE ASSEMBLY

The lowering system shall consist of a suspension contact unit, divided support arm, and a pole adapter for attachment to a pole top tenon, conduit mount adapter, pole top junction box, and camera connection box. **The construction of the camera lowering device shall be the [MG]² Model CLDMG2-HYP**IP+7

The divided support arm and receiver brackets shall be designed to self-align the contact unit with the pole centerline during installation and ensure that the contact unit cannot twist under design wind conditions.

Round support arms are not acceptable.

The camera lowering device shall be designed in accordance with AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals – 2009 (Fifth Edition), including the latest interim specifications.

The lowering device manufacturer shall furnish independent laboratory testing documents certifying adherence to the stated wind force criteria identified in the CAMERA POLE section below utilizing, as a minimum, the effective projected area (EPA), the actual EPA or an EPA greater than that of the camera system to be attached.

The camera lowering device to be furnished shall be the product of the manufacturers with a minimum of two (2) years of experience in the successful manufacturing of such systems. The lowering device provider shall be able to identify a minimum of three (3) previous projects where the proposed system has been installed successfully for over a one-year period of time each.

Suspension Contact Unit

The suspension contact unit shall have a load capacity 600 lbs. with a 4 to 1 safety factor.

There shall be a locking mechanism between the fixed and moveable components of the lowering device. The movable assembly shall have a minimum of 2 latches. This latching mechanism shall securely hold the device and its mounted equipment. The latching mechanism shall operate by alternately raising and lowering the assembly using a winch and lowering cable. When latched, all weight shall be removed from the lowering cable. The fixed unit shall have a heavy duty cast tracking guide and means to allow latching in the same position each time. The contact unit housing shall be weatherproof with a gasket provided to seal the interior from dust and moisture.

The prefabricated components of the lift unit support system shall be designed to preclude the lifting cable from contacting the power or video cabling. The lowering device manufacturer shall provide a conduit mount adapter for housing the lowering cable. This adapter shall have an interface to allow the connection of a contractor-provided 1.25 inch PVC conduit and be located just below the cable stop block at the back of the lowering device. The Contractor shall supply and install the internal conduit in the pole as required by the Engineer and/or lowering device provider. **The only cable permitted to move within the pole or lowering device during lowering or raising shall be the stainless steel lowering cable. All other cables must remain stable and secure during lowering and raising operations.**

The female and male socket contact halves of the connector block shall be made of a UL94, V-0 rated thermosetting synthetic rubber. The female barrel contacts and the male pin contacts shall be permanently and integrally encased in this rubber material to ensure optimum protection from moisture and the environment.

All current carrying male pin and female socket/barrel contacts shall be Gold-plated per ASTM B-488 over Nickel plated CA 360 per QQ-N-290m.

The DUAL Analog/Ethernet configuration contact connector shall include:

(7) specifically designed Male contacts sized a minimum of 0.125 inches while the female contacts shall be at least 0.125 inches I.D. at the contact area. All (7) contacts shall be soldered to #18/1 UL lead wire and affixed with numbered tags. Two of these wires shall be equipped with a factory installed BNC connector for video transmission/connection from the CCTV.

(13) specifically designed Male contacts sized a minimum of 0.09 inches while the female contacts shall be at least 0.09 inches I.D. at the contact area. Eight of the thirteen contacts shall be soldered to CAT5e Wire end terminated with an RJ45-Male connector. Five of the thirteen contacts shall be soldered to #18/1 UL lead wire and affixed with numbered tags, which may be used for additional camera requirements including but not limited to power, control, alarms or grounds.

All current carrying male pin and female socket/barrel contacts shall be Gold-plated per ASTM B-488 over Nickel plated CA 360 per QQ-N-290m. Each individual female barrel contact shall have a Nickel plated CA 360 sleeve which prevents foreign matter from entering the contact area as well as preclude the possibility of the leaves of the female contact from opening beyond allowable limits and ensure a snug fit around the respective male pins. There shall be at least one contact that is positioned in a manner which will allow it to make first and break last providing optimum grounding performance.

All soldering shall be per IPC J STD-001E. Each individual contact shall be rated for up to 600v and 7A but de-rated according to the wire used in the application. For optimum weatherproofing, each male shall be self-wiping with a shoulder at the base of each male contact so that it will recess into the female block, thereby giving a rain-tight seal to each individual contact when mated. Further, the wire leads from both the male and female rubber contact blocks shall be permanently and integrally molded in the synthetic rubber body. The facility manufacturing the electrical contact connector must comply with Mil Spec Q-9858 and Mil Spec I-45208.

Spare Equipment

A minimum of one spare camera lowering device assembly with camera pole shall be supplied

The spare camera lowering device assembly and pole shall be the same manufacturer and model provided for the camera lowering device assembly installed within the project limits.

The spare camera lowering device assembly shall include all necessary materials including but not limited to camera lowering device, pole top, camera junction box, cables, pole, etc. to provide a complete working lowering device assembly.

The spare camera lowering device assembly and pole shall be delivered to State Stores 660 Brook St. Rocky Hill, CT. Hours for the DOT Stores is between 8:00 AM and 3:00 PM, Monday through Friday. The Contractor shall contact Mr. Fred Connors, Assist. Fiscal Administrative Officer, at 860-258-1980 at least 48 hours prior to delivery.

<u>Camera Junction Box</u>

The camera junction box shall be of two piece clamshell design with one hinge side and one latch side to facilitate easy opening. The general shape of the box shall be cylindrical to

minimize the EPA. The Camera Junction Box shall be cast aluminum with stabilizing weights on the outside of the box to increase room on the interior. The box shall be capable of having up to 40 pounds of stabilizing weights. The bottom of the Camera Junction Box shall be drilled and tapped with a 1-1/2" NPT thread to accept industry standard dome housings and be able to be modified to accept a wide variety of other camera mountings. The junction box shall be gasketed to prevent water intrusion. The bottom of the box shall incorporate a screened and vented hole to allow airflow and reduce internal condensation. If utilizing a CCTV dome housing, it must be furnished from the camera factory with an epoxy sealed connection flange at the point of connection of the dome to the CLD junction box to ensure that there is no moisture migration from the CLD junction box into the dome.

Pulleys

All pulleys for the camera lowering device and portable lowering tool shall have sealed, self-lubricated bearings, oil tight bronze bearings, or sintered bronze bushings.

Cables and Connectors

The lowering cable shall be a minimum 1/8" diameter stainless steel aircraft cable with a minimum breaking strength of 1740 pounds with (7) strands of #19 wire each.

All electrical and video coaxial connections between the fixed and lowerable portion of the contact block shall be protected from exposure to the weather by a waterproof seal to prevent degradation of the electrical contacts. The electrical connections between the fixed and movable lowering device components shall be designed to conduct high frequency data bits and one (1) volt peak-to-peak video signals as well as the power requirements for operation of dome environmental controls.

The Power/Signal cable provided by the contractor/camera provider per the requirements of the camera shall be in the lengths as noted on the plans for each camera site. See Item No. 1112210A Camera Assembly for requirements pertaining to the camera power/signal cables. Further, the power signal cable shall be delivered to the lowering device manufacturer and prewired to the lowering device at the lowering device manufacturer prior to arrival at the jobsite. The coaxial video connection for the CCTV Camera shall be made from twisted pair to BNC with a manufactured off-the-shelf connector.

Other Materials

The interface and locking components shall be made of stainless steel and or aluminum. All external components of the lowering device shall be made of corrosion resistant materials, powder coated, galvanized, or otherwise protected from the environment by industry-accepted coatings to withstand exposure to a corrosive environment.

The Camera Manufacturer shall provide weights and /or counterweights as necessary to assure that the alignment of pins and connectors are proper for the camera support to be raised into position without binding. The lowering unit will have sufficient weight to disengage the camera and its control components in order that it can be lowered properly.

The Camera Manufacturer shall provide the power and signal connectors for attachment to the bare leads in the camera junction box.

The Camera Manufacturer shall provide a mounting flange sufficient for mounting their respective camera assembly to a standard 1.5 inch NPT female, or other suitable method approved by the Engineer, at the bottom of the Camera connection box.

Lowering Tool

The camera-lowering device shall be operated by use of a portable lowering tool. The tool shall consist of a lightweight metal frame and winch assembly with cable as described herein, a quick release cable connector, an adjustable safety clutch and a variable speed industrial duty electric drill motor.

This tool shall be compatible with accessing the support cable through the hand hole of the camera pole. The lowering tool shall attach to the pole with one single bolt. The tool will support itself and the load assuring lowering operations and provide a means to prevent freewheeling when loaded.

The lowering tool shall have a reduction gear to reduce the manual effort required to operate the lifting handle to raise and lower a capacity load. The lowering tool shall be equipped with a positive locking mechanism to secure the cable reel during raising and lowering operations. The lowering tool shall be provided with an adapter for operating the lowering device by a portable drill using a clutch mechanism.

The lowering tool should be capable of lowering and raising the camera assembly for a 70’ pole within a five-minute time period.

Construction Methods:

CAMERA POLE

The Contractor is responsible for reviewing the site conditions at each pole location as soon as possible. He shall immediately notify the Engineer of concerns such as conflicts with overhead utilities, trees, the presence of drainage swales, buried facilities, etc. that could make installation undesirable, extremely difficult or even impossible.

Pole Fabrication

A maximum of one telescopic, slip-type field splice is permitted in the pole. The minimum length of this splice shall be 1.5 times the inside diameter of the exposed end of the female section.

Poles shall be fabricated in accordance with the dimensions and tolerances listed in ASTM A595. Each pole will be inspected for straightness at the fabrication shop and again upon delivery to the site where it will be installed. Deviations from the allowable tolerance are cause for rejection.

The pole top plate shall have slotted holes that allow field adjustment of the arm/camera orientation up to 360 degrees. A tenon shall be welded to a separate tenon plate - NOT to the pole top plate. The tenon plate shall be bolted to the pole top plate. The tenon shall have standard size mounting holes as shown on the plans for the mounting of the camera-lowering device assembly. The tenon shall be of dimensions necessary to facilitate camera lowering device component installation. A slot in the tenon shall be parallel to the pole centerline as shown on the plans for mounting the lowering device.

Traffic appurtenances shall be located and mounted on the pole as shown on the Traffic Flow Monitor (TFM) plans. A ½" diameter hole shall be located on the traffic side of the pole 12" above the detector, whose height is noted on the TFM plans. A rubber grommet shall be installed in the hole to protect the wire from chafing and to prevent moisture from entering.

A handhole of the size detailed on the plans shall be placed at the level of the ½" diameter TFM monitor cable hole facing away from oncoming traffic.

Handhole Requirements:

- The camera pole shall have handholes that are detailed and located as shown on the plans.
- The handhole shall be provided with a cover connected to the frame with stainless steel bolts.
- A neoprene gasket shall be adhered to the inside of the handhole cover such that the gasket makes contact with the frame and seals the opening against intrusion of water.
- The cover shall be attached to the frame with stainless steel bolts as shown on the plans. Coupling nuts shall be welded to the inside face of the handhole frame to receive the handhole cover bolts. The cover shall be trial-fitted in the shop before being galvanized. All bolts shall be threaded into the coupling nuts simultaneously and the cover shall fit tightly to the handhole frame with the elastomeric seal in place.
- A stainless steel chain shall connect the handhole cover and the handhole frame.
- The handhole frame shall accommodate a winch-anchoring bolt to secure the lowering device attachment. A drilled and tapped hole is specified on the plans. The female threads shall be re-tapped after galvanizing, if necessary, for compatibility with the bolt.
- The exposed edges of the handhole shall be ground smooth and rounded by grinding.

Welding Requirements:

All welding shall conform to the following requirements:

- Department Welding Inspector shall be present during welding. At no time will welding of the pole and base plate and welding of the handhold frame to the pole be permitted without oversight by the Department Welding Inspector.
- AWS D1.1 Structural Welding Code - Steel as supplemented by Section 12 of AASHTO/ANSI/AWS D1.5 Bridge Welding Code.
- The pole members may be fabricated with no more than 2 longitudinal seam welds.

- The longitudinal seam welds for the pole members shall have 60% minimum penetration, except longitudinal seam welds within 6" of the member ends shall be complete joint penetration groove welds. At the slip-type splice, the longitudinal seam welds on the female section of telescopic splices shall be complete penetration groove welds for a length equal to 1.5 times the inside diameter of the exposed end of the female section plus 6".
- A minimum of 25% of the partial joint penetration seam welds and 100% of the complete joint penetration seam welds shall be non-destructively tested.
- Partial joint penetration seam welds shall be non-destructively tested in accordance with the magnetic particle method.
- Complete joint penetration seam welds shall be non-destructively tested in accordance with the ultrasonic method.
- Poles: the pole-to-transverse base plate connection may be made with a fillet welded socket connection with two fillet welds or a complete joint penetration groove weld with a backing ring attached to the plate with a continuous fillet weld.
- If a complete joint penetration groove weld is chosen for tube walls less than 5/16" thick, ultrasonic testing of the weld shall be performed in accordance with Annex K of AWS D1.1, as specified in Article 6.20.1.
- 100% of complete joint penetration groove welds shall be non-destructively tested by the ultrasonic method.
- 100% of fillet welds shall be non-destructively tested by the magnetic particle method.
- The joint between the backing ring and tubular member shall be sealed with silicone sealant at the top of the backing ring.

All welding, drilling of holes and any other fabrication practices that would damage the galvanized coating shall be completed prior to galvanizing the post.

After the post has been completely fabricated, welds ground smooth, flux and spatter removed, they shall be hot-dip galvanized in accordance with AASHTO M111 (ASTM A123). All pieces shall be galvanized in a single dip. Double-dipping will not be accepted.

All damaged areas of the galvanizing shall be properly prepared and touched-up. "Damaged" does not include mishandling or deliberate welding or drilling. Such deliberate destruction of the galvanized finish may be cause for rejection of the member. Damaged zinc shall be touched-up in accordance with ASTM A780. Spray aerosol cans of zinc rich primer will not be permitted. Zinc paint shall match the color of the galvanizing as nearly as possible. The Engineer may order additional touch-up if he deems it appropriate. Aluminum paint will not be permitted.

Fabricated materials shall be packed with sufficient dunnage and padding to protect finished surfaces. Poles shall be stored in a manner that does not dent or permanently bend the wall of the pole or permanently bend the pole along its axis.

Pole Installation

See the camera pole drawings for a suggested erection procedure. The Contractor is fully responsible for developing a workable erection procedure.

The Contractor is responsible for the proper orientation of the camera pole and arm. The station and offset of the pole shall be as shown on the CCTV\TFM plans or as directed by the Engineer.

The camera pole shall be electrically grounded by attaching one end of a bare copper grounding conductor to the ½" ground tap using an exothermic weld. The rigid metal conduit shall be electrically grounded by passing the ground conductor through an insulated bonding bushing attached to the conduit. The conductor shall terminate at the ground lug connection at the handhole.

Ensure that the handhole covers are securely installed before leaving the pole unattended.

In the void between the top of the concrete foundation and underside of the base plate a ring of closed cell elastomer shall be placed to seal the opening in the base plate completely. Closed cell elastomer shall fit inside the anchor bolts, but allow clearance for tightening. The elastomer shall be compressed approximately 10% to 20% when the base plate is in its final position.

The following installation procedure is critical to preventing fatigue failure of the anchor rods with UNC threads:

1. The anchor rod double leveling nuts shall be pre-set to expose as few threads as possible below the nuts, while forming a level line in all directions across the top of the top leveling nuts. A sufficient number of threads should be exposed below the leveling nuts to allow the nuts to be adjusted when plumbing the installed pole. The installation will be considered unacceptable if 1 ½" or more of threads are exposed below the bottom nut.
2. The anchor rod leveling nuts and washers shall be in full contact with the bottom surface of the base plate when the centerline of the pole is plumb.
3. Once the leveling nuts have all been brought into full contact with the bottom of the base plate, the nuts above the base plate may be tightened to snug-tight. Snug tight is equivalent to the full effort of a workman on a 12" wrench.
4. The nuts shall then be turned an additional one-third turn beyond snug-tight.
5. The leveling nuts shall be retightened to ensure that full contact has been made.
6. Bring all double nuts in contact with the tightened nuts and turn until snug-tight.

Note: Nut rotation is relative to the anchor rod. The tolerance is plus 20 degrees.

The camera lowering device assembly shall be installed according to the manufacturer's specifications. The camera will be installed after the pole has been erected. To facilitate the camera installation, lower the control cable to the ground, attach the camera and raise it into position.

CAMERA LOWERING DEVICE ASSEMBLY

The Contractor shall install the lowering device and pole on the span pole foundation in the location(s) as shown on the plans.

The Contractor shall utilize an authorized representative from the lowering device manufacturer to assist with the assembly and testing of the first lowering system onto the pole assembly. The manufacturer shall furnish the Engineer documentation certifying that the electrical contractor has been instructed on the installation, operation and safety features of the lowering device. The contractor shall be responsible for providing applicable maintenance personnel “on site" operational instructions.

The Contractor shall install two (2) - 1.25 inch PVC conduits inside the camera pole between the tenon assembly and camera pole handhole. One conduit will be installed to contain the stainless steel aircraft lowering device control cable. The second conduit will be used to contain the twisted pair camera control, category 6 cable, and coax video cable. The camera control cable shall be contained inside of the 1.25 inch PVC conduit and the camera coax video cable shall be secured with plastic cable ties to the outside the PVC conduit. The TFM communication cable shall not be contained inside a PVC conduit.

The Contractor shall be responsible for installing and coordinating the CCTV and TFM cables between the lowering device and the pole installation per the manufacturer’s recommendations. All Contractor personnel involved in terminating communication cables for the above listed items shall meet or exceed the above referenced installation qualifications and shall be approved by the Office of Highway Operations. See the special provision “Notice to Contractor – Installation Qualifications”.

The Contractor shall contact the Engineer prior to installation of each lowering device assembly to determine the appropriate pole top tenon angle to use for optimum camera visibility. The Contractor shall then adjust the angle of the lowering device and pole top tenon as required.

The Contractor shall connect all power, video and data cables as required to fully operate the lowering device and camera assembly.

The camera lowering device assembly shall be mounted on the Camera Pole as dictated by the camera lowering device installation manual and the onsite representative. The lowering device assembly components, wiring and cabling shall be tested for proper signal continuity prior to installation of the pole on the foundation supports and anchor bolts.

Upon completion of the pole installation on the foundation, the unit shall be tested with a replica of the actual CCTV unit for the lowering device system functionality. The system shall be tested in the presence of the manufacturer’s representative and Engineer.

Method of Measurement:

This work will be measured for payment by the number of camera lowering device and steel camera pole assemblies of the height specified, furnished, installed, tested, completed and accepted in place.

Basis of Payment:

This work will be paid for at the contract unit price each for "Camera Lowering Device Assembly – Type B", complete in place, which price includes the steel camera pole, tenon, base plate and all attachments, camera lowering device assembly, PVC conduit, suspension contact unit, pulleys, cables, connectors, lowering tool, spare equipment, and all equipment, materials, coordination, design, fabrication, tools, labor testing, manufacturer representation and incidentals thereto.

Anchor rods, nuts, and washers and anchor plates will be included for payment in the item "Traffic Control Foundation Span Pole – (Type _)." The foundation type shall be as indicated on the plans.

Pay Item	Pay Unit
Camera Lowering Device Assembly – Type B	ea.

ITEM #1112241A - FIBER OPTIC CABLE SPLICE ENCLOSURE

Description:

This Item shall consist of furnishing and installing splice enclosures to interconnect optical fibers between two or more fiber optic cable segments.

Materials:

A. Applicable Publications

1. Publications listed below form a part of these specifications to the extent referenced. The publications are referred to in the text by basic designation. All Fiber Optic Communication System hardware shall be compliant with the following specifications: Electronics Industries Association (EIA):

   a. TIA-526-3-89 Fiber Optic Terminal Equipment Receiver Sensitivity and Maximum Receiver Input.
   b. TIA-455-32A-90/Fiber Optic Circuit Discontinuity.
   c. EIA-310-C Racks, Panels, and Associated Equipment.
   d. EIA-359-A Colors for Color Identification and Coding.
   e. EIA-TIA-455-A Standard Test Procedures for Fiber Optic Fibers, Cable Transducer Sensors, Connecting and Terminating Devices and Other Fiber Optic Components.
   f. EIA-455-6B Cable Retention Test Procedure for Fiber Optic Cable Interconnecting Devices.
   g. TIA/EIA–598–A Optical Fiber Cable Color Coding.

B. Fiber Optic Splice Enclosure

1. The Splice Enclosures shall accommodate from a minimum of 72 to 168 fiber splices. Each splice enclosure shall have a splice tray organizer capable of holding a minimum of 12 to 18 splice trays. The organizer shall provide access to and removal of individual splice trays and permit selective splicing to allow one or more fibers to be cut and spliced to branch cable(s) without disrupting other fibers.

2. The Contractor shall install Splice Enclosures of a capacity that they are capable of handling of 36 fibers more than the current fiber count at any given splice location as shown on the Drawings.

3. The Splice Enclosure shall fit within the space allocated for it as shown on the plans and to operate within the environment in which it is to be installed.

4. The Splice Enclosure shall protect the fiber optic cable splices from mechanical damage, shall provide strain relief for the cable, and shall be resistant to salt corrosion. The enclosure shall be waterproof and airtight, and shall be manufactured of non-corroding materials.

5. The Splice Enclosure shall be designed for a temperature range of -30° C (-22° F) to +70° C (158° F). The splice enclosure shall be capable of performing in a cable vault or pull box, environment where total and continuous submersion in water is to be expected.

6. All materials in the enclosures shall be non-reactive and shall not support galvanic cell action. The outer enclosure shall be compatible with the other enclosure components, splice trays, and cables. The end plate shall consist of two sections and shall have the capacity for a minimum of two cable entries on each end.

7. All Splice Enclosures shall employ re-usable sealing materials allowing multiple re-entrances without replacing any component. Access to the splice enclosures shall be accomplished without the use of special tools or devices. The splice enclosure shall employ a latching mechanism for entrance to the internal components of the enclosure.

8. All environmentally exposed components of the Splice Enclosures shall be UV light resistant.

9. All splice trays shall be lined to provide a contrasting a contrasting background for splicing colored fibers or as approved by the Engineer. The splice trays shall include clear snap-on covers and tie wraps to secure the buffer or transport tubes to the tray. The splice trays shall be of adequate size to prevent induced attenuation due to fiber bending.

10. Each splice tray shall be capable of accommodating a minimum of 12 fusion splices for the single mode fiber cable of the type selected.

11. The splice tray shall have features that retain the fiber loops and control the bend radius. The splice tray cover shall be clear plastic to allow for inspection of the fibers without opening the tray.

12. Vinyl markers shall be supplied to identify each fiber to be spliced within the enclosure. Each splice shall be individually mounted and mechanically protected on the splice tray.

C. Cable Racking Hardware

1. Cable racking hardware shall be made of a high performance polymer: Each splice enclosure shall be supported in the pullbox by a medium duty rack capable of supporting a minimum load of 100 lbs (445 N). Racks shall not be less than 6 inches (150mm) in length. Medium duty racks shall have 4 inch (100mm) arms minimum. At splice points, the pullbox shall have a horizontal rack capable of supporting, and holding securely in place, a splice closure.

D. Warranty

1. All equipment supplied for this shall be warranted for parts by the vendor against defects and failures, which may occur through normal use for a period of one (1) year from the date of installation. A copy of the warranty must be presented to the Engineer before installation of the equipment.

Construction Methods:

A. Installation

1. Splice Enclosures shall be installed as shown in the Drawings or as directed by the Engineer. Unless otherwise specified, outdoor type Splice Enclosures shall be installed within vaults or pull boxes located adjacent to CCTV cameras and at fiber optic cable reel-end splice locations as shown on the Drawings.

2. The installations shall include all required components including sealing kits, cable racking hardware and mounting hardware to achieve an environmentally secure permanent installation.

3. The Contractor shall supply all materials, tools, equipment and labor including but not limited to fan out kits, connectors, trays, splice enclosures, and any other incidentals necessary to complete the installation of the fiber optic cable splice enclosure.

4. The Splice Enclosure shall be secured to the interior of the cavity of the vault or pullbox on cable racking hardware using tie-wraps.

5. The Outdoor Splice Enclosure shall be mounted in such position to allow the cable to enter and exit the enclosure without exceeding the cables minimum bending radius. Sufficient cable shall be coiled in the vault or pull box to allow the Splice Enclosure to be removed from the vault for current and future splicing and cable repairs. The Contractor shall install mounting hardware within the pullbox or splice location to support the splice enclosure and the splice enclosure shall be securely fastened in place. In no cases shall the splice Enclosure be allowed to rest on the bottom of the pullbox or vault.

6. After the splice trays are placed inside the enclosure, the enclosure shall be sealed using a procedure recommended by the manufacturer that will provide a waterproof environment for the splices. Encapsulant shall be used to ensure water resistance. The individual fibers shall be looped one full turn within the Splice Enclosure to avoid micro bending.

7. Care shall be taken at the cable entry points to ensure a tight salt resistant and waterproof seal is made which will not leak upon aging. It is acceptable to have multiple cables enter the fiber optic cable Splice Enclosure through one port as long as all spaces between the cables are adequately sealed.

8. All splices shall be protected with a thermal shrink sleeve and shall be labeled in the splice tray with permanent vinyl markers. Butt ends shall also be labeled to identify the destination of the fiber.

9. The splices shall be fabricated using modern, high quality fusion type splicing equipment. All splicing equipment shall be in good working order, properly calibrated, and meeting all industry standards and safety regulations. Cable preparation, Enclosure installation, and splicing shall be accomplished in accordance with accepted and approved industry standards.

10. Optical fibers shall be spliced as noted on the plans using the fusion type and the maximum splice loss shall not exceed 0.10 dB per splice in each direction. The Contractor shall test all splices for signal loss.

11. Each splice shall be tested for tensile strength by applying a force of not less than 7 oz. (200 grams).

12. All splices shall be arranged neatly in splice trays, supported and protected with a suitable splice protector.

13. Only the fibers required to be spliced to Drop Cables at the CCTV Camera and Mini-Hub locations shall be severed and spliced. Where required, the buffer tube splitting tool recommended by the manufacturer shall be used to open the correct buffer tube. Unsevered fibers in an open buffer tube shall be coiled in the splice tray. When buffer tubes do not need to be opened, at least 4.0 m of unopened buffer tubes shall be coiled in the fiber optic Splice Enclosure.

14. Drop cable entrances to the splice enclosures shall adhere to the manufacturer's recommendations for the type of cable.

15. In order to reduce the overall number of splices required, the cable shall be installed in the maximum continuous reel length provided by the manufacturer, or as shown on the plans, or as approved by the Engineer. Factory splices will not

be permitted. Prior to ordering the fiber optic cable, the Contractor shall be required to submit a detailed cable layout plan showing the proposed reel lengths and splice points.

16. Fiber identification shall be in accordance with the tables and schedules provided in the Contract Drawings.

17. Upon completion of the splicing operation, all waste material shall be deposited in suitable containers, removed from the job site, and disposed of in an environmentally acceptable manner.

B. Submittals

1. Submit:

a. Functional block diagrams, cable diagrams, and point to point cabling details.
b. Product data, installation manuals, materials, system configuration options and features, and accessories.
c. Shop Drawings shall be completely dimensioned and shall indicate the intended installation method and details.
d. Specifications for all assemblies and subassemblies (eg. High Density Frames, Splice Housings, Connector Panels, Underground Splice Enclosures and associated Splice Trays).
e. Installation and maintenance manuals for all equipment.

C. Testing

1. Testing shall be performed to demonstrate that all furnished and installed equipment complies with the requirements of each item, and shall be conducted using Manufacturer recommended procedures, materials and test equipment.

D. Delivery, Storage, and Handling

1. The Contractor shall deliver, store, handle and install all materials and equipment in such a manner as not to degrade quality, serviceability or appearance.

2. The Contractor shall be responsible for storage of the materials and equipment prior to installation in a clean, dry location free from construction dust, precipitation and excess moisture.
3. Contractor shall be required to replace any damaged materials and equipment, as determined by the Engineer, at no additional cost to the owner.

Method of Measurement:

Work under these items shall be measured for payment by the actual number of "Fiber Optic Cable Splice Enclosures" of the type specified, installed, tested, operating and accepted in place.

Basis of Payment:

The work to be done under this item shall be paid at the Contract Price each for "Fiber Optic Cable Splice Enclosure" which price shall include all materials, hardware, termination panels, labor, cables, connectors, tools, equipment and incidentals necessary to complete this work.

The Contractor shall note that the required racking in the pullboxes and the vaults is included in the splice enclosure item.

Pay Item	Pay Unit
Fiber Optic Cable Splice Enclosure	ea.

ITEM #1112252A - EQUIPMENT OPERATIONS (ESTIMATED COST)

Description:

The purpose of this item is to provide the necessary services required to maintain the Incident Management System (IMS) equipment existing and newly installed, operating to the manufacturer's specifications, so as to provide a means to monitor, detect and manage incidents as they occur on the highway. The work included in this item for the existing IMS equipment will commence upon receiving the Notice to Proceed for this contract. The work included in this item for newly installed IMS equipment will commence upon completion of the 30 Day Operational Test.

Materials:

All materials utilized to maintain and repair the Incident Management System (IMS) shall be in conformance with the specifications of this project or shall be in conformance with the specifications of the Procurement Contract, or as recommended by the manufacturer. The existing or newly installed IMS equipment shall include but not be limited to the operation of the CCTV Cameras, Traffic Management System Cabinets (TMSC), Traffic Flow Monitors (TFM) and Variable Message Signs (VMS).

The Contractor shall provide all the cables, connectors, tools, replacement equipment and labor necessary to successfully maintain the equipment.

The Contractor shall be able to use replacement parts available from the State of Connecticut inventory in order to expedite the repair process. As soon as possible and to the State's satisfaction, the Contractor shall provide replacement equipment to be re-entered into the State's inventory.

The Contractor shall provide documentation certifying the manufacturer's repair or replacement of the spare equipment upon return of the equipment to the Department.

Construction Methods:

Certification:
The Contractor shall provide the State with evidence satisfactory to the State that they fully understand the purpose for which the equipment is intended and they are qualified and capable of fulfilling all provisions of this item. The Contractor as well as individual personnel performing this work shall be certified by all manufacturers of the equipment to be maintained as being capable of maintaining the equipment and also capable of obtaining and installing the necessary spare parts to keep the system on-line. The Contractor, prior to the commencement of the start of the equipment operations, shall be required to submit training certificates for all of the pertinent equipment.

Response Time:

The Contractor shall service and maintain the newly installed IMS equipment at the conclusion of the 30 Day Operational Test for each installation and the existing IMS equipment from the contract Notice to Proceed as allowed by the Engineer. All IMS equipment shall be serviced and maintained on a twenty-four (24) hour a day, seven days a week basis. The Contractor shall provide a suitable means of communication between them and the Highway Operations Center (HOC). This shall include a twenty-four (24) hour telephone number, an email address for emergency purposes and an email address for daily communications and log activities. Repairs shall commence not more than 8 hours after notification and shall be completed within 24 hours of notification.

The Contractor shall keep a neat and accurate log book of all the malfunctions reported with the date and time that the information was received and the nature of the problem. The log book shall be submitted to the Engineer monthly or upon request by the Engineer. The Contractor shall include in the log book the time that each unit is checked for proper operation, the condition of each unit checked, and the date and time each unit was restored to proper operation or replaced.

Work performed under this item shall conform to the latest National Electrical Code standards, local electrical codes, and Department of Transportation installation requirements. The Contractor shall conform to these requirements as specified herein.

Any IMS equipment that has been damaged through the Contractors own actions shall be repaired and/or replaced by the Contractor at no cost to the State.

Method of Measurement:

This item shall be measured for payment as provided under Article 1.09.04 – Extra and Cost Plus Work.

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

Basis of Payment:

This work will be paid on a cost-plus basis according to Article 1.09.04 – Extra and Cost Plus Work. Warranties in effect for newly installed equipment associated with CCTV Cameras, Traffic Management System Cabinets (TMSC), Traffic Flow Monitors (TFM) and Variable Message Signs (VMS) operation shall be honored by the suppliers of the equipment. Contractor or sub-contractor will be responsible for securing warranted equipment and installation. There will be no payment for materials included under a manufacturers warrantee. Labor costs only will be reimbursed on a cost plus basis.

If warranties have expired, any equipment and labor that must be repaired will be paid on a cost plus basis.

Pay Item	Pay Unit
Equipment Operations (Estimated Cost)	est.

ITEM #1113059A - TRAFFIC FLOW MONITOR

Description:

This special provision covers the requirements for the installation, calibration, and testing of the Traffic Flow Monitors (TFM) at the locations shown on the plans. The components shall include:

1. Detector unit and Enclosure

2. Traffic Flow monitor manufacturer approved fully regulated Power Supply to be installed in the Traffic Management System Cabinet or Traffic Management System Mini-hub Cabinet to supply power to a minimum of two Traffic Flow Monitors.

3. Traffic Flow monitor manufacturer approved external Serial to Ethernet converter

4. Cable between the detector unit and the adjacent traffic management system cabinet (TMSC) or traffic management system mini-hub cabinet (TMSMHC), including the cables and connectors necessary at the locations where an auxiliary connection cabinet is specified.

5. Supporting bracket and banding for the TFM unit.

6. Pole-mounted Auxiliary Detector connection cabinet provided and installed when a traffic flow monitor is installed on opposite side of highway from the camera or (TMSC) or when a dedicated TFM pole is installed.

7. All other miscellaneous hardware required for the installation of the TFM

8. Menu Driven Windows 7 compatible or greater Set-up Software

The TFM will be used for traffic flow monitoring within the project limits. The TFM will be mounted on steel poles/sign structures as shown on the plans.

The Traffic Flow Monitor shall be a true presence microwave radar detector which can provide presence, volume, lane occupancy and speed information for a minimum of twelve discreet zones. The detector shall meet the following minimum performance specifications without being affected by wind, rain, snow, fog or needing to be recalibrated over time:

- Per direction volume accuracy 95%
- Per lane volume accuracy 90%
- Per direction average speed accuracy + or – 5 MPH
- Per lane average speed accuracy + or – 10 MPH
- Per direction occupancy accuracy + or – 10%
- Per lane occupancy accuracy + or – 20%
- Detectable area 6 – 250 feet with detection over barriers.

The flow monitor shall operate thru a Frequency Modulated Continuous Wave Operation. The flow monitor shall be able to detect stationary vehicles within the beam path. Flow monitors that utilize the "Doppler Effect" for detection will not be accepted. The flow monitor shall detect the presence of vehicles in 2 foot wide or less radial range slices in the path of the microwave beam. The Traffic Flow Monitor shall be capable of being installed in either a side-mounted or a forward-looking configuration.

The mean time between failures (MTBF) of the unit in its operating environment shall be 90000 hours (10 years) or greater.

Materials:

Dual radar traffic flow monitor with minimum Radar Operating frequency 24 GHz with a 245 MHz Bandwidth

The approximate size of the unit shall be 13.2 x 10.6 x 6 in or smaller and the approximate weight shall be 4.2 pounds or less. The enclosure shall be rugged and shall meet the requirements of NEMA-4X and IP-65 or better. The enclosure shall be sealed to protect the unit from wind, dust and airborne particles, and exposure to moisture. The operating limits of the unit shall be as follows:

Operating temperature Range:-37 to 74° C or better for all equipment including regulated power supply and serial to Ethernet converter.

Humidity: Up to 95% Relative Humidity

Wind: Winds up to 90 mph

The performance of the unit shall not be degraded by wind, precipitation, snow, or dust. The Traffic Flow Monitor shall not require cleaning and shall maintain performance ratings over a wide range of ambient temperature changes without needing to be recalibrated.

The unit shall operate within a range of 12-24V AC or DC. The unit shall contain a sensor that will shut down the unit if the maximum peak voltage is exceeded. The maximum power consumption for the individual unit shall be approximately 8.1 watts. The unit shall be capable of automatically recovering from power failure within 5 seconds.

An AC regulated power supply with fuse and surge suppression shall be provided for each traffic flow monitor and installed on the wiring panel assembly in the (TMSC) or (TMSMHC). The AC supply output shall provide the required operating voltage to the traffic flow monitor, and conform to the temperature range noted above. The output of the power supply must be able to power a minimum of two or more traffic flow monitors. The Contractor shall consider the voltage drop of the TFM cable wiring when determining the type and size of power cable provided for use. At sites that require more than one (1) traffic flow monitor, a single regulated

power supply that can power the required number of traffic flow monitors may be substituted as long as the proper amperage and operating voltage is obtained at the TFM unit.

The interface at the unit consists of a single MS connector which provides power to the unit and two serial communication lines for central communication and interface setup/testing. Central communications shall be RS-485/Ethernet and the setup/testing interface shall be RS-232. The TFM shall be optically isolated that will protect the internal circuits against surges of up to 6KV. Data format of the serial port shall be standard binary NRZ 8 bits data, 1 stop bit, no parity which will be used for field setup only. An optional external serial to 10/100 Base-T Ethernet port must be supplied with the unit for communication back to the operations center. The Ethernet port shall support TCP, UDP, IP, ARP, ICMP, and Ethernet MAC protocols. The transmission speed for the TCP/IP interface shall be 1200bps to 115Kbps. The Serial to Ethernet converter communication must be fully compatible with our existing Advanced Traffic Management Software (CRESCENT).

Bracket: The mounting assembly shall be Aluminum or stainless steel and shall support a minimum load of 15 pounds. The bracket support shall be aluminum or stainless steel material supplied by the manufacturer of the detector unit. The bracket shall allow limited freedom of rotation on three axes.

The brackets shall be attached with manufacturer approved ¾ inch wide, .025 inch (0.6mm) thick, stainless steel bands or to a concrete wall/bridge using 2 stainless steel expansion bolts of sufficient length and diameter to support 100 pounds.

Cables:The power and RS-232/422/485 communication cable between the flow monitor and the camera hub cabinet shall consist of multiple twisted pairs of stranded AWG #22 to #12 wires with a common shield rated at 300V with a temperature rating of 105° C (Belden #9516 or approved equal) and shall be UV-resistant. The contractor will be responsible for determining and supplying the proper power cable size for the TFM and remote media converter based upon the distance from the TMSC or TMSMHC to the remote cabinet and the wattage of the traffic flow monitor.

If required the auxiliary detector cabinet shall be NEMA 4-X rated, weather resistant, and shall allow the entrance of the necessary cables. The cabinet shall be constructed of aluminum, and be constructed in accordance with the Department's Functional Specifications for Traffic Signal Equipment. The minimum dimensions of the cabinet shall be as follows: 406mm (16 inches) wide, 460 mm (18 inches) high, and 200 mm (8 inches) deep. The cabinet shall include a hinged door with a corbin style locking mechanism. The lock shall be CONN 2 keyed. A catalog cut of the proposed detector cabinet shall be included in the shop drawing submittal for this item.

The detector must be able to communicate using the EIS RTMS X2/X3 protocol. The detector must be able to support a 30 second polled mode operation. The detector must report actual speeds of zero values in instances where no vehicles pass in front of the detector during a polling period. The RTMS X2/X3 protocol must be compatible with our ATMS central software (Crescent).

Construction Methods:

Installation of the Traffic Flow monitor consists of the following steps:

1. If needed the Contractor shall calculate the required AC power wire size required for installation in the traffic management system/mini-hub cabinet if distances exceed 100feet from the power supply to the detector. A copy of the calculations and selected wire size shall be recorded and supplied to the Engineer for review. It is the Contractor's responsibility to ensure that the proper operating voltage is provided to the traffic flow monitor unit.

2. Secure mounting bracket to the pole or other designated location (bolts or banding supplies required) facing the required detection zones as shown on the site plans with the mount pointed downwards according to the manufacturers setup instructions. Refer to the manufacturer's installation height/setback charts for proper mounting height on the pole. Straps should be left adjustable before final tightening for possible fine-tune adjustments.

3. Aim the unit according to the manufacturer's installation manual. Apply silicon dielectric compound into the electrical connector at the base of the sensor.

4. Install the cable from the unit to the cabinet.

5. Connect the cable supplying power and delivering the Flow monitor outputs. Twist the outer ring of the MS connector clockwise until it locks.

6. Installation of the power supply, cabling and connectors within the (TMSC) or (TMSMHC). The Contractor shall properly connect the power and data communications surge suppression devices (supplied as part of the cabinet item) to the traffic flow monitor cables.

7. Measurement and recording of the operating voltage measured at the traffic flow monitor unit. Verify that the operating voltage is within the manufacturer's specified range.

8. Installation of the auxiliary detector cabinet (where required)

9. Connect a PC, at either the cabinet or the auxiliary detection cabinet, and perform set-up as recommended by the manufacturer.

The MS connector pins must be crimped to the cable conductors, assembled, and tested prior to installation and pulling of cable on-site. Pins must be crimped, not soldered, onto the cable conductors. Cable strain relief measures should be provided as recommended by manufacturer. The manufacturer shall provide a standard RS-232 5 m cable for set-up purposes, which shall include power leads, a DB9 RS-232 connector, and an RJ45 Ethernet Port.

Connections at the TMSC or TMSMHC with no Auxiliary Detector Cabinet:

The RS-232 test and setup cable will be installed inside the TMSC or TMSMHC; the contractor will loop the cable within the enclosure and tie up so that the cable is not touching the bottom of the cabinet. The secondary RS-485 communications cable shall be attached to the external serial to Ethernet converter in the TMSC or TMSMHC. The RJ 45 Category 6 cable from the serial to Ethernet converter will then be patched into the Ethernet port sharing device or 10/100 Ethernet switch.

The Contractor shall be required to provide a serial interface for the new TFM to the existing Hull Speed Port Sharing Device in the existing/relocated TMSC.

Connections at the Auxiliary Detector Cabinet:

At the locations where an auxiliary detector cabinet is to be installed, the Contractor will loop the RS-232 test cable within the enclosure and tie up so that the cable is not touching the bottom of the cabinet. The secondary RS-485 communications shall be connected to a manufacturer approved surge arrestor within the Auxiliary Detector cabinet. The secondary RS-485 shall then be installed into the TMSC or TMSMHC and connect to the external serial to Ethernet converter. The serial to Ethernet converter shall connect into the Ethernet port sharing device or 10/100 Ethernet switch.

Cables shall be installed neatly between adjoining equipment and shall be secured to rigid structures using appropriate fastening devices. Cable and connectors shall not be stressed during or after installation. A written procedure for cable preparation and connectorization shall be provided to the Engineer for approval. Manufacturer descriptions of all equipment required to do the work shall be included. The ITS integrator will be required to make all communication terminations for this item.

The Contractor will be responsible for setting up the Traffic Flow Monitor Unit at the various locations. **The manufacturer will be available and will conduct on-site visits as necessary to provide technical expertise.** The approved ITS integrator will be responsible for calibrating and setting up the units to detect the required number of lanes as shown on the site plans. The ITS integrator will perform the set-up process at all of the locations and have the unit configured to detect vehicles in the specified lanes.

Anchor bolts for conduit supports and bracket supports shall be drilled and anchored into sound concrete only. The anchorage system shall be installed per the manufacturer's recommendations. If existing reinforcement is encountered during drilling, the hole shall be abandoned, filled with non-shrink grout and relocated as directed by the Engineer. After installation of the supports, tighten all chemical anchor bolts to the torque as recommended by the anchorage system manufacturer.

The TFM units shall be calibrated upon installation to provide accurate volume, speed and occupancy traffic data using software provided by the manufacturer. The Contractor shall provide a laptop computer for calibration and testing. The configurations at each site shall be

saved and provided to the Department for future use. The filenames used at the various sites shall be in a format agreeable to the Department.

The Contractor shall have the manufacturer's representatives on-site to oversee the installation, testing and calibration of the TFM to ensure all manufacturer requirements are satisfied.

Testing:

The Contractor shall carry out proof of performance testing to ensure that the TFM units provide adequate quality of the traffic data. The contractor shall submit test procedures detailing the methodology of the test activities to be performed. Two copies of the test procedure shall be submitted to the Department for review and approval three weeks prior to commencing testing.

The Contractor is required to perform manual validation of traffic volumes and traffic speeds for 100% of TFM units installed under this contract. The validation shall include two 15 minute periods performed during peak and off-peak periods. The Contractor shall document the test results in accordance with the quality control test procedures and submit the results to the Department. The Department's representatives will witness the validation testing.

Upon successful completion of the installation test and approval by the Engineer, a 30-day System Operational Test for each TMSMHC site shall commence. During the course of this test, the system must function continuously in accordance with the specifications for the duration of the test. If a malfunction occurs within the stated time frame, the Contractor shall make all necessary repairs to the system and re-establish proper operation. Upon approval of the Engineer, the 30-day test will begin anew. The system must operate for a full thirty (30) consecutive days without malfunction before the system will be accepted by the Engineer. The Contractor shall refer to "Notice To Contractor – 30 Day System Operational Test" for additional testing requirements. The Contractor shall coordinate the 30-day System Operational Test with other pertinent items in this contract.

Spare Equipment:

As part of this item the Contractor shall supply two (2) spare Traffic flow monitor assemblies and all associated cabling, mounting brackets, power supplies, cabling, and surge arrestors.

Warranty:

The manufacturer shall warranty the product to be free from defects in material and workmanship for a period of two years from the date of acceptance. The manufacturer shall also warranty the operation of the firmware and software provided with the units.

Method of Measurement:

This item will be measured for payment by the actual number of complete Traffic Flow Monitor units installed, configured, and accepted.

Basis of Payment:

This work will be paid for at the contract unit price each for "Traffic Flow Monitor" complete-in-place, which price shall include all materials, and all equipment, tools, labor and work incidental thereto. The price shall also include all necessary auxiliary detector cabinets, brackets, power supplies, spare equipment, all power and communication cabling and connectors. This price shall also include furnishing, set-up, installing, warranty, and testing of the traffic flow monitor.

Pay Item	Pay Unit
Traffic Flow Monitor	ea.

ITEM #1113604A - OPTICAL FIBER CABLE – SINGLE MODE LOOSE BUFFER TUBE CABLE, 6 FIBER

ITEM #1113621A - OPTICAL FIBER CABLE – SINGLE MODE LOOSE BUFFER TUBE CABLE, 72 FIBER

Description:

This Item specifies the requirements for furnishing, installing in conduit, splicing, and terminating fiber optic cables. As part of this item, the Contractor shall install a pull tape in all innerducts within the contract limits of work, as necessary to install the fiber optic cable and future fiber optic cable.

Materials:

A. General

1. The fiber optic cable supplied in this project shall be certified by the manufacturer to use 100% corning glass in order to be completely compatible with the existing fiber cable supplied under Project 63-548/42-288. The cable shall be compatible with Fitel/Lucent single jacket loose tube fiber optic cable with DryBlock Core. The Contractor shall provide proof of compatibility to the Department with the appropriate shop drawings and catalog cut submittals.

2. Outdoor fiber optic cable shall be installed in conduit, spliced as required and terminated in Camera-Hub Cabinets and Mini-Hub Cabinets, as shown on the Drawings.

3. Plenum-rated indoor fiber optic cable shall be installed inside the State Transportation Building within existing conduits, spliced as required and terminated at the fiber optic patch panel, as shown on the Drawings.

4. The fiber optic cable, splices, connectors and interconnect panels shall meet all requirements stated in this Specification.

5. All optical fiber cables used in this project shall be from the same manufacturer. That manufacturer shall be regularly engaged in the production of fiber optic cables. Each optical fiber cable for this project shall be dielectric, loose tube, duct-type.

B. Applicable Publications

1. Publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation. All Fiber Optic Communication System hardware shall be compliant with the following specifications:

   Electronics Industries Association (EIA):

   a. EIA-310-C Racks, Panels, and Associated Equipment.
   b. EIA-359-A Colors for Color Identification and Coding.
   c. EIA-422-A Electrical Characteristics of Balanced Voltage Digital Interface Circuits.
   d. EIA-TIA-455-A Standard Test Procedures for Fiber Optic Fibers, Cable Transducer Sensors, Connecting and Terminating Devices and Other Fiber Optic Components.
   e. EIA-455-6B Cable Retention Test Procedure for Fiber Optic Cable Interconnecting Devices.
   f. EIA-485 Standard for Electrical Characteristics of Generators and Receivers for use in Balanced Digital Multipoint Systems.
   g. TIA/EIA-598-A Optical Fiber Cable Color Coding.

2. USDA Rural Utilities Service (RUS) 7 CFR 1755.900.

3. ANSI/ICEA Standard for Fiber Optic Outside Plant Communications Cable, ANSI/ICEA S-87-640-1992.

4. UL-listed OFNR

5. CSA-listed FT-4

C. Outdoor Fiber Optic Cable Requirements

1. The cable shall be an accepted product of the United States Department of Agriculture Rural Utilities Service (RUS) 7 CFR 1755.900 and meet the requirements of the ANSI-ICEA Standard for Fiber Optic Outside Plant Communications Cable, ANSI/ICEA S-87-640-1992.

2. The Outdoor Fiber Optic Cable shall be stranded loose tube cable with the required number of fibers as shown in the Contract Drawings. The buffer tubes shall contain 12 fibers per tube unless otherwise noted in the Contract.

3. The Contractor shall provide manufacturer's documentation certifying that the Outdoor Fiber Optic Cable complies with the following performance requirements:

a. When tested in accordance with FOTP-3, "Procedure to Measure Temperature Cycling Effects on Optical Fibers, Optical Cable, and Other Passive Fiber Optic Components," the change in attenuation at extreme operational temperatures -40°F and +158°F (-40°C and +70°C) shall not exceed 0.2 dB/km at 1550 nm for single-mode fiber.

b. When tested in accordance with FOTP-82, "Fluid Penetration Test for Fluid-Blocked Fiber Optic Cable." a one meter length of unaged cable shall withstand a one meter static head or equivalent continuous pressure of water for cable end.

c. When tested in accordance with FOTP-81, "Compound Flow (Drip) Test for Filled Fiber Optic Cable", the cable shall exhibit no flow (drip or leak) of filling and/or flooding material at 149°F (65°C).

d. When tested in accordance with FOTP-41, "Compressive Loading Resistance of Fiber Optic Cables," the cable shall withstand a minimum compressive load of 220 N/cm (125 lbf/in) applied uniformly over the length of the sample. The load shall be applied at the rate of 1/10 in to ¾ in (3 mm to 20 mm) per minute and maintained for ten minutes. The change in attenuation shall not exceed 0.4 dB during loading and 0.2 dB after loading at 1550 nm for single-mode fiber.

e. When tested in accordance with FOTP-104, "Fiber Optic Cable Cyclic Flexing Test," the cable shall withstand 25 mechanical flexing cycles around a sheave diameter not greater than 20 times the cable diameter. The change in attenuation shall not exceed 0.1 dB at 1550 nm for single-mode fiber.

f. When tested in accordance with FOTP-25, "Repeated Impact Testing of Fiber Optic Cables and Cable Assemblies," the cable shall withstand 25 impact cycles. The change in attenuation shall not exceed 0.2 dB at 1550 nm for single-mode fiber.

g. When tested in accordance with FOTP-33, "Fiber Optic Cable Tensile Loading and Bending Test," using a maximum mandrel and sheave diameter of 22 in (560 mm), the cable shall withstand a tensile load of 608 lbf (2700 N). The change in attenuation shall not exceed 0.2 dB during loading and 0.1 dB after loading at 1550 nm for single-mode fiber.

h. When tested in accordance with FOTP-85, "Fiber Optic Cable Twist Test," a length of cable no greater than 13 feet (4 meters) shall withstand 10 cycles of mechanical twisting. The change in attenuation shall not exceed 0.1 dB at 1550 nm for single-mode fiber.

i. When tested in accordance with FOTP-181, "Lightning Damage Susceptibility Test for Optic Cables with Metallic Components," the cable shall withstand a

simulated lightning strike with a peak value of the current pulse equal to 105 kA without loss of fiber continuity. A damped oscillatory test current shall be used with a maximum time-to-peak value of 15 μs (which corresponds to a minimum frequency of 16.7 kHz) and a maximum frequency of 1800000 rpm (30 kHz). The time to half-value of the waveform envelope shall be from 40 - 70 μs.

j. When tested in accordance with FOTP-37, "Low or High Temperature Bend Test for Fiber Optic Cable", the cable shall withstand four full turns around a mandrel of ≤ 10 times the cable diameter for non-armored cables and ≤ 20 times the cable diameter for armored cables after conditioning for four hours at test temperatures of -22°F and +140°F (-30°C and +60°C). Neither the inner or outer surfaces of the jacket shall exhibit visible cracks, splits, tears or other openings. Optical continuity shall be maintained throughout the test.

4. All optical fibers, coatings, tubes, metals and jackets shall be free of roughness, porosity, blisters, splits and voids in accordance with good manufacturing practice.

5. The color coding and position of fibers / buffer tubes within the cable shall be in accordance with TIA/EIA–598-A “Optical Fiber Cable Color Coding”. Fibers shall be colored with ultraviolet curable ink. In buffer tubes containing multiple fibers, the colors shall be stable across the specified storage and operating temperature range and not subject to fading or smearing onto adjacent fibers or into the gel filing material. Color materials shall not cause fibers to stick together.

6. The buffer tubes shall be resistant to external forces and shall meet the buffer tube cold bend and shrinkback requirements of 7 CFR 1755.900.

7. The cable shall be suitable for operation over a temperature range of -22°F to +158°F (-30ºC to +70ºC) and shall be suitable for installation in outdoor ducts.

8. The cable shall provide mechanical support and protection for the specified number of fibers.

9. The central anti-buckling member shall consist of a dielectric, glass reinforced plastic (GRP) rod. The GRP rod shall be coated with a black colored thermoplastic when required to achieve dimensional sizing to accommodate buffer tubes/fillers.

10. All interstices within the cable outer jacket and within each buffer tube shall be filled with a compound to prevent the ingress and migration of water. The compound shall be a non-hygroscopic, non-nutritive to fungus, electrically non-conductive, homogeneous gel that is nontoxic and dermatologically safe. The gel shall be free from dirt and foreign matter. Some leakage of the compound is permitted, however, there shall be no bulk flow of compound out of the cable over the specified operating temperature range which could impact on the waterproofness of the cable. The gel shall be readily removable with conventional nontoxic solvents.

11. Buffer tubes shall be stranded around the dielectric central member using the reverse oscillation, or "S-Z", stranding process. Water blocking yarn(s) shall be applied longitudinally along the central member during stranding.

12. A water blocking tape shall be applied longitudinally around the outside of the stranded tubes/fillers. The tape shall be held in place by a single polyester binder yarn. The water blocking tape shall be non-nutritive to fungus and electrically non-conductive.

13. The cable shall be able to withstand a maximum pulling tension of 607lbf (2700 N) during installation without any resulting damage. Tensile strength shall be provided by dielectric yarns. The high tensile strength dielectric yarns shall be helically stranded evenly around the cable core.

14. The outer jacket of the cable shall be constructed of medium or high density polyethylene. The minimum nominal jacket thickness shall be 1/20 inch (1.4 mm). Jacketing material shall be applied directly over the tensile strength members and water blocking tape. The polyethylene shall contain carbon black to provide ultraviolet light protection and shall not promote the growth of fungus. MDPE jacket material shall be as defined by ASTM D1248, Type II, Class C and Grades J4, E7 and E8.

15. The cable shall contain at least one ripcord under the sheath (outer cable jacket) for easy sheath removal of all-dielectric cable.

16. The cable jacket shall be marked with manufacturer's name, sequential meter or foot markings, month, year or quarter year of manufacture, and a telecommunications handset symbol, as required by Section 350G of the National Electrical Safety Code. The actual length of the cable shall be within 1% of the length markings.

17. Materials used in the cable shall not produce hydrogen in a concentration large enough to cause any degradation in the transmission performance of the optical fibers.

18. Materials used in the cable shall not support galvanic action.

D. Single Mode Optical Fibers

1. The Single Mode fiber shall consist of a doped silica core surrounded by a concentric silica cladding. The fiber shall be matched clad design.

2. The dispersion un-shifted or dispersion flattened single mode fiber shall conform to the following specifications:

a. The Single Mode fiber core shall have a diameter of between 8.3 to 9 μm inclusive with a tolerance of ± 1.3 μm.

b. The Single Mode fiber cladding shall have an outer diameter of 125 μm with a tolerance of ±1.0 μm.

c. The core-to-cladding offset shall not be greater than 0.6 μm.

d. The cladding Non-Circularity shall not be greater than 1.0% defined as: (1- Minimum Cladding Diameter/Maximum Cladding Diameter) x 100

e. The Single Mode fiber shall be coated with a protective polymer to preserve the strength of the fiber. The coating shall be removable by mechanical or chemical means. The coating shall retain its color when subject to the manufacturer's recommended fiber cleaning and splicing preparation methods.

f. The SM fiber shall have attenuation and bandwidth specified at two wavelength windows.

i. The first wavelength window shall be at and around 1310 nm.
ii. The second wavelength window shall be at and around 1550 nm.

3. The mean optical attenuation at 1310 nm shall not be greater than 0.4 dB/km with a standard deviation not greater than 0.05 dB/km. The maximum attenuation of any continuous length of SM fiber at 1310 nm shall not exceed 0.45 dB/km.

4. The mean optical attenuation at 1550 nm shall not be greater than 0.3 dB/km with a standard deviation not greater than 0.06 dB/km. The maximum attenuation of any continuous length of SM fiber shall not exceed 0.36 dB/km.

5. The fiber attenuation shall not vary more than 0.2 dB/km over the specified cable operational temperature range.

6. The fiber optical bandwidth at 1310 nm or 1550 nm shall be equal to or greater than 1000 MHz-Km.

7. The zero dispersion wavelength shall be at a wavelength of 1310 ± 10 nm.

8. The maximum dispersion at 1550 nm shall not exceed 18 ps / (nm-km).

9. The maximum dispersion in the wavelength range of 1285 to 1330 nm shall not exceed 3.2 ps / (nm-km).

E. Fiber Optic Distribution Cable

1. This item consists of furnishing and installing optical fiber cables and connectors of the size and type specified at the locations shown on the Drawings or as indicated by the Engineer, in accordance with these Specifications.

2. The Contractor shall provide multiple fiber, stranded, loose tube cable with single mode fiber that shall be suitable for placement in an underground environment as shown in the Drawings.

3. The optical fiber capacity of the fiber optic distribution cables to be supplied and installed under this Contract will vary in capacity according to network topology and traffic requirements. The current minimum requirements are for distribution cable to be of the following capacities: 72 SM **Refer to Drawing**, Fiber Optic Cable Plant. (Note SM refers to the number of Single Mode fibers within a cable segment.)

4. The Contractor shall provide a manufacturer's certification that the offered cable complies with all optical and mechanical requirements set forth in this Specification. Any deviation of the offered cable from the specifications set forth herein shall be clearly noted in the Contractor's proposal.

5. All optical fiber distribution cable used on this project shall be from the same manufacturer. Each optical fiber cable shall be all dielectric, duct type, loose tube and shall conform to these Specifications.

F. Fiber Optic Drop Cables

1. Drop cables are used for connecting Traffic management system cabinets, Traffic management system Mini-Hub cabinets and Variable Message Sign (VMS) cabinets to the fiber optic distribution (trunk) cable or between cabinets.

2. The Drop Cable shall consist of single mode fibers housed in a protective jacket. The end of the fiber installed at the Traffic Management system cabinet, Traffic Management system Mini-Hub cabinet, or VMS cabinet shall be terminated in a patch panel. The other end of the drop cable shall be spliced into a fiber optic distribution cable at an underground Splice Closure within an adjacent pull box. When drop cables are run between two cabinets the cable shall be terminated in a patch panel at both ends.

3. For drop cables landing in each traffic management system cabinet, VMS cabinet or any Incident management system (IMS) cabinet with a fiber count of 12 or less, the contractor shall furnish a 19" rack mounted patch panel with six SC fiber connectors.

4. The exact number of Drop Cables at each Splice Closure shall be in accordance with the Contract. The Contractor shall employ the most efficient means of meeting the Drop Cable requirements, as approved by the Engineer.

5. The attenuation of Drop Cable after installation, not including the connector loss, shall not exceed 0.1 dB measured at 1310 nm and 1550 nm.

G. Fiber Optic Connectors

1. The ST connector shall have a ceramic ferrule with a nickel plated nut and body. SC connectors shall have a ceramic insert.

2. The connector shall be of the ST-type or SC-type and fully compatible with the fiber optic cable utilized and the mating jacks to which they will be attached.

3. The connector shall be compatible with an ultra physical contact (UPC) finish. All connectors shall be polished to a UPC finish such that the return loss per mated pair of connectors is at least 25 dB. The return loss when the connector is mated with previously installed connectors shall be at least 18 dB.

4. The connector mean loss shall not be greater than 0.2 dB with a standard deviation of not greater than 0.1 dB.

5. Index matching fluids or gels shall not be used.

6. The connector loss shall not vary more than 0.1 dB after 500 repeated matings.

7. The connector shall withstand an axial load of 30 lb (135 N).

8. The connectors shall be attached in accordance with the manufacturer's recommended materials, equipment and practices.

9. The connector shall be suitable for the intended environment and shall meet the following environmental conditions.

   a. Operating Temperature: -4°F to +122°F (-20 to +50o C)

   b. Storage Temperature: -22°F to +140°F (-30 to +60o C)

   c. The connector loss shall not vary more than 0.2 dB over the operating temperature range.

   d. Connectors shall be protected by a suitably installed waterproof protection cap.

H. Pull Tape

1. The poly-line installed to verify the integrity of the conduit system shall be ¼" (6 mm) polypropylene.

2. The detectable pull tape shall consist of a single 24 AWG copper wire with polyethylene or PVC jacket woven into the polyester tape. The pull tape shall be NEPTCO Part No. WP1250PDP1250P, or approved equal, for cable sizes of less than 97 fibers. NEPTCO Part No. WP1800PDP1800P, or approved equal, shall be used for cable size of 97-288 fibers.

3. The detectable pull tape shall have the following properties:
   - 1250 lb (5.56 kN) tensile strength
   - flat, not round, construction
   - printed foot markings
   - pre-lubricated for reduced pulling tension at start of cable pull
   - low susceptibility to absorption of moisture; moisture resistant

I. Fiber Optic Cable Fabrication

1. Packing and Shipment

a. The cable shall be supplied on reels. Top and bottom end of the cable shall be available for testing. Both ends of the cable shall be sealed to prevent ingress of moisture.

b. The optical cable shall be in one continuous length per reel with no factory splices in the fiber. Each reel shall be marked to indicate the direction the reel should be rolled to prevent loosening of the cable. Installation procedures and technical support shall be furnished upon request.

c. Each reel shall have the following information clearly labeled on it:

i. Customer
ii. Customer order number
iii. Reel number
iv. Destination
v. Ship date
vi. Manufactured date
vii. Manufacturer's name
viii. Cable code
ix. Length of cable

J. Warranty

1. All equipment supplied for this shall be warranted for parts and labor by the vendor certified by the manufacturer against defects and failures, which may occur through normal use for a minimum period of one (1) year from the date of installation. A copy of the warranty must be presented to the Engineer after installation of the cable and equipment.

K. Quality Assurance

1. The Contractor shall have a Quality Assurance Program in place.

2. A minimum of ten (10) year's experience in the design, manufacture, and testing of Fiber Optic Cable and Connectors is required. The cable and connectors shall be designed and manufactured according to world class quality standards. The manufacturer shall be ISO 9001 certified.

Construction Methods:

A. Submittals

1. Submit:

a. Functional block diagrams, cabling diagrams, and point to point cabling details, including locations of all distribution cable splice points (both drop cable splices and reel-end splices.
b. As built drawings including a cable route diagram indicating the actual cable route and "foot marks" for all interchanges, intersections, directional change points in the cable routing, and all termination points. The Contractor shall record these points during cable installation. Cable system "as-built" drawings showing the exact cable route shall be provided by the Contractor to ConnDOT. Information such as the location of slack cable and its quantity shall also be recorded in the cable route diagram.
c. Product data, manufacturer's test certifications, installation manuals, materials, system configuration options and features, and accessories.
d. Shop Drawings shall be completely dimensioned and shall indicate the intended installation method and details.
e. Specifications of cable, connectors, and fiber splice kits.
f. Operating and maintenance manuals for all equipment.
g. Vendor Optical Time Domain Reflectometer (OTDR) certification for each reel of fiber optic cable listing each specification compliant fiber by fiber color code and group color code.

B. Delivery, Storage, and Handling

1. The Contractor shall deliver, store, handle and install all materials and equipment in such a manner as not to degrade quality, serviceability or appearance.

2. The Contractor shall be responsible for storage of the materials and equipment prior to installation in a clean, dry location free from construction dust, precipitation and excess moisture.

3. Contractor shall be required to replace any damaged materials and equipment, as determined by the Engineer, at no additional cost to the owner.

4. Cable shall be transported to site using cable reel trailers.

5. Care shall be taken at all times to avoid scraping, denting, or otherwise damaging the cable before, during or after installation. Damaged cable shall be replaced by the Contractor without additional compensation.

6. Sufficient slack shall be pulled to allow cable cutting and connection to communications equipment.

C. Installation in Ducts

1. Cable shall be installed in innerduct, duct or conduit in the field in accordance with the Contract Drawings.

2. Fiber Optic Distribution Cable shall be installed in the lowest innerduct (relative to ground level). Where more than one cable is to be installed in a conduit, the mid-level innerduct shall be used, and the highest level innerduct shall be reserved.

3. The Contractor shall install pull tape in the existing innerducts as necessary to install the fiber optic cable. A 6.5 ft (2.0 m) length of pull tape shall be left coiled, tied, and accessible in each cabinet, vault, maintenance hole and junction box. The pull tape shall be installed according to manufacturer recommendations and shall be “free” and NOT helical about communications cables.

4. The Contractor shall install cables in innerducts consistently throughout the project; crossover of a cable from one innerduct to another is not allowed.

5. Duct ends shall have all rough ends smoothed to prevent scraping the cable.

6. Where cable will be installed directly in conduit with no innerduct, a stiff bristle brush shall be pulled through each section of duct before pulling cable.

7. The Contractor shall not exceed the manufacturer's recommended safe pulling tension and minimum bending radius during delivery and installation.

8. A manufacturer's recommended lubricant shall be applied to the cable to reduce friction between the cable and the duct.

9. A cable grip shall be attached to the cables so that no direct force is applied to the optical fiber. The cable grip shall have a ball bearing swivel to prevent the cable from twisting during pulling.

10. Cable rollers and feeders and winch cable blocks shall be used to guide the cable freely into the duct and at maintenance hole locations.

11. Mechanical aids and pulling cable or ropes shall be used as required.

12. The Contractor shall employ personnel at as many pull points as need be to achieve the longest continuous cable segment as possible to reduce the need for excessive main-line splices.

13. Personnel equipped with two-way radios shall be stationed at each maintenance hole, cabinet and communications vault at which the cable is to be pulled to observe and lubricate the cable.

14. Where mechanical pulling is required (i.e. all runs greater than 164 ft (50 m)), a dynamometer shall be used to record installation tension and a tension limiting device shall be used to prevent exceeding the maximum pulling tension as defined by the cable manufacturer. The maximum pulling tension shall be recorded for each run of cable. The cable shall be taken up at intermediate pulling points with an intermediate cable take-up device as approved by the Engineer to prevent over tension on the cable. Cable pulls shall be continuous and steady between pull points and shall not be interrupted until the entire run of cable has been pulled.

15. Trunk fiber cable segment lengths shall be the maximum tolerable length within the maximum pulling tension defined by the manufacturer. The number of trunk cable reel-end splices shall be minimized. The Contractor shall provide a plan to the Engineer showing the reel-end splice point locations following a field investigation of the conduit and shall not install cable until receiving the Engineer's approval of the reel-end splice location plan. The Contractor shall obtain the Engineer's approval for all required changes to the reel-end splice point location plans. Cable segments installed with reel-end splices not approved by the Engineer will be replaced by the Contractor at no additional cost to the Department.

16. The Contractor shall be responsible for ensuring the cable length is sufficient to allow for connection between the communication equipment and the splice enclosures including provision for slack, vertical runs, cable necessary for splicing, wastage and cable to allow for the removal of the splice enclosure for future splicing.

17. Drop Cables shall be of length suitably long to be connected to the rack mounted patch panel within the Traffic management system cabinet, VMS cabinet, or IMS cabinet. Sufficient slack shall be left at each end to allow removal of the rack mounted patch panel for relocation anywhere within the cabinet.

18. Drop Cable fibers in the Mini-Hub Cabinet shall be spliced to pig-tails in a rack-mounted patch panel/splice closure provided by others. Splicing shall be in accordance with the requirements specified elsewhere in these Specifications and as shown on the Drawings. All unused fibers shall be properly terminated in accordance with manufacturer recommendations.

19. All cable ends, connectors, and fiber optic jacks shall be protected from moisture ingress by using properly sealed caps.

20. Following installation of the cable in the ducts, all duct entrances at pedestals and cabinets shall be sealed with duct sealing compound to prevent the ingress of moisture, foreign materials, and rodents.

21. 20 feet (6 m) of cable going to and coming from each Splice Closure shall be coiled in the first pull box on each side of each closure. In addition, 50 feet (15 m) of cable shall be left coiled in the first pull box on each side of all surface mounted conduit systems.

22. Where trunk cable terminations are left “dead ended”, 100 feet (25 m) of cable shall be left coiled.

23. All coiled cables shall be securely fastened in place with a minimum of four galvanized steel conduit straps.

24. Fish line shall be installed in all communications ducts or conduits along with fiber optic communication cables. A 6ft. 6 in (2.0 m) length of fish line shall be left coiled, tied and accessible in each cabinet, vault, maintenance hole and junction box. The fish line shall be installed according to manufacturer specifications and shall be "free" and NOT helical about communications cables.

25. At intermediate pulling points, to prevent over tension on the cable, the cable shall be either taken up with an intermediate cable take up device as approved by the Engineer, or all excess cable shall be laid out on the ground in a figure eight configuration before subsequent installation.

26. Following installation in duct, a label shall be affixed to each cable end in a pull box or cable vault and the label shall contain the following information:

27. Customer order number
    x. Reel number

xi. Ship date
xii. Manufactured date
xiii. Manufacturer's name
xiv. Cable designation as shown on the Drawings
xv. Length of cable to next reel-end splice point
xvi. Location of other end of cable (reel-end splice point)
xvii. Cable test data

D. Splicing

1. Splicing of the cable shall only be permitted at splice closure or field fiber optic interconnect panel locations as indicated in the Drawings, unless authorized by the Engineer.

2. The Contractor shall prepare for splicing the designated fibers of the cable to the Drop Cables connecting the communications equipment located in the traffic management system cabinet and traffic management system minihub cabinet. Sufficient cable shall be coiled in the vault/cabinet to allow for consumption during the splicing and to permit the splice closure to be removed from the vault/cabinet for future splicing.

3. At least 3 feet of each fiber shall be stored in the splice trays. The Contractor shall further splice all additional fibers provided in order to meet the fiber requirements specified in the Contract and including any fibers provided which are additional to the Contract requirements.

E. Testing

1. Test Documentation

a. The Contractor shall be responsible for all testing and documentation required to establish approval and acceptance of this Item.

b. The Contractor shall submit test procedures and documented test results to the Engineer. The test procedures shall document the nature of test activities to be performed.

c. The test procedures shall be submitted to the Engineer prior to initiation of the testing. The procedures will be returned to the Contractor within two week indicating either “accepted” or “make corrections noted”. If corrections are required, the Contractor shall submit revisions within 1 week.

d. Four copies of the final test procedures shall be submitted to the Engineer prior to commencement of testing.

2. Pre-Installation Testing

a. Reels of cable shall be tested for attenuation prior to installation in ducts. The Contractor shall measure and record the attenuation of 100% of the total single mode fibers on each reel. Attenuation shall meet or exceed the specified performance requirements in accordance with the Contract.

b. The Contractor shall ensure that specifications for the fiber optic cable are met prior to installation.

3. Proof of Performance Testing

a. The Contractor shall measure the attenuation per kilometer of fiber in each length of cable after installation.

b. The Contractor shall measure the attenuation of a randomly selected minimum of 10% of the total single mode fibers, which will be connected to equipment.

c. All (100%) of optical fibers assigned to be spare or reserved shall be individually tested for optical attenuation.

d. The Contractor shall sequence the fibers which are to be measured after each pull, such that the same fibers are not measured on consecutive lengths.

e. The Contractor shall record the reel number from which the cable came, the identification of the fibers measured and the attenuation in dB/km of the fibers measured.

f. The Contractor shall measure and record the splice quality of each fusion splice performed. The Engineer shall be provided with access to interim results.

4. Optical Time Domain Reflectometer (OTDR) Testing

a. The Contractor shall perform single mode Fiber OTDR testing after each cable has been installed.

b. The Contractor shall provide the Engineer with information regarding OTDR test equipment make and model with the equipment calibration procedures and certification dates prior to conducting the test routine.

c. An OTDR shall be used for backscattered light measurements. The OTDR shall operate at a nominal wavelength of 1310 nm and 1550 nm and shall include all necessary hardware required to couple it with single mode fiber.

d. The backscatter light measurement of each single mode fiber and each single mode optical link shall be measured in both directions and at both 1310 nm and 1550 nm wavelengths. Each single mode optical link shall be defined as being the total length of interconnected single mode fibers and the splices which form a continuous end-to-end optical link.

e. The Contractor shall maintain a test result record of each single mode optical link and each single mode fiber by means of printer copy of the OTDR measured cable attenuation profile. All single mode optical links shall be identified in the test results by identifying the cabinet site and patch panel fiber at which the OTDR was connected.

f. The test results shall include the following measurements:

    i. Total length of the single mode link
    ii. Total attenuation of the single mode link
    iii. Attenuation of each splice in the link under test
    iv. Attenuation per kilometer of each interconnected fiber in the link under test
    v. Identification of each fiber including location, patch panel, and labeled fiber designator.

g. Attenuation shall be measured in decibels referencing optical power.

h. Each End to End single mode fiber shall be tested to meet the performance requirements in accordance with the Contract. Fiber strands failing this test shall be re-terminated and re-tested. A copy of the fiber test with identifiers shall be provided to the engineer. The test results shall include detailed information for each fiber and a summary cover sheet listing losses for each fiber tested at 1310 and 1550 nm.

Method of Measurement: Work under this item shall be measured for payment by the number of linear feet of Fiber Optic Cable furnished and installed, as specified and shown on the Drawings.

Basis of Payment: The work to be done under this item will be paid at the Contract unit price for each foot of the Fiber Optic Cable furnished and installed as described in this Specification. This work shall include all cable, connectors, rack mounted patch panels, equipment, splicing equipment, testing, materials and incidental items required to satisfy these Specifications.

PAY ITEMS	PAY UNIT
Optical Fiber Cable – SM, LB Tube Cable, 6 Fiber	l.f.
Optical Fiber Cable – SM, LB Tube Cable, 72 Fiber	l.f.

ITEM #1113814A - REMOVAL AND/OR RELOCATION OF EXISTING ATMS

Description:

This Item includes the work for removal and/or relocation of the existing ConnDOT Advanced Traffic Management System (ATMS) in the West Hartford segment of the I-84 Incident Management System.

The project equipment is identified on the Contract Drawings for the project, as originally installed. Plans in an electronic portable document format (.pdf) can be obtained from the Bureau of Highway Operations upon request.

> Project Number: 63-548- Hartford Area Incident Management System CCTV/ TFM and Communication System Installation

Materials:

There are no specific material requirements for the work under this item, as the work entails turn-off of the existing system and removal of equipment. If the use of any materials is required for the removals, then said equipment shall be in conformance with the Standard Specifications, Form 817 and these Special Provisions.

Construction Methods:

The removal of the ATMS shall not commence until the new system equipment is operational and accepted by the Department. Only after the Contractor has received written permission from the Department shall the ATMS be turned off and shall the removal of the existing equipment begin. The equipment shall only be removed within the limitations of operations specified herein these General Conditions, Prosecution and Progress, Notice to Contractor - Incident Management System – IMS Installation and Maintenance and Protection of Traffic special provisions.

The process for removing the system shall not interfere with any equipment and operation of the newly installed IMS system equipment. Existing IMS Equipment (CCTV/TMSC/TFM) shall not be removed until the proposed IMS Equipment (CCTV/TMSC/TFM) has been installed, operational and the Contractor has been authorized in writing to commence these removals. Each of the existing locations shown on the contract plans shall have the CCTV, TFM, structure and/or control cabinet removed and salvaged to ConnDOT. The foundations shall be demolished to 12” below grade and backfilled to 6 inches (150 mm) below finished grade. Top soil shall then be placed to 1 inch (25 mm) above finished grade, then fertilized and seeded. Fertilizing and seeding shall be in accordance with pertinent provisions of Section 9.50.

The Contractor shall submit a detailed schedule of the work under this item to the Engineer for review, including days required to remove equipment.

The Contractor shall implement appropriate and approved construction signing patterns in accordance with Maintenance and Protection of Traffic herein these special provisions and contract drawings.

Prior to completion of the work under this item, the Contractor shall solicit the Department for concurrence on the equipment removed.

The removal and/or relocation of the ATMS are identified on the plans and described in the special provision Notice to Contractor – IMS Installation shall include the following:

Existing Infrastructure	Removed Materials	Relocated Materials	Salvaged Materials
CCTV 84E-036	TFM	N/A	Camera Assembly and Camera Pole
CCTV 84W-037	TFM	TMSC	Camera Assembly and Camera Pole
CCTV 84E-038	TFM	N/A	Camera Assembly and Camera Pole

Removed Materials (Traffic Flow Monitor)
The Contractor shall contact Mr. Robert Kennedy (860-594-3458), Highway Operations at least 48 hours prior to the removal of the existing CCTV 84E-036, CCTV 84W-037, and CCTV 84E-038 Camera Pole to schedule the removal of the existing Traffic Flow Monitors and connected communications cable by others (Conn DOT maintenance contractor).

Relocated Materials (Traffic Management System Cabinet)
The Contractor shall relocate the existing TMSC for CCTV 84W-037 from its existing foundation onto a new Traffic Control Foundation Type IV Modified as identified on the plans. The relocation and final operation for CCTV 84W-037 TMSC shall be completed within one work day (8 hours).

Salvaged Materials (Camera Assembly and Camera Pole)
The Contractor shall set aside the removed Camera Assembly including communications cables and Camera Pole for ConnDOT to salvage.

Camera Assembly
The Contractor shall contact the ConnDOT Maintenance Contractor, John Lombardo from Semac Electric at 860-604-7546 to arrange pick-up of the salvaged Camera Assembly and Camera communications cables.

Camera Pole
The salvaged camera pole shall be delivered to State Stores 660 Brook St. Rocky Hill, CT. Hours for the DOT Stores is between 8:00 AM and 3:00 PM, Monday through Friday. The

Contractor shall contact Mr. Fred Connors, Assist. Fiscal Administrative Officer, at 860-258-1980 at least 48 hours prior to delivery.

Method of Measurement:

Work under this item shall not be measured for payment. A lump sum fee will be provided for the total removal work under this item, "Removal And/Or Relocation of Existing ATMS".

Basis of Payment:

The work to be done under this item shall be paid for at the Contract lump sum price for "Removal And/Or Relocation of Existing ATMS", which price shall include all materials, hardware, labor, transportation of removed materials, tools, equipment and incidentals necessary to complete this work. Cost shall also include all backfilling, grading, topsoil and seeding for restoration of areas where foundations are removed.

Pay Item	Pay Unit
Remove and/or Relocation of Existing ATMS	l.s.

ITEM #1118012A - REMOVAL AND/OR RELOCATION OF TRAFFIC SIGNAL EQUIPMENT

ITEM #1118014A - REMOVAL AND/OR RELOCATION OF TRAFFIC SIGNAL EQUIPMENT (SITE NO. 2)

Section 11.18: Replace the entire section with the following:

11.18.01 – Description:

Remove all abandoned traffic signal equipment. Restore the affected area. Where indicated on the plans remove and reinstall existing traffic signal equipment to the location(s) shown.

Lead paint is presumed present on the painted surface of all cabinets and structures located within project limits. Any activities performed by the contractor that results in a painted surface being impacted or altered, shall be performed in accordance OSHA Lead in Construction Standard 29CFR 1926.62, or the painted surface shall be tested prior to any paint being disturbed by a qualified third party hired by the contractor to confirm that no lead is present.

11.18.02 – Materials:

The related sections of the following specifications apply to all incidental and additional material required for the proper relocation of existing equipment and the restoration of any area affected by this work.

- Division III, "Materials Section" of the Standard Specifications.
- Current Supplemental Specifications to the Standard Specifications.
- Applicable Special Provisions to the Standard Specifications.
- Current Department of Transportation, Functional Specifications for Traffic Control Equipment.

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.

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" or "Removal and/or Relocation of Traffic Signal Equipment (Site No. 2)" 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" or "Removal and/or Relocation of Traffic Signal Equipment (Site No. 2)" 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.
Removal and/or Relocation of Traffic Signal Equipment (Site No. 2)	l.s.

ITEM #1118051A - TEMPORARY SIGNALIZATION (SITE NO. 1)

ITEM #1118052A - TEMPORARY SIGNALIZATION (SITE NO. 2)

Description:

Work under this item shall consist of providing Temporary Signalization (TS) at the intersections shown on the plans

1. Existing Signalized Intersection: The Contractor shall keep each traffic signal completely operational at all times during construction through the use of existing signal equipment, temporary signal equipment, new signal equipment, or any combination thereof once TS has started as noted in the section labeled "Duration."

2. Unsignalized Intersection: The Contractor shall provide TS during construction activities and convert the temporary condition to a permanent traffic signal upon project completion. The Contractor shall furnish, install, maintain, and relocate equipment to provide a complete temporary traffic signal, including but not limited to the necessary support structures, electrical connection and disconnection (if required) and energy supply, vehicle and pedestrian indications, vehicle and pedestrian detection (paid for under Item #11112XXA – Temporary Detection {Site No. X}), pavement markings, and signing.

Materials:

- Pertinent articles of the Standard Specifications
- Supplemental Specifications and Special Provisions contained in this contract

Construction Methods: The Contractor shall perform a Preliminary Inspection and submit a Temporary Signalization (TS) Plan as described herein. No physical work will be allowed at any location until the requirements of the Preliminary Inspection and Temporary Signalization (TS) Plan have been met.

1. Preliminary Inspection

Prior to beginning any physical work, the Contractor shall meet with the Engineer and a representative from the DOT Electrical Maintenance Office (Town representative for a Town owned signal), to inspect and document (for the Engineer's concurrence) the existing traffic signal's physical and operational condition prior to implementing any Temporary Signalization (TS.) The inspection shall include, but not be limited to, the condition of the following:

- Controller Assembly (CA)
  - Controller Unit (CU)
  - Detection Equipment
  - Pre-emption Equipment
  - Coordination Equipment
- Vehicle and Pedestrian Signals

- Vehicle and Pedestrian Detectors
- Emergency Vehicle Pre-emption System (EVPS) *
- Interconnect Cable and Splice Enclosures
- Support Structures
- Handholes, Conduit and Cable

It may be necessary to repair or replace equipment that is missing, damaged, or malfunctioning. The Contractor shall prepare a list of items for replacement or repair. If authorized by the Engineer, this work will be considered "Extra Work" under Article 1.09.04.

* At a State owned signal the EVPS equipment is usually owned by the municipality. The Engineer will notify the municipality of the inspection schedule and information relating to its EVPS equipment as required.

The Preliminary Inspection meeting shall also include discussion of potential utility conflicts according to the *Utilities* section under *TS Plan* below.

2. Temporary Signalization (TS) Plan

At least 30 days prior to implementation of each stage, the Contractor shall submit a 1:40 (1:500 metric) scale TS plan in pdf format for each location to the Engineer for review and comment. This TS Plan shall include, but not be limited to the following:

- Survey Ties
- Dimensions of Lanes, Shoulders, and Islands
- Slope Limits
- Clearing and Grubbing Limits
- Signal Phasing and Timing
- Location of Signal Appurtenances such as Supports, Signal Heads, Pedestrian Push buttons, Pedestrian Signals
- Location of Signing and Pavement Markings (stop bars, lane lines, etc.)
- Location, method, and mode of Temporary Detection
- Location of utilities and potential conflicts

Review of the TS plan does not relieve the Contractor of ensuring the TS meets the requirements of the MUTCD. The existing traffic signal plan of record for State-owned traffic signals is available from the Division of Traffic Engineering upon request. The Contractor may request existing traffic signal plans for Town-owned traffic signals from the Town.

It is acceptable to use the existing traffic signal plan as the TS plan by marking up the existing plan to show any needed changes.

The Contractor shall not implement the TS plan until all review comments have been addressed.

The TS Plan shall also address the following elements:

Earthwork

The Contractor shall perform the necessary clearing and grubbing and the grading of slopes required for the installation, maintenance, and removal of the TS equipment. Upon termination of the TS, the Contractor shall restore the affected area to its prior condition and to the satisfaction of the Engineer.

Maintenance and Protection of Traffic

The Contractor shall furnish, install, maintain, relocate, and remove signal-related signing (lane-use, signal ahead, NTOR, etc.), and pavement markings, as needed.

The Contractor shall install, relocate, or remove, equipment in a manner to cause no hazard to pedestrians, traffic or property. The Contractor shall maintain traffic as specified in the Special Provisions "Prosecution and Progress" and "Maintenance and Protection of Traffic" in the Contract.

Utilities

The Contractor shall verify that proposed temporary and/or relocated signal equipment will not conflict with proposed project utility relocations. The Contractor shall ensure that temporary span/temporary poles will not restrict the ability to shift utility cables off of the poles.

The Contractor shall coordinate its TS activities with all utility companies in the project area to ensure that the proposed temporary and/or relocated signal equipment will not be in conflict with existing utilities. The Contractor shall coordinate any utility work that may be needed prior to the Contractor implementing the TS plan.

Electrical Service and Telephone Service at Existing Signalized Intersections

The Contractor shall be responsible for relocating and changing any electrical service or telephone service source if required. Any arrangements with these companies and costs associated with any relocation or change shall be paid for by the Contractor. The Contractor shall ensure that the party previously responsible for the monthly payment of service shall continue to be responsible for that payment during TS.

Electrical Service for TS at Unsignalized Intersections

The Contractor shall be responsible for providing electrical service for TS at unsignalized intersections. All charges and all arrangements with the power company, including service requests, scheduling, and monthly bills in accordance with Section 10.00.12 and Section 10.00.13 of the Standard Specifications shall be the responsibility of the Contractor. The Contractor shall remove the service or leave the service if it will become permanent as shown on the plans or as directed by the Engineer.

Temporary Signalization

The Contractor shall furnish, install, maintain, relocate, and remove existing, temporary, and proposed traffic signal equipment and all necessary hardware; modifications to or furnishing of a new CA;and reprogramming of the CU phasing and timing; and any other incidentals related to this TS, as many times as necessary for each stage/phase of construction to maintain and protect traffic and pedestrian movements as shown on the plans or as directed by the Engineer.

Inspection

When requested by the Engineer, the TS will be subject to a field review by a representative of the Division of Traffic Engineering and/or the Town, The Contractor shall revise the TS as needed to address comments.

Detection

The Contractor shall provide vehicle detection on the existing, temporary, and/or new roadway alignment for all intersection approaches that have existing detection, detection in the final condition as shown on the signal plan, or as directed by the Engineer. The Contractor shall keep existing pedestrian pushbuttons accessible and operational at all times during TS. Temporary Detection is described and is paid for under Item # 11112XXA - Temporary Detection (Site No. X)

Emergency Vehicle Pre-emption System (EVPS)

The Contractor shall furnish, install, maintain, relocate, and remove the equipment necessary to keep the existing EVPS operational as shown on the plan. The Contractor shall not disconnect or alter the EVPS without the knowledge and concurrence of the Engineer and the EVPS owner. The Contractor shall schedule all EVPS relocations so that the system is out of service only when the Contractor is actively working. The Contractor shall ensure EVPS is returned to service and is completely operational at the end of the work day and shall keep the EVPS owner apprised of all changes to the EVPS.

Coordination

The Contractor shall furnish, install, maintain, relocate, and remove the equipment necessary to keep the intersection coordinated to adjacent signals as shown on the plan. The Contractor shall not disconnect the interconnect without the approval of the Engineer.

- Closed Loop System: If it is necessary to disconnect the communication cable, the Contractor will notify the Engineer and the Bridgeport Operation Center (BOC) or the Newington Operation Center (NOC) prior to disconnect and also after it is reconnected.
- Time Base System: The Contractor shall program and synchronize all Time Clock/Time Base Coordination (TC/TBC) units as necessary.

Maintenance

Once TS is in effect, the Contractor shall assume all maintenance responsibilities of the entire installation in accordance with Section 1.07.12 of the Standard Specifications. The Contractor shall notify the Engineer for the project records the date that Temporary Signalization begins. The Contractor shall coordinate with the Engineer to notify the following parties that maintenance responsibility has been transferred to the Contractor:

Signal Owner
CT DOT Electrical Maintenance Office or
Town Representative
Local Police Department

The Contractor shall provide the Engineer a list of telephone numbers of personnel who will be on-call during TS and shall respond to traffic signal malfunctions by having a representative at the site within three hours from the initial contact. Any traffic signal malfunction shall be made operational according to plan within twenty-four (24) hours.

If the Engineer determines that the nature of a malfunction requires immediate attention and/or the Contractor does not respond within three (3) hours, then an alternate maintenance service will be called to repair the signal. Expenses incurred by the alternate maintenance service for each call will be deducted from monies due to the Contractor with a minimum deduction of $1,000. The alternate maintenance service may be the owner of the signal or another qualified electrical contractor.

Duration

Temporary Signalization shall commence when the Contractor begins physical work at a particular intersection.

a) For intersections with a State furnished controller, TS terminates when the inspection of the permanent signal is complete and operational and is accepted by the Engineer.
b) For intersections with a Contractor furnished controller, Temporary Signalization terminates at the beginning of the 30 day test period for the permanent signal.

Ownership

The Contractor shall remove and deliver any existing equipment that is designated as salvage to its original owner upon completion of use. Any temporary equipment supplied by the Contractor shall be removed by the Contractor unless noted otherwise.

Method of Measurement:

Temporary Signalization (TS) shall be measured for payment as follows:

Fifty percent (50%) shall be paid when the TS for that site is operational as shown on the plan and to the satisfaction of the Engineer.

Fifty percent (50%) shall be paid upon termination of the TS as described herein.

Basis of Payment:

This work shall be paid at the contract Lump Sum price for “Temporary Signalization (Site No.)” for each site. This price includes the preliminary inspection, TS plan for each stage/phase, furnishing, installing, maintaining, relocating and revising traffic signal equipment, controller assembly modifications, controller unit program changes such as phasing and timing, removing existing, temporary, and proposed traffic signal equipment, arrangements with utility companies, towns or cities including the fees necessary for electric and telephone service, clearing and grubbing, earthwork and grading, area restoration and all necessary hardware, materials, labor, and work incidental thereto.

All material and work for signing and pavement markings is paid for under the appropriate Contract items.

All material and work necessary for vehicle and pedestrian detection for TS is paid for under item 11112XXA - Temporary Detection (Site No. X).

All Contractor supplied items that will remain the Contractor's property shall be included in the contract Lump Sum price for "Temporary Signalization."

Any items installed as part of the permanent installation will be paid for under those separate pay items in the Contract.

Pay Item	Pay Unit
Temporary Signalization (Site No.)	l.s.

ITEM #1131006A - REMOTE CONTROLLED CHANGEABLE MESSAGE SIGN WITH RADAR

11.31.01 – Description is supplemented by the following:
Work under this item shall include furnishing and maintaining a trailer-mounted, "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.

11.31.02 –Materials is supplemented by the following:

3. Physical Characteristics of the Radar:

a) The radar equipped signs shall include a high-speed electronic control module (ECM-X), Radar SI transceiver, signal processing board and radar logging software

b) 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.

11.31.04 - Method of Measurement is supplemented by the following:
This work will be measured for payment for each "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.

11.31.05 - Basis of Payment is supplemented by the following:
This work will be paid for at the Contract unit price per day for each "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 "Remote Controlled Changeable Message Sign with Radar", the cellular telephone service and telephone charges shall be included.

Pay Item	Pay Unit
Remote Controlled Changeable Message Sign with Radar	day

ITEM #1131016A - SMART WORK ZONE MOBILE VIDEO CAMERA/QUEUE SENSOR TRAILER (SVQS)

ITEM #1131017A - SMART WORK ZONE MOBILE VIDEO CAMERA/QUEUE SENSOR TRAILER (SVQS) SERVICE

ITEM #1131018A - SMART WORK ZONE VARIABLE MESSAGE SIGN/QUEUE SENSOR TRAILER (SVMQ)

ITEM #1131019A - SMART WORK ZONE VARIABLE MESSAGE SIGN/QUEUE SENSOR TRAILER (SVMQ) SERVICE

ITEM #1131020A - SMART WORK ZONE DEPLOYMENT

ITEM #1131021A - SMART WORK ZONE OPERATIONS

ITEM #1131022A - SMART WORK ZONE TRAILER RELOCATION

ITEM #1131023A - SMART WORK ZONE QUEUE TRAILER/SENSOR (SQT)

ITEM #1131024A - SMART WORK ZONE QUEUE TRAILER/SENSOR (SQT) SERVICE

Description: This work shall consist of furnishing, installing, operating, servicing, maintaining, relocating and removing an automated Smart Work Zone (SWZ) and providing service and maintenance of the complete system for the duration of the Project.

These items shall include vehicle trailers, sensors, cameras, variable message signs, cloud hosted third party traffic speed data, processed rock for leveling trailers, website, communications equipment, relocation, service and maintenance. Included in the operational responsibilities is the assumption of all trailer license plates, communication costs such as FCC licensing, cellular telephone, wireless data networks, satellite and internet subscription charges, solar system support, battery charging and maintenance. In addition to these requirements, the Contractor shall assume all responsibility for any damaged equipment included in the system due to crashes, vandalism, adverse weather, etc. that may occur during system deployment and operation.

This system shall monitor the areas in advance of the project work zone and project's work zone area. The SWZ shall provide Connecticut Department of Transportation (CTDOT) operators control of the cameras to disseminate real-time information to the traveling public and other stakeholders. The system shall be completely operational fourteen (14) days prior to the start of roadwork to allow for traffic data accumulation by the system. The SWZ shall consist of an automated system using trailer-mounted microwave sensors that transmit vehicle speed and related data through cellular communications to a Contractor-hosted central computer system. The camera shall be used to verify traffic conditions within the viewable area of the camera. The central computer system shall send automated and operator manual commands to variable message

signs through cellular communications to display travel time, delay and stopped traffic information. The speed data, video images, and variable message sign content shall be hosted on a Contractor-supplied website.

The SWZ shall be capable of detecting the presence of queued traffic in the segments identified on the plans and reporting via the queue warning Smart Work Zone Variable Message Sign/Queue Sensor Trailer (SVMQ). The distance from the SVMQ to the detected back of queue shall be reported within one-half (1/2) mile accuracy on the system, but reported on the SVMQ at one (1) mile accuracy rounded up to the nearest mile. This "real-time" queue location information shall be calculated and displayed on the applicable SVMQ to the nearest minute.

The SWZ shall have the capability to notify the construction field office, Contractor or others, as determined by the Engineer, of travel times and when the speed through the work zone decreases below thirty (30) mph. The system shall be capable of transferring real-time data in a file format compatible with Oracle®. "Motion" video feeds updated once per one (1) second shall be available for the CTDOT to display on the Contractor-provided website. In addition, any number of CTDOT or Contractor employees shall be notified via email or text message for these speed changes. Contact information will be furnished by the Engineer at the start of the SMZ deployment.

All the required components of the SWZ shall be fully operational within forty-five (45) days of notice to deploy from the Engineer. If not fully operational within said forty-five (45) days, a payment reduction of five percent (5%) for each day the entire system is not operating will apply, as determined by the Engineer.

Once operations begin, the SWZ shall perform with no major malfunctions throughout the Contract, unless the Engineer requests the system or portions of the system be removed. Malfunctions include, but are not limited to, the inability of the equipment to provide accurate real-time video feeds, delay, or travel time information, inability to withstand the construction roadside environment or normal weather conditions. The Engineer reserves the right to terminate this item at any time if it is determined the SWZ is not performing in accordance with this specification.

Construction Methods:

Submittals:

1 Within seven (7) days after the bid opening, the Contractor shall submit to the Engineer for review and approval, in consultation with the CTDOT's Subject Matter Expert, evidence that the proposed supplier has successfully completed at least five (5) SWZ projects similar in concept and scope to the proposed system in the past five (5) years. The proposed supplier shall also provide the credentials of a qualified technician who shall install and operate the system. Include names, addresses, and telephone numbers of the similar project's owner's representatives for verification.

2. Also, within seven (7) days after the bid opening, submit brochures and cut sheets on all units of the SWZ, with details of how and which communications systems shall be used, and the technical specifications for the website.

3. The Contractor shall demonstrate to the Engineer an operating SWZ.

4. Within thirty (30) days after the bid opening, the Contractor shall propose the actual device layout to the CTDOT for review and approval.

5. Prior to public viewing, the website map showing device locations and other interactive elements shall be submitted for the Engineer's review.

6. The Engineer reserves the right to add or remove locations as needed.

Equipment:

1. The SWZ shall consist of the following equipment.
   a) Seven (7) SVQS with camera with pan-tilt-zoom (PTZ). The computer hardware and software must meet the manufacturer's requirements to operate and monitor the system. The camera response time to web commands for PTZ shall be reviewed and approved by the Engineer. The PTZ response time shall follow the operator's manual commands to move the camera to the desired position.
   b) Two (2) SQT shall provide real time speed, volumes, occupancy and other necessary data to the SWZ to activate messaging on the variable message signs and provide historical data.
   c) Eight (8) SVMQ shall display real-time travel time messaging and back of queue warning to the traveling public.
   d) Communication equipment including wireless data networks, base stations, cell phone data interfaces, Ethernet network interfaces, and internet interfaces.
   e) Customized Webpage integrated with the SWZ to include traveling public and Project staff accessibility; SWZ website shall be allowed to "link" to the CTDOT's website
   f) Software package customized for this particular Project's needs.

2. The following shall be provided for each SQT, SVMQ and SVQS with PTZ:
   a) Approximate locations of variable message signs and traffic sensors shown on the figures below may be adjusted to ensure sightlines and safety are adequate
   b) Clean stone or processed rock to provide a level area for trailers and provide for sufficient height for sensors to operate correctly.
   c) Individually mounted on trailer units with solar power.
   d) Equipped with digital wireless cellular modems as required.
   e) Linked to the Contractor's central computer server.
   f) Maintained as needed to remain operational, including cleaning and inspecting components, snow and ice removal from solar panels and keeping batteries charged.
   g) Extra set of programming instructions stored in the units for emergency use.

3. The SVQS, SQT, and SVMQ shall collect and process traffic data as programmed within the software provided with the sensors. This data shall be transmitted over a digital cellular network to access and store the respective data remotely. The remote monitoring and data collection shall be placed in areas where wireless communication is available. The SVQS, SQT, and SVMQ shall use both solar power and deep cycle batteries to provide a self-contained completely autonomous system.

The SVQS mobile camera(s) shall provide a mobile, self-contained, all-weather, trailer-mounted equipment platform. The mobile camera system shall use wireless communication. The mobile

camera shall provide a rapidly-deployable real-time video system viewable from a remote location. The mobile camera shall be capable as a stand-alone camera system.

a) Trailer and power requirements:
    i. 2-wheel industrial grade trailer with stabilizer legs
    ii. Available as a mobile unit or permanent mount
    iii. Adjustable solar array for maximum exposure to sun
    iv. Removable trailer tongue
    v. Battery bank sized for thirty (30) day autonomy
b) SVQS requirements:
    i. Microwave detection (Wavetronix Smart Sensor HD) with Dual Radar that reliably detects up to twenty-two (22) lanes of traffic, auto configuration
    ii. Provide data including speed, volume and occupancy
    iii. Digital cellular communications
    iv. Dome camera with day/night adjustable pan/tilt/zoom IP addressable
    v. Mobile camera system shall provide camera operating software to use camera manufacturer's operating system.
    vi. Minimum thirty (30) ft extendable mast with 360 degree lockable rotation
    vii. Capable of providing streaming or snapshot video
    viii. Electric hoists for rapid deployment
c) SQT requirements:
    i. Microwave detection reliably detects up to twenty-two (22) lanes of traffic
    ii. Data provided includes speed, volume and occupancy
    iii. Available as a mobile unit or permanent mount
    iv. Digital cellular communications

4. The SVMQ shall be configured with the following variable message sign requirements or approved equal:

a) Trailer and power requirements:
    i. 2-wheeled trailer structurally adequate to serve as both a carrier and an operating platform
    ii. Meets Federal Regulations for safety and travel
    iii. Color of trailer paint shall be safety orange or as approved by the Engineer
    iv. Bank of batteries capable of being recharged automatically by a group of solar panels located at the highest point on the unit
    v. Variable message signs shall be designed with sufficient energy backup to operate for a period of thirty (30) days (minimum) at 75°F without sun exposure
    vi. Solar panel generator array shall recharge the battery bank at a rate of 2 1/2 hours peak sun per twenty-four (24) hour period of usage
    vii. Solar panel array sized to replace the power used in typical daily operation with less than four (4) hours of sun
    viii. Deep cycle, lead acid 12-volt batteries wired in parallel, housed in a lockable heavy duty steel weatherproof battery box
    ix. Batteries recharged by a solar panel array producing 110 watts of power minimum
    x. Built-in battery charger with minimum 25 ampere per hour rating
    xi. Solar charge current meter and battery charger current meter visible

xii. Protective housing painted with manufacturer's standard colors

b) Variable Message Sign/Queue Sensor requirements:
   i. Sign panel of welded aluminum alloy construction, assembled to prevent dissimilar metal action from occurring
   ii. Length of sign panel 128 inches or less
   iii. Front face of sign covered with clear UV-inhibited polycarbonate to prevent fading
   iv. Message center:
      1) Three (3) separate lines, center justified
      2) Each line up to eight (8) characters, equally spaced a minimum of three (3) inches apart
      3) Each character eighteen (18) inches high by twelve (12) inches wide
      4) Each character configured with thirty-five (35) LED lamp pixels in a five (5) x seven (7) element arrangement
      5) Message color 590 nanometers (yellow-orange)
   i. Remote sign operation via central computer
   ii. Messages to be displayed shall have capability to be timed to changes at various times of day and days of week
   iii. Trailer-mounted variable message board consisting of optically enhanced LED lamp matrix panels powered by a bank of batteries in order to convey bright, distinctive messages to the traveling public
   iv. Sign capable of displaying up to eight (8) pages in a multiple page message, with variable timing in one-tenth (1/10) second increments under computer control
   v. Sign shall completely change all lines of message copy in not more than one hundred (100) milliseconds
   vi. Sign clearly visible and legible from a distance of eight-hundred (800) feet under both day and night conditions, with a photocell automatically adjusting its light source for variable light level conditions
   vii. Sign panel supported on a telescoping upright member with hydraulic lift to permit raising the sign for operation and lowering the sign for transport
   viii. Telescoping upright able to rotate 360 degrees and shall lock into position
   ix. Telescoping distance of nominally five (5) feet to allow bottom of sign to be at least seven (7) feet above the ground
   x. Sign panel shall pivot to the longitudinal axis of the trailer for transport, to reduce aerodynamic drag
   xi. Static sign attached identifying the message board is for the Project; coordinate sign content and appearance with the Engineer
   xii. Microwave detection (Wavetronix Smart Sensor HD) with dual radar that reliably detects up to twenty-two (22) lanes of traffic, auto configuration
   xiii. Data provided from sensor to include speed, volume and occupancy
   xiv. Available as a mobile unit or permanent mount

c) Variable Message Sign on-board dedicated computer requirements:
   i. Solid state design, removable, including a keyboard through which user originated messages may be entered for display or storage

ii. LCD display screen upon which messages can be reviewed before display on the message sign
iii. Storage of a minimum of one hundred (100) preprogrammed messages for display when called upon by an operator through the keyboard and a minimum of one hundred (100) users originated multiple page messages.
iv. Password coding or key entry.
v. Control programming to present sequenced messages under operator control through keyboard entry.
vi. Control for moving arrow displays.
vii. Calendar program to automatically start and stop the display of sequences at predetermined times.
viii. Character board and battery diagnostics.
ix. Computer housing: weather resistant, shock resistant lockable control box with a light for night operation.
x. Power control unit housed in a lockable, steel, weatherproof battery box containing two (2) current meters (to show amperage generated with battery charger and amperage from solar panels to battery bank).
xi. Power control unit to incorporate a PV regulator with thermal compensation for variances in ambient temperature, to regulate the charge rate to the battery bank.
xii. Control circuitry connected to variable message sign's photocell that detects ambient light conditions and reduces lamp intensity at night to reduce glare.

d) Variable Message Sign - other requirements:
i. Variable message sign operation using cellular telephone and cellular telephone service (trailer must be located within cellular telephone coverage), allowing operator remote control of the on-board computer
ii. A Queue Trailer/Sensor may be located next to designated SVMQ to collect data
iii. The message sign shall provide for remote sign operation via central computer base station or Website allowing operators to manually override the automated messaging in order to display a message at any time. The operator shall be able to cancel this override and initiate the systems automated messaging feature.
iv. Any request to change messages on the Variable Message Signs shall be approved by the CTDOT.

Deployment and Operation:

The decision to deploy or remove individual devices or the entire SWZ will be made by the Engineer. Once the decision is made to deploy the system, the Engineer will coordinate with the Contractor for the duration of system deployment.

1. The SWZ shall be installed as shown in the approved layout. The locations may require repositioning as directed by the Engineer and as the project continues. The system shall be maintained and operated for the duration of the Project or as directed by the Engineer. The Contractor shall service the SWZ on a six (6) month regular interval for the duration of the Project or as directed by the Engineer. Additionally, the Contractor shall clean the Camera dome bubbles at least once per month during the winter months between December and March for the duration

of the project as directed by the Engineer. The service shall include cleaning the sign panel, removing snow/ice and debris from the solar panels as needed or as directed by the Engineer. The Contractor shall follow the manufacturer's requirements for cleaning the SVQS. The cost of the service shall be included in the items (Item Nos. 1131017A, 1131019A, and 1131024A) for each unit.

2. The Contractor shall prepare the locations to receive the equipment in accordance with the equipment manufacturer's requirements. Each location shall include clean stone or processed rock provided and installed by the Contractor to level the surface area. Some location may require the trailers to be lifted over the safety barrier and placed on the level processed rock.

3. The Contractor shall install each of the system components in accordance with the manufacturer's recommendations, in compliance with all industry standards and codes such that each system is fully operational and can be operated and controlled from the Construction Field Office or remotely, as approved by the Engineer.

4. The Contractor shall coordinate the work with others as designated by the Engineer to complete installation and integration of all equipment for all system types.

5. System Calibration and Configuration: The SWZ shall provide the following:
   a) Software shall be configured for notification to appropriate personnel at the Highway Operations Center, the Construction Field Office and the Contractor by email each time a malfunction has occurred in the system. A malfunction record shall also be made in the database. The software shall be configured so that any number of approved personnel can be notified. The email shall display an error message for the device or devices affected. Through the Contractor, the SWZ Webpage Integrator shall be responsible for this notification procedure.
   b) Software shall be configured to provide current operational and location status (such as current traffic data and messages, communications system, signs, and sensors as well as latitude/longitude of all deployed devices) via the Internet to a dedicated Website established for the purpose of monitoring the corridor and the SWZ equipment.
   c) Software shall be configured to assess any type of malfunction that has occurred. This assessment includes communications disruption between any device in the system configuration, variable message board malfunctioning, speed sensor malfunction, loss of power, low battery, etc. This malfunction information shall be sent via email in text format to the Highway Operations Center, Engineer, or Contractor, as designated by the Engineer, for each occurrence.
   d) To support incident management, the SWZ software shall be configured to allow Project staff to manually override motorist information messages for a user-specified duration; after which, automatic operation will resume with display of messages appropriate to the prevailing traffic conditions. All overriding messages shall have the message content and the username logged into the database.

6. SWZ Website shall have the following:
   a) Password protected link for approved personnel to access the operational characteristics of the system, allowing manual override of errant messages.

b) The website shall display current traffic conditions and real time speed at upstream locations to the nearest minute. The "real time" traffic delay information displayed on the SVMQ's shall be updated every one (1) minute minimum with the website delay information updated simultaneously.
c) The website shall allow the scheduling of messages by the operator on a sign or group of signs, to turn on and to turn off messages at times set in the future.
d) Placement of all devices shall be shown on the dedicated website using latitude/longitude coordinates. The placement of these devices on the website shall be approved by the Engineer prior to release of the website.
e) The website shall display camera images at least five (5) frames per second. Cameras images shall be displayed by a user selectable menu. Cameras can be selected one (1) at a time or all cameras images simultaneously using another page or "video wall." Camera images can be displayed by "hovering" over and selecting the camera icon.
f) Via the internet and the dedicated website, the website shall provide a full color map using Google Maps or equivalent depicting the Project area with locations of traffic sensors and SVMQ's. Using an administrator defined color-coding scheme, the map reflects the current average speed at each traffic sensor and displays the entire information message being shown by each SVMQ either on the map or on the side bar of the website. The Contractor shall use the third party traffic speed data to "fill" in the speed data display on the website between sensors. The contractor shall use the sensors for maximum distance of one-half (1/2) mile on the map. The map shall be automatically refreshed a minimum of once every minute to display any changes to traffic sensor(s) and/or SVMQ's. A legend of all icons and a short description of each shall be placed on the website.
g) The SWZ website shall be capable of providing and displaying the travel delay cost data (monetary values) in a graph and/or chart format and allow users to run reports against the data by hour, day and month intervals through the browser. This feature shall not be accessible by the public. The SWZ website shall have report output formats that include at minimum PDF, rich text format, and Microsoft Excel formats. See requirement 10. part o.
h) The SWZ Website shall provide a map with current traffic conditions by way of a colored layer over the road. The layer on the map shall display a different color for the different traffic speeds by use of colored bars over the existing road, with a legend explaining the meaning of each color. The color descriptions are as follows:
    i. less than 10 mph = black
    ii. less than 30 mph = red
    iii. less than 40 mph = orange
    iv. less than 50 mph = yellow
    v. 50 mph and over = green

7. Smart Work Zone Operations
a) System Communications shall meet the following requirements:
    i. The Contractor shall perform the required configuration of the SWZ's communications system during system initialization.
    ii. Communications between the server and any individual SVMQ or SVQS shall be independent through the full range of deployed locations and shall not rely upon communications with any other SVMQ or SVQS sensor.

iii. The SWZ communications system shall incorporate an error detection/ correction mechanism to insure the integrity of all traffic conditions data and motorist information messages.

b) In addition to meeting manufacturer's specifications, the Contractor shall program the SWZ to ensure that the following General Operational requirements are met:

i. The SWZ traffic sensors shall be such that the accuracy is not degraded by inclement weather and visibility conditions including precipitation, fog, darkness, excessive dust and road debris. The sensors shall be capable of acquiring traffic data for a minimum of twenty-two (22) lanes of traffic on a lane-by-lane basis.

ii. The SWZ shall operate continuously (24 hours, 7 days a week) when deployed on the Project. It shall always be collecting and storing data.

iii. All traffic data and motorist information messages displayed by the SWZ shall be archived in the database with time and date stamps.

iv. The SWZ shall be capable of acquiring traffic volume and speed data, developing travel times, and selecting motorist information messages automatically without operator intervention after system initialization.

v. The SWZ shall automatically select default and advisory messages based on traffic conditions at a single traffic sensor point or at multiple traffic sensor points in combination.

vi. Administrative users shall be able to create and save a library of messages with up to twenty (20) different default or automatic advisory messages for each SVMQ.

vii. System operator control functions shall be password protected.

viii. To support incident management, the SWZ shall allow the Engineer and Project staff with password privileges to manually override motorist information messages for a user-specified duration, after which automatic operation shall resume with display of messages appropriate to the prevailing traffic conditions.

ix. The SWZ shall be capable of providing current operational status (such as current traffic data and messages, communications system, signs and sensors, video feeds) via the dedicated Project website.

x. For remote sign operation, the website shall allow password-protected access for Project staff to manually override automated messaging in order to display a message at any time. The staff shall be able to send a pre-programmed or custom message to a selected sign or group of signs. The staff shall be able to cancel this manual override and initiate any and all of the system's automated messaging features at any time.

xi. The default and advisory message content shall be programmable from the website as well as the field laptops.

xii. The dedicated Project website shall provide a full color map depicting the Project area with locations of SVQS sensors and SVMQ's. The graphical representation of each device location is based on latitude/longitude coordinates. The map shall show the current traffic conditions at each SQT and display the entire SVMQ message at each location.

xiii. The website shall have a link to the CTDOT's website and the website shall allow the CTDOT's website to link to it.

xiv. The system shall autonomously restart in case of power failure in any part of the system.

xv. Each SVMQ shall be capable of displaying eight (8) characters on each of three (3) rows. Standard messages shall be as defined in "Smart Work Zone Management System Motorist Information Messages" section below.

xvi. Cameras must be capable of operating on both solar and AC power. Should the visibility of the traffic cameras be degraded by inclement weather including snow, precipitation, excessive dust or road debris, the Contractor shall clean the camera housing to restore proper viewing.

8. Training and Support required:
   a) Ensure that the SWZ is furnished, installed and maintained by personnel who are experienced in this type of work. Deploying firm personnel must have a minimum of five (5) similar deployments.
   b) Training shall be provided to Project staff on their authorized use and operation of the physical field hardware, software and website of the SWZ.
   c) The Contractor shall supply training and documentation to enable the Engineer to add additional signs or traffic sensors to the system. The Contractor shall provide the communications for any of these additional signs or traffic sensors.

9. System Operational Performance:
   a) To ensure a prompt response to incidents involving the integrity of the SWZ devices, the Contractor shall be required to make all necessary corrections to the components of the system within twenty-four (24) hours of notification by the CTDOT.
   b) If all corrections are made within this twenty-four (24) hour period and the system is brought back on-line, no pay reduction (as outlined in the Method of Measurement section) will occur.
   c) If the twenty-four (24) timeframe expires and the components of the system are not fully restored to proper working order, no payment will be made from the time of initial notification until the system is brought back on-line. If the system is restored within ten (10) days, a pro-rated monthly payment reduction will be determined as outlined in the Method of Measurement section.
   d) If the components of the SWZ are down for more than ten (10) total days in a month, whether they are consecutive or cumulative, and then NO payment will be made for that month. Components are the SWZ variable message signs, SWZ Mobile Camera with PTZ, Communications Equipment, and SWZ Queue Sensors, computer hardware and software required to place the real time information on the signs, and the project's Website. The CTDOT reserves the right to remove the SWZ components if it determines the system is not performing in accordance with this specification, and no additional payment shall be made.

10. Data Acquisition requirements:
   a) Each SVQS sensor shall communicate with the field computers and the website to activate the appropriate SVMQ whenever the prevailing traffic speed slows to below fifteen (15) mph (or other designated speed as determined by the Engineer). Once activated, pre-

programmed messages shall be automatically displayed on the SVMQ. The message content shall be as directed by the Engineer.

b) The SWZ shall be capable of calculating and having "real time" delay information displayed on the SVMQ's. This "real time" delay shall be calculated and displayed on the SVMQ's to the nearest minute.

c) The website delay information shall be updated simultaneously with the traffic speed information displayed on the Variable Message Signs.

d) To allow for motorist information messages of high specificity, the SWZ shall acquire quantitative traffic data using an accurate speed measurement technique that includes the capability of detecting stopped traffic and counting traffic volume.

e) The SWZ system's traffic sensors shall be of a type whose accuracy is not degraded by inclement weather or low visibility conditions including precipitation, fog, darkness, excessive dust, and road debris.

f) The SWZ shall be capable of acquiring traffic data from up to twenty-two (22) lanes of traffic in multiple directions, for example: Eleven (11) northbound and eleven (11) southbound.

g) The Contractor shall provide redundancy for data archiving and exchange. The Contractor shall provide Content Delivery Network (CDN) to aggregate video data streams from any PTZ camera to a centralized location to reduce bandwidth consumption from each individual PTZ camera head to end users and allow for separate controllable/ configurable streams for public and operator use.

h) The CDN shall be capable of allowing the Project staff to start and stop public feeds from the SWZ website while not interfering with the private feeds being displayed on the website.

i) All traffic data acquired by the SWZ including, but not limited to, calculated data fields shall be archived in a log file with time and date stamps for the duration of the Project. During the Project, requests for archived data may be made through the Engineer to the SWZ contractor. The Contractor shall provide this data to the Engineer within five (5) days upon receipt of the original request.

j) At the end of the Project, the SWZ Contractor shall provide the CTDOT comprehensive Project archive data with the exception of video. This logged information shall be in a format compatible with CTDOT requirements. The Contractor shall coordinate with the Engineer for requirements.

k) The SWZ shall provide device outage alerts via email to the Engineer for outages greater than fifteen (15) minutes. The alerts shall be used to generate a monthly summary spreadsheet displaying outages greater than twenty-four (24) hours, submitted to the Engineer. The email addresses for recipients of outage alerts shall be provided by the Engineer. Any pay reductions as per the pro-rated schedule will be calculated from the monthly outage summaries, as described in the Method of Measurement section.

l) The system shall be capable of transferring for each camera device a video data format acceptable to the CTDOT.

m) The Contractor shall provide notification of data format changes to the CTDOT before they take place.

n) Unique device identifiers shall be coordinated at the beginning of the Project and shall not change once the SWZ contractor has initially defined them, unless otherwise approved by the Engineer.

o) The SWZ shall be capable of calculating travel delay cost (monetary value) information for passenger cars and trucks from the beginning of the Project to the end of the Project. The SWZ system shall maintain a database of current and historical travel delay cost data. The SWZ travel delay cost information shall be provided in dollars per hours ($/hr.) of travel time. The SWZ travel time delay cost information shall follow the Chapter 2 (Sections 2.2.1 – 2.2.2.3) of the Work Zone Road Users Costs Manual (FHWA-HOP-12-005). The Contractor shall provide the calculations and formulas for the travel delay costs to the Engineer for review and approval prior to the SWZ system implementation. The Contractor shall provide examples of the charts and tables for the travel delay costs to the Engineer for review and approval prior to the SWZ system implementation. The scale of the travel delay costs charts and tables shall be consistent with the data accumulated by the SWZ throughout the Project period.

11. SWZ Motorist Information Message requirements:

a) The SVMQ shall be capable of providing speed, delay, length of traffic queue, travel time, stopped vehicles, and lane closure message advisories to motorists.

b) Records of all motorist information messages and travel times displayed by the SWZ shall be submitted to the Engineer in a format compatible with CTDOT requirements.

c) The SWZ must have capacity to preset up to twenty (20) different default or automatic advisory messages for each SVMQ.

d) Message Sets:

i. The upstream SVMQs within 1 1/2 miles of the work zone shall display either the following message or an alternate message approved by the Engineer:

ROAD WORK AHEAD
XX MIN THRU WORKZONE

ii. SVMQs located within the work zone will display different messages as per their location. Either the following sample message or an alternate message approved by the Engineer will be displayed:

TO EXIT XX
X MILES
X - X MIN

iii. Queue warning SVMQ's located prior to any construction activity that negatively impacts traffic flows shall display the following message or an alternate message approved by the Engineer:

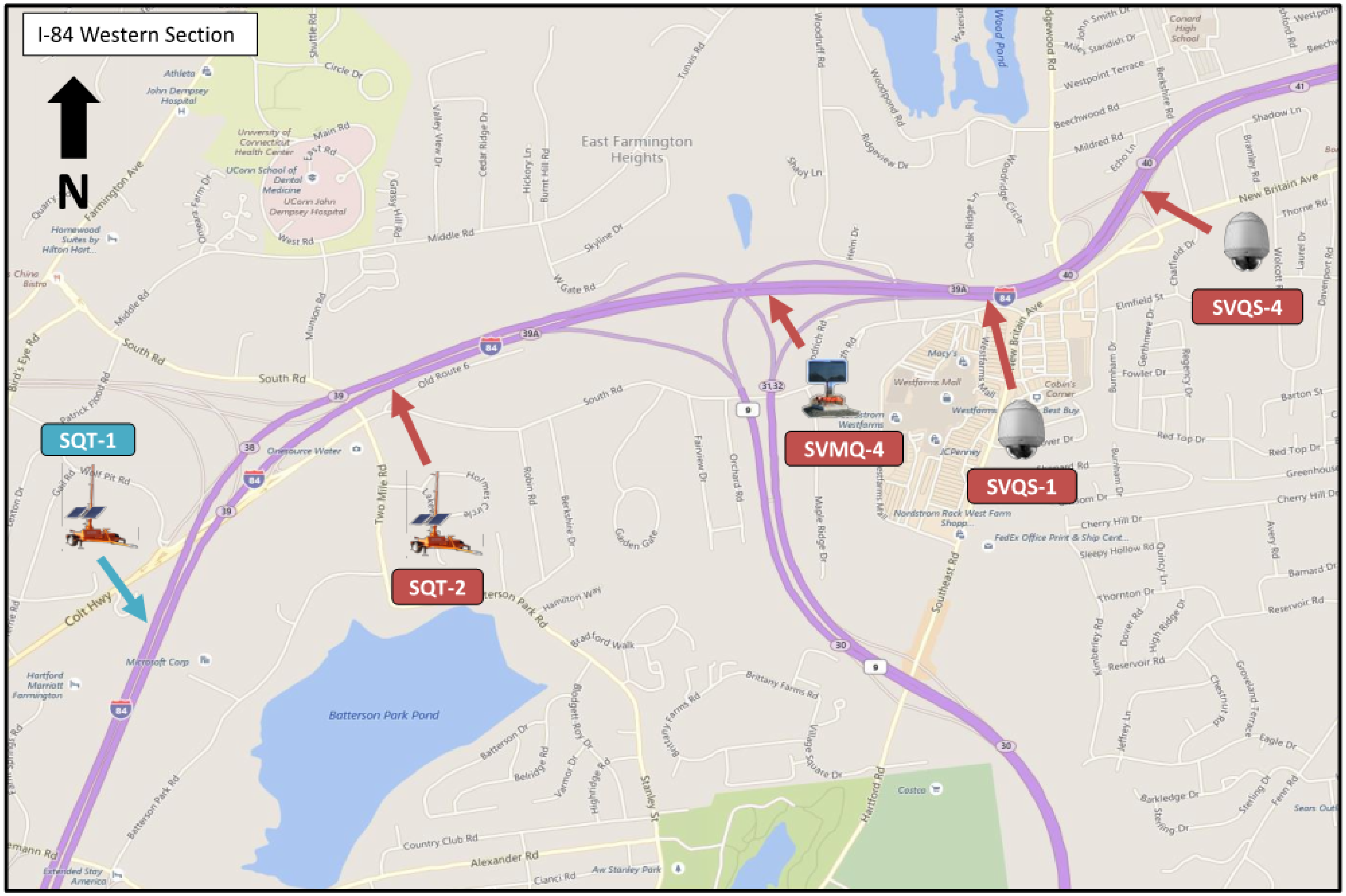
STOPPED TRAFFIC XX MILES
BE PREPARED TO STOP
- or -
SLOW TRAFFIC XX MILES
USE CAUTION

e) The sequences above are a minimum requirement and can be adjusted by the Engineer at his or her discretion.
f) The SWZ shall acquire traffic flow data and use an accurate speed calculation technique that includes the capability of detecting stopped traffic, counting traffic volume and lane occupancy.
g) The wireless cellular communications system(s) used for the Project must be reliable, dependable, and capable of functioning at all times regardless of weather, locations and cell phone usage. The Contractor shall be responsible for all communications costs, utilities, and satellite or cellular phone services needed to provide the dependable functioning SWZ.

Approximate Location of SWZ:

Figures 1-5 and Tables 1-5 are provided as a guide. Actual locations of the SWZ equipment shall be determined in the field. The Engineer will review and approve final locations of the equipment.

FIGURE 1: I-84 Western Section



LEGEND			
EB SQT		WB SQT	
EB SVQS		WB SVQS	
EB SVMQ		WB SVMQ	

FIGURE 2: I-84 Eastern Section

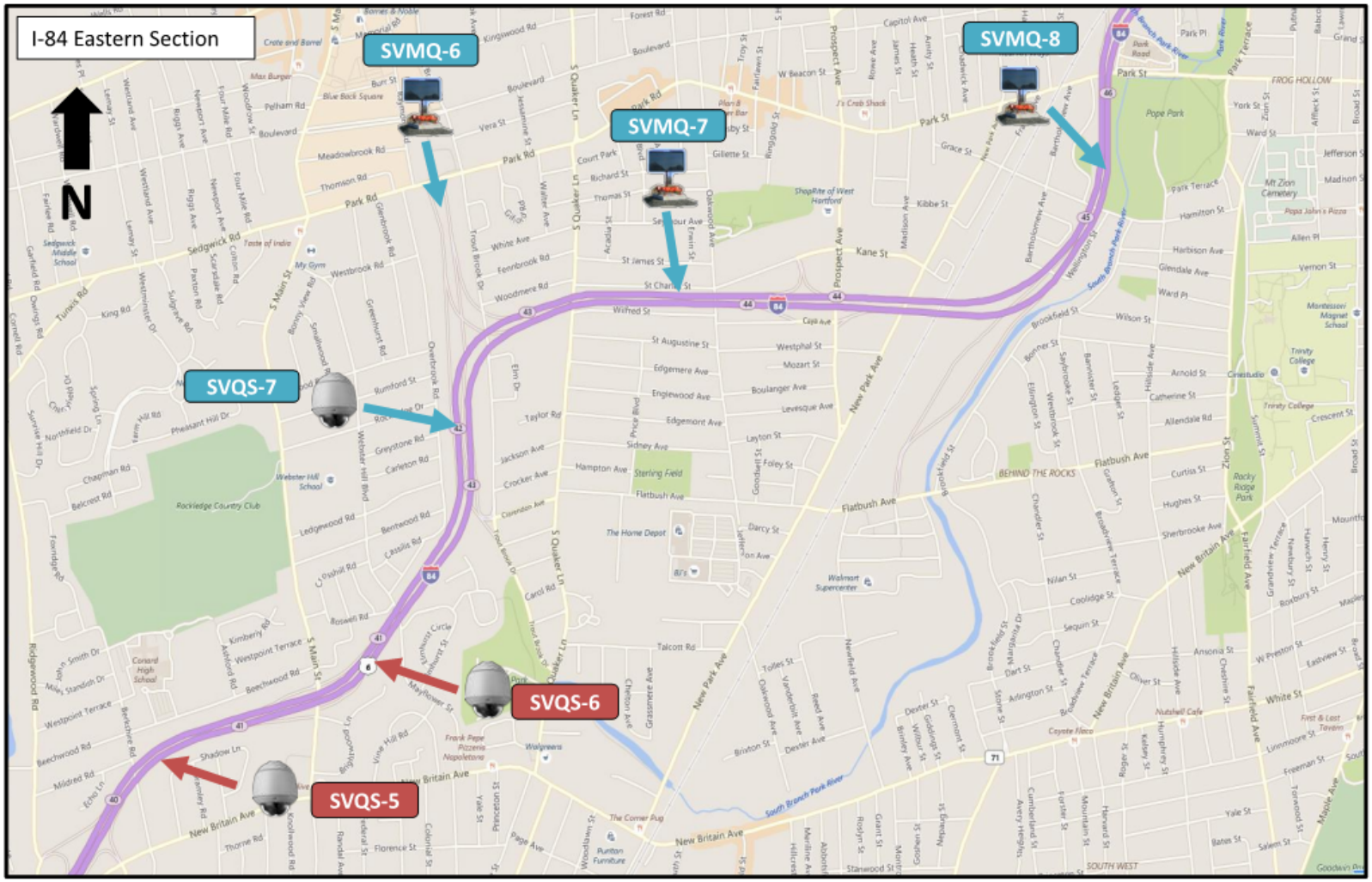


FIGURE 3: Route 9 Southern Section

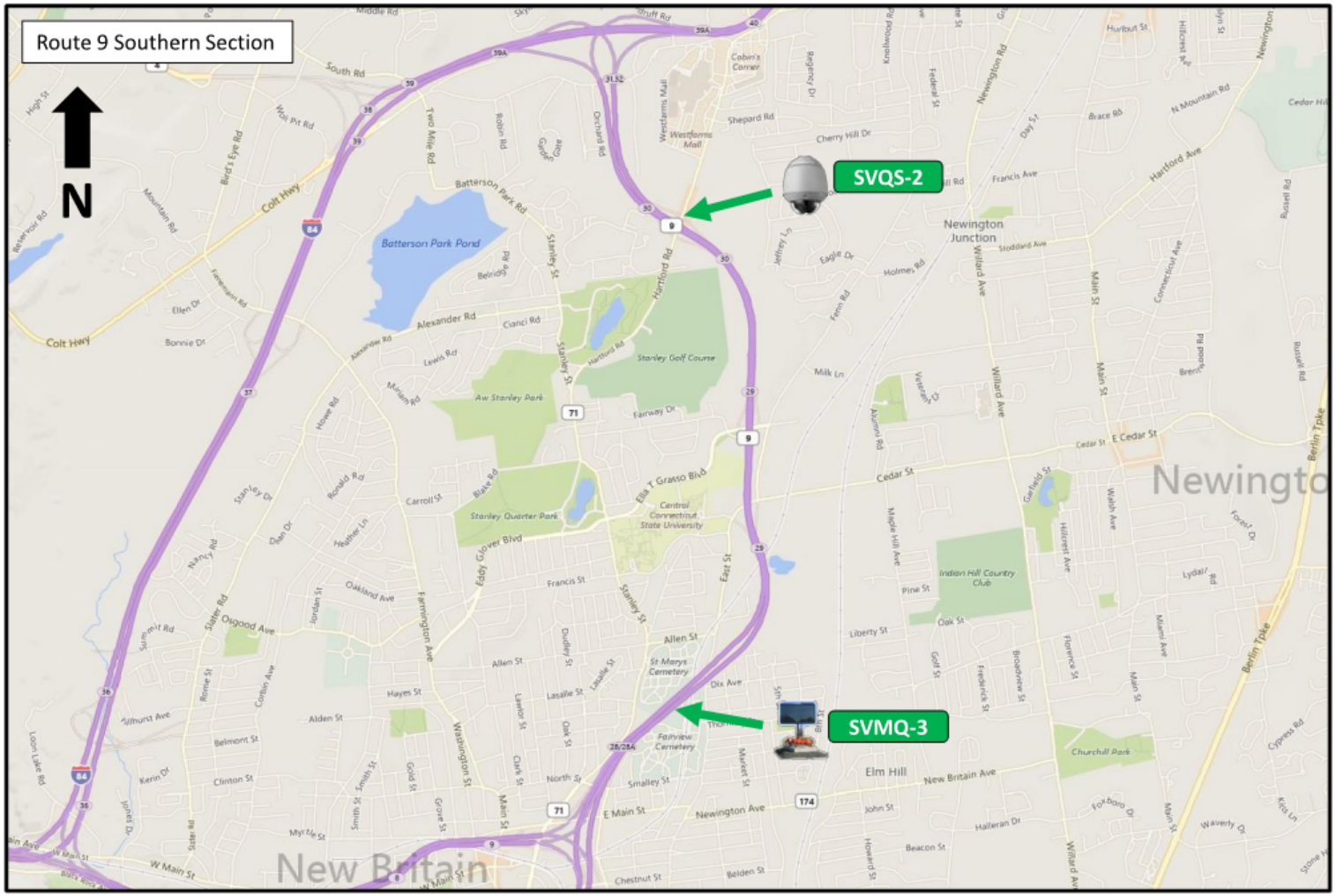


FIGURE 4: Route 4 and Route 6 Sections

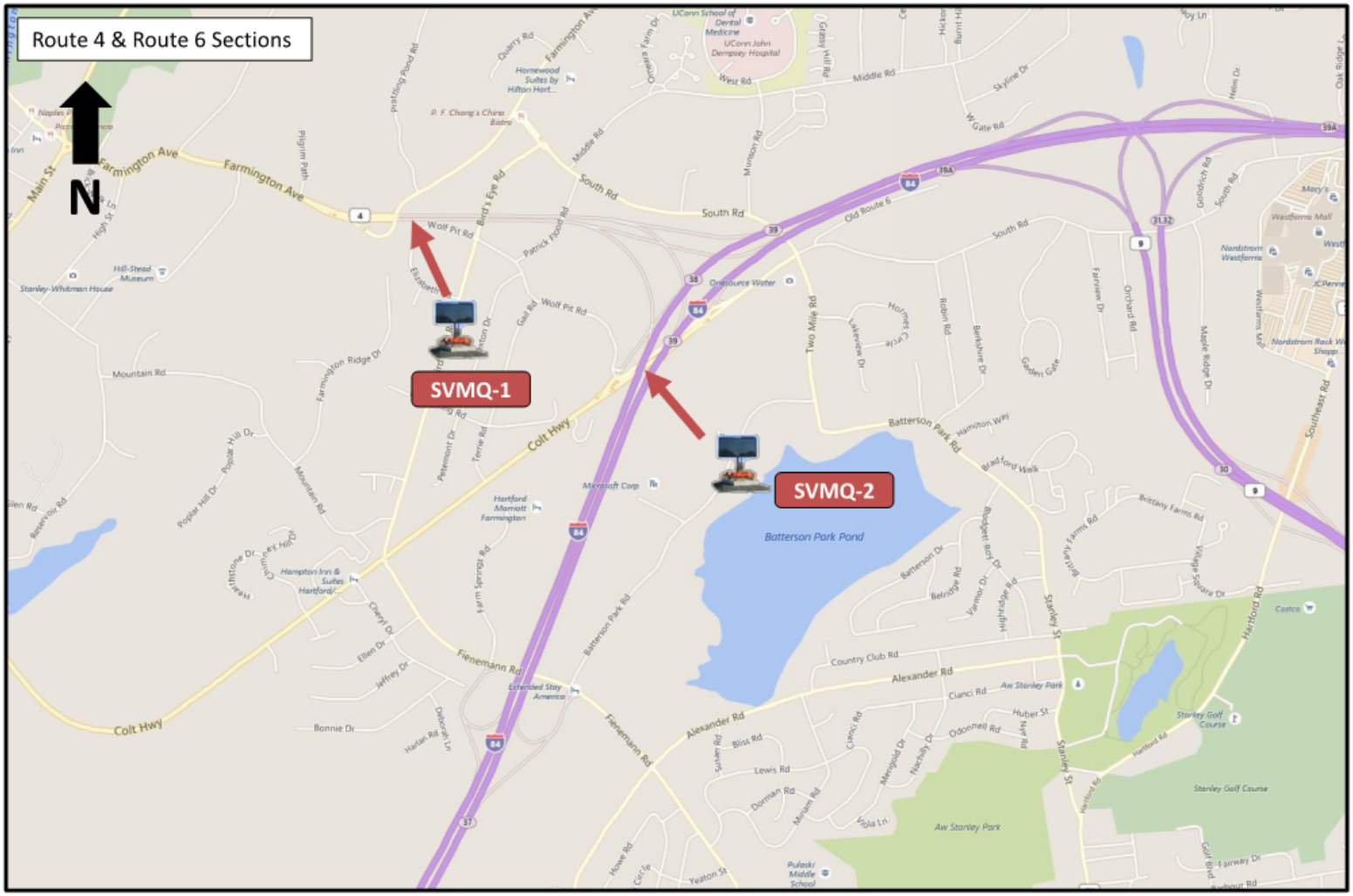


FIGURE 5: New Britain Avenue Section

Tables: Approximate Location of SWZ Implementation for the Project Site. All locations shall be confirmed with the Engineer.

Table 1 – I-84 Western Section				
Route	**Direction**	**Town**	**Location**	**Type of Equipment**
I-84	Westbound	Farmington	After I-84 Exit 39, just before "New Britain Next 3 Exits" sign	SQT
I-84	Eastbound	Farmington	Before I-84 Exit 39A, passing Speed Limit sign	SQT
I-84	Eastbound	Farmington	Beyond I-84 Exit 39A, after Route 9 overhead bridges and at the end of guiderails	SVMQ
I-84	Eastbound	West Hartford	Route 9 On Ramp at I-84 behind guiderails	SVQS
I-84	Eastbound	West Hartford	On Ramp Gore Area after I-84 Exit 40	SVQS

Table 2 – I-84 Eastern Section				
Route	**Direction**	**Town**	**Location**	**Type of Equipment**
I-84	Eastbound	West Hartford	Before I-84 Exit 41, close to Overhead clearance sign behind barrier	SVQS
I-84	Eastbound	West Hartford	After I-84 Exit 41, crossing Safety Patrol Sign behind barrier	SVQS
I-84	Westbound	West Hartford	On Ramp Area at I-84 for Park Road, close to big gantry sign board behind guiderails	SVQS

I-84	Westbound	West Hartford	Start of On Ramp Area at I-84 for Park Road and at the end of guiderails	SVMQ
I-84	Westbound	West Hartford	Off the shoulder area before I-84 Exit 43 and after Speed Limit Sign	SVMQ
I-84	Westbound	Hartford	In median between barriers before I-84 Exit 45	SVMQ

Table 3 – Route 9 Southern Section				
Route	**Direction**	**Town**	**Location**	**Type of Equipment**
9	Northbound	New Britain	North-East corner of Route 9 Off Ramp and Hartford RD intersection	SVQS
9	Northbound	New Britain	Before Route 9 Exit 29, close to Route 9 north Sign behind guiderails	SVMQ

Table 4 – Route 4 & Route 6 Sections				
Route	**Direction**	**Town**	**Location**	**Type of Equipment**
4	Eastbound	Farmington	South-East corner of Route 4 and SR 508 intersection, before the guiderails start	SVMQ
6	Eastbound	Farmington	On Colt Highway in between two I-84 overhead bridges behind guiderails	SVMQ

Table 5 – New Britain Avenue Section				
Route	**Direction**	**Town**	**Location**	**Type of Equipment**
71	Eastbound	West Hartford	Route 71 Off the shoulder area just before Ridgewood ramp to I-84	SVMQ
71	Eastbound	West Hartford	North-East Corner of New Britain Ave and On, Off ramps of I-84 intersection	SVQS

Trailer Relocation Operations:

1. The Contractor shall relocate the SWZ trailers as agreed between the Contractor and the Engineer.

2. The Contractor shall reconfigure the SWZ equipment including the SVQS sensor and the camera with PTZ shall to monitor travel lanes at the relocation site. The Contractor shall confirm the reconfigured settings with the Engineer.
3. The Contractor shall update the website with the relocation sites of the SWZ. The Website shall show the new location of the SWZs upon completion of the update. The update shall occur within two (2) weekdays of the relocation.

Method of Measurement:

1. The SWZ Deployment will be measured as a Contract lump sum item.

2. The SVMQ, SVQS, and SQT items will be measured based on uninterrupted operation of all trailer, sensors, cameras with pan-tilt-zoom, variable message signs, solar panels, batteries. SVMQ, SVQS, and SQT will be measured for payment on a per unit basis for each month that the piece of equipment is in use, and as follows:
    a) Measurement will begin from the date each unit is fully operational, as determined by the Engineer, to the date it is released back to the Contractor.
    b) The Engineer will compute periods of less than one (1) month at the rate of 1/30 of a month for each day of use.

3. The SVMQ, SVQS, and SQT service items will be measured for payment by the month or fraction of a month as follows:
    a) Includes monthly operations, monthly cellular service communications, maintenance, charging batteries, cleaning solar panels, camera dome bubble, repair, programming, and integration.
    b) The following pro-rated reduction of the monthly payment will be computed if the monthly summary spreadsheet of outages greater than twenty-four (24) hours indicates interruption of service has occurred:

1 day = 5% pay reduction	6 days = 30% pay reduction
2 days = 7% pay reduction	7 days = 35% pay reduction
3 days = 10% pay reduction	8 days = 40% pay reduction
4 days = 20% pay reduction	9 days = 50% pay reduction
5 days = 25% pay reduction	10 days = 75% pay reduction

    c) If the components of the SWZ are down for more than ten (10) total days in a month, whether they are consecutive or cumulative, and then NO payment will be made for that month.

4. The SWZ Operations item will be measure items will be measured for payment by the month for web site operations.

5. The SWZ Trailer Relocation item will be measured for payment each time a SQT, SVQS, or SVMQ is relocated from an existing location to another location, as approved or directed by the Engineer.

Basis of Payment:

1. Payment for accepted SWZ installation will be at the Contract lump sum price for "Smart Work Zone Deployment" which shall include submittals, component delivery, and system set up, all materials, equipment, tools, travel and labor incidental thereto. The Contractor shall comply with the requirements stated in the System Performance section herein.

2. Payment for accepted trailer-mounted components will be at the Contract unit price per month or a fraction of the month for each "Smart Work Zone Queue Trailer/Sensor (SQT)," "Smart Work Zone Mobile Video Camera/Queue Sensor Trailer (SVQS)" and "Smart Work Zone Variable Message Sign/Queue Sensor Trailer (SVMQ)" which price shall include queue trailer and sensor, camera/queue sensors and trailers, variable message signs, sensors and trailers, cloud hosted third party traffic speed data, processed rock, temporary license plates, solar panels, batteries, removal, travel, and all materials, equipment, tools and labor incidental thereto.

3. Payment for accepted SQT Service, SVMQ Service, and SVQS Service items shall include all operational and service costs directly related to the furnishing and installing individual trailers and trailer-mounted equipment including, but not limited to, cellular communications, programming, service, maintenance, cleaning, repair, and all materials, equipment, tools, and labor incidental thereto.

4. Payment for uninterrupted SWZ operations as specified will be at the Contract unit price per month for "Smart Work Zone Operations" which price shall include all operations and maintenance costs not directly related to the individual trailers and trailer mounted equipment including, but not limited to, website operations, data collection and travel delay costs calculations, programming, system integration, maintenance, repair, and all materials, equipment, tools and labor Cost for hosting a web site incidental thereto.

5. Payment for approved relocation of SQT, SVQS and SVMQ units will be at the Contract unit price for each "Smart Work Zone Trailer Relocation" which price shall include processed rock, website revisions, and all materials, equipment, tools and labor incidental thereto.

The pay unit is each that will be paid on a monthly basis for each of the Smart Work Zone Variable Message Sign/Queue Sensor Trailer (SVMQ) and the Smart Work Zone Video Camera/Queue Sensor Trailer (SVQS). The Engineer may remove or add SWZ items by unit at the Engineer's discretion. The contractor will be notified thirty (30) days in advance by the Engineer. The payment shall be adjusted based on the actual number of SWZ units installed or removed including corresponding operations items.

Pay Item	*Pay Unit*
Smart Work Zone Deployment	l.s.
Smart Work Zone Operations	mo.
Smart Work Zone Trailer Relocation	ea.
Smart Work Zone Queue Trailer/Sensor (SQT)	ea.
Smart Work Zone Queue Trailer/Sensor (SQT) Service	mo.
Smart Work Zone Variable Message Sign/Queue Sensor Trailer (SVMQ)	ea.
Smart Work Zone Variable Message Sign/Queue Sensor Trailer (SVMQ) Service	mo.
Smart Work Zone Video Camera/Queue Sensor Trailer (SVQS)	ea.
Smart Work Zone Video Camera/Queue Sensor Trailer (SVQS) Service	mo.

ITEM #1201802A - 4 CHORD TRUSS BRIDGE SIGN STRUCTURE

Description: Work under this item shall consist of designing, fabricating and installing a sign support structure to carry extruded aluminum traffic signs, on a prepared foundation, in accordance with the details shown on the plans, in accordance with these specifications and as ordered by the Engineer. For the purposes of this specification, the sign support structure shall be composed of a 4 chord truss supported on each end by a 2 post tower.

Materials: The tower posts, tower bracing, truss chords and truss bracing shall be tubular members fabricated from round steel pipe. The steel pipe shall have a tabulated yield stress no less than 35,000 psi.

Tower and truss members fabricated from multisided tubular members are not permitted.

The structural plate components, such as the baseplates, connection/flange/splice plates, gusset plates, handhole frames and plates in the truss to post connection, shall be made of steel that conforms to the requirements of ASTM A709, Grade 50T2.

Anchorage plates shall conform to the requirements of ASTM A709, Grade 50T2.

The non-structural components, such as handhole covers and cap plates, shall conform to the requirements of ASTM A709, Grade 50. Sign panel support members shall conform to the requirements of ASTM A709, Grade 50.

The use of steel plate or rolled shapes with a tabulated yield stress less than 50 ksi is not permitted.

The steel for tower posts, truss chord members, structural plate components, such as the baseplates, connection/flange/splice plates, gusset plates, handhole frames and plates in the truss to tower connection, and shall meet the following Charpy V-notch impact testing requirements:

Yield Strength	Thickness in.	Minimum Test Value Energy ft.-lbs.	Minimum Average Energy, ft.-lbs.
$F_y \leq$ 36 ksi	$\leq$ 4	20	25 at 40ºF
36 ksi < $F_y \leq$ 50 ksi	$\leq$ 2	20	25 at 40ºF
36 ksi < $F_y \leq$ 50 ksi	2 < t $\leq$ 4	24	30 at 40ºF
50 ksi < $F_y \leq$ 70 ksi	$\leq$ 4	28	35 at -10ºF
Charpy V-notch sampling and testing shall be in accordance with ASTM A673, “P” piece frequency.			

The weld filler metal shall have a matching strength relationship with the base metal.

All high strength bolts shall conform to ASTM F3125 Grade A325, Type 1. Nuts shall conform to ASTM A563, Grade DH. Circular, flat, hardened steel washers shall conform to ASTM F436. The bolts, nuts and washers shall be galvanized in accordance with ASTM F2329 or ASTM B695, Class 55. The nuts shall be overtapped to the minimum amount required for the bolt assembly and all surfaces of the nuts shall be lubricated with a lubricant containing a visible dye of any color that contrasts with the color of the galvanizing. The high strength bolts shall conform to the requirements of Subarticle M.06.02-3.

Compressible-washer-type direct tension indicators shall conform to ASTM F959, Type 325, and shall be galvanized in accordance with ASTM B695, Class 55.

U-bolts and threaded rods shall conform to ASTM A449. The nuts shall conform to ASTM A563, Grade DH. The washers shall conform to ASTM F436. The bolts, nuts and washers shall be galvanized in accordance with ASTM F2329 or ASTM B695, Class 55. The nuts shall be overtapped to the minimum amount required for the fastener assembly and all surfaces of the nuts shall be lubricated with a lubricant containing a visible dye of any color that contrasts with the color of the galvanizing. The threaded ends of all U-bolts and threaded rods shall be supplied with 1 washer and 2 nuts.

The anchor bolts shall conform to ASTM F1554, Grade 105. The nuts shall conform to ASTM A563, Grade DH. The washers shall conform to ASTM F436. The bolts, nuts and washers shall be galvanized in accordance with ASTM F2329. The nuts shall be overtapped to the minimum amount required for the bolt assembly and all surfaces of the nuts shall be lubricated with a lubricant containing a visible dye of any color that contrasts with the color of the galvanizing. Prior to shipping the anchor bolts, the nuts and washers shall be installed by hand on the anchor bolts to ensure that the nuts can be run on the threads. Only anchor bolts on which the nuts are free running shall be shipped. The anchor bolts shall be shipped with the nuts and washers on the threads.

All steel components, including anchor bolts, shall be completely hot-dip galvanized, after fabrication, in accordance with ASTM A123 or ASTM F2329, as applicable. Repairs to damaged areas of the hot-dip galvanized coatings shall conform to the requirements of ASTM A780 amended as follows:

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

The silicone sealant shall be a 1-component, 100% silicone sealant recommended for use with galvanized steel.

Neoprene gasket material for the access openings shall conform to ASTM D1056, Grade 2A2 or 2A3. Other grades of neoprene approved by the Engineer may be used.

Bare copper grounding conductor shall be #8 AWG stranded bare copper wire conforming to M.15.13. The grounding bolt shall be galvanized steel with a hex head.

All materials used in the finished structure shall be new. The use of materials that have been previously used in a structure or salvaged from a structure is not permitted.

The Contractor shall submit Certified Test Reports and Materials Certificates in conformance with Article 1.06.07 for the steel used in the tower and truss members and components, high-strength bolts (including nuts and washers), anchor bolts (including nuts and washers), U-bolts (including nuts and washers) and threaded rods (including nuts and washers). In addition, the following shall be submitted:

a. Mill test reports that indicate the place where the material was melted and manufactured.

b. High-strength bolt test results for proof load tests, wedge tests, and rotational-capacity tests that indicate where the tests were performed, date of tests, location of where the components were manufactured and lot numbers.

c. Galvanized material test results that indicate the thickness of the galvanizing.

Prior to incorporation into the work, the Contractor shall submit samples in conformance with Article 1.06.02 for the steel used in the support members and components, high-strength bolts (including nuts and washers), anchor bolts (including nuts and washers), U-bolts (including nuts and washers) and threaded rods (including nuts and washers).

Construction Methods: The design and fabrication of the sign support structure, including its anchorage (into the foundation) and the hardware and structural members required to support the traffic appurtenances, shall conform to the requirements of the latest edition of the AASHTO LRFD Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals, including the latest interim specifications, available prior to the advertising date of the contract, amended as follows:

- The design of the sign support structure shall consider all load effects due to the Strength I, Extreme I, Service I and Fatigue I limit states.

- The unfactored dead load of the sign panels, sign panel support members and hardware shall be no less than the 8 psf.

- The design wind speed shall be 150 mph for the Extreme I limit state and 80 mph for the Service I limit state.

- The design shall investigate the load effects resulting from applying the maximum and minimum load factors for each applicable limit state.

- The wind drag coefficient, C_d, for traffic signs shall be 1.3.

- The height and exposure factor, K_z, shall be determined based on the highest elevation of the structure or the supported sign panels. The factor shall be considered constant in all pressure calculations required for the design of the structure. The height and exposure factor shall be no less than 1.05.

- The sign structure shall be designed for fatigue category I for noncantilevered structures. The sign structure shall be designed for the wind load effects due to natural wind gusts and truck-induced gusts. The design pressure for the truck-induced gust shall be based on a truck speed of 65 mph. The sign structure shall be designed assuming that vibration mitigation devices will not be installed.

- The vertical deflection of the truss due to the wind load effects of truck-induced gusts shall not exceed 8 inches.

- The fixity of the structure connections shall be as follows:

  Welded gusset plate, bracing member to chord connections shall be considered rigid in the plane of the gusset plate and pinned perpendicular to the plane of the gusset plate.

  Flange plate chord to chord connections shall be considered rigid with respect to both axes.

  Baseplate to anchor bolt connection shall be considered rigid with respect to both axes.

- The minimum effective length factor, K, shall be as follows:

  For the tower posts, $k = 2.1$

  For truss chord and bracing, and tower bracing, $k \geq 1.0$

- For any structure components subject to combined forces, the combined force interaction ratio due to each limit state shall not exceed 0.75. For any structure components not subject to combined forces, the ratio of the computed force (or stress) to the force (or stress) limit due to each limit state shall not exceed 0.75.

- The maximum vertical deflection of the overhead truss resulting from the Service I limit state shall be no greater than $^{L}/_{150}$, where L is the span length of the truss measured from centerline to centerline of the tower posts. Wind loads on components that reduce the vertical deflection shall be neglected.

- The truss shall be cambered to compensate for the dead load deflections. The truss shall have a permanent camber no less than $^{L}/_{1000}$ and no greater than $^{L}/_{500}$. L is the span length of the truss measured from centerline to centerline of the tower posts. The permanent camber is in addition to the dead load camber.

- The maximum span length of the truss shall be 200.00 feet or as shown on the Contract Drawings, measured from the centerline to centerline of the towers. Span lengths shown on the Contract Drawings shall be field verified by the Contractor prior to design.

- The truss chords shall be fabricated in 1 or more sections and connected with chord flange splices. The chords within the sections shall be fabricated from a single piece of pipe. Chord sections fabricated from multiple pieces of pipe are not permitted. All truss chords shall have the same cross-sectional properties and material designations. The minimum wall thickness of the truss chord members shall be 0.3125 inches.

- Tower posts shall be fabricated from a single piece of pipe. Posts fabricated from multiple pieces of pipe are not permitted. All tower posts shall have the same cross-sectional properties and material designations. The minimum wall thickness of the tower posts shall be 0.3125 inches. The maximum outer diameter of the tower posts shall not exceed 2.00 feet.

- Tower and truss bracing shall be fabricated from steel pipe. All tower bracing shall have the same cross-sectional properties. All truss bracing shall have the same cross-sectional properties. The cross-sectional properties of the tower and truss bracing may differ. All bracing shall have the same material designations. The bracing shall have a minimum nominal diameter of 2.50 inches. The bracing shall have a minimum thickness of 0.203 inches. The bracing shall be connected to tower post and truss chord gusset plates with slotted tube connections. The bracing slot shall have a coped hole at the end of the slot. In a minimum of 25% of the bracing gusset plate to tower post connections, 100% of the fillet welds on each side of the connection, shall be non-destructively tested in accordance with the magnetic particle method. In a minimum of 25% of the bracing gusset plate to truss chord connections, 100% of the fillet welds on each side of the connection, shall be non-destructively tested in accordance with the magnetic particle method.

- At a minimum, internal diagonal bracing shall be provided at each end of each truss section to maintain the shape and stability the truss sections during shipping and handling of the sections and the erection of the completed truss. At a minimum, additional internal diagonal bracing shall be placed at a panel point at the midspan of the truss sections greater than 25.00 feet in length. The internal diagonal bracing may be provided using either a single member or multiple members.

- All tubular member to transverse plate connections shall be made with a complete joint penetration groove weld with a backing ring attached to the plate with a continuous fillet weld. 100% of the complete joint penetration groove welds shall be non-destructively tested by the ultrasonic method after fabrication and prior to galvanizing. 100% of the complete joint penetration groove welds shall also be non-destructively tested by the ultrasonic method for toe cracks after galvanizing. 100% of backing ring fillet welds shall be non-destructively tested by the magnetic particle method after fabrication prior to galvanizing. After galvanizing, the joint between the backing ring and tubular member shall be sealed with silicone sealant to prevent the ingress of moisture.

- The use of stiffeners at tubular member to transverse plate connections is not permitted.

- The strength of a connection made with a complete joint penetration groove weld shall be no greater than the strength of the base metal. In connections joining base metal with different yield strengths, the base metal with the lower yield strength shall govern the design.

- The minimum flange splice plate thickness shall be 2.00 inches. The determination of the plate thickness in the tubular member to transverse plate connections shall consider the potential for the plate to warp due to the heat from welding. Consideration should be given to the use of thicker plates to allow for subsequent machining of warped plates to a flat surface so that removal of material will not compromise the required strength of the plate.

- All high-strength bolted connections shall be designed as slip critical connections with standard holes, unless otherwise noted. The high-strength bolts shall conform to the maximum spacing requirements for sealing and stitch fasteners. The high-strength bolts shall conform to the edge distance requirement for fasteners. Consideration should be given to the use of smaller diameter bolts since they require lower specified minimum bolt tensions.

- The minimum number of high-strength bolts in flange splices in the truss chords shall be 6.

- The minimum thickness of the tower and truss bracing gusset plates shall be 0.50 inches.

- The minimum size fillet weld shall be 0.25 inches, unless noted otherwise. The use of seal and tack welds is not permitted. No welding shall be performed after galvanizing.

- The minimum base plate thickness shall no less than 2.00 inches or at least as thick as the anchor bolt diameter, whichever is greater. The determination of the plate

thickness in the tubular member to transverse plate connections shall consider the potential for the plate to warp due to the heat from welding. Consideration should be given to the use of thicker plates to allow for subsequent machining of warped plates to a flat surface so that removal of material will not compromise the required strength of the plate.

- The opening in the base plate shall be sized to allow for proper galvanizing and allow conduits projecting from the foundation to pass through it. The size of the opening shall be kept to a minimum to reduce the flexibility of the baseplate.

- The anchor bolt to base plate connection shall be designed as a double-nut connection with shear holes. The minimum distance from the center of the anchor bolt hole to the edge of the base plate shall be no less than 2 times the diameter of the anchor bolt. The anchor bolts shall use an embedded anchorage plate, 0.75 inch minimum thickness, to transmit loads from the post base to the concrete foundation. The use of hooked anchor bolts is not permitted. The minimum number of anchor bolts shall be 4. The minimum anchor bolt diameter shall be 1.50 inches. The minimum anchor bolt embedment, the distance from the top of the foundation to the top of the embedded anchorage plate, shall be 3.50 feet or the tension development length of the vertical foundation reinforcement plus the end concrete cover, whichever is greater, unless otherwise shown on the plans. Each anchor bolt shall be supplied with 5 nuts and 4 washers. Washers shall be placed on the top and bottom surfaces of the post base plate and anchorage plate. Welding to the anchor bolts is not permitted. The use of lock washers with the anchor bolt assembly is not permitted.

The approximate dimensions of the truss and the tower post heights are shown in plan and elevation on the traffic sheets. The actual sign support dimensions shall be determined by the Contractor based on a the horizontal and vertical clearances shown on the plans, a field survey of the finished grade at the site, the elevation of the top of the finished foundation, the locations of overhead and subsurface utilities, the location of the drainage facilities and noise barrier wall locations.

The minimum vertical clearance from the top of the finished road to the bottom of the sign panels and the centerline of the truss shall be a minimum of 18.00 feet unless shown otherwise on the plans. If shown on the plans, the minimum vertical clearance from the top of the finished road to the bottom of the sign panels and the centerline of the truss shall be as shown on the sign support drawings as amended by the sign support elevation on the traffic sheets. The minimum vertical clearance from the top of the finished road to the lowest point of the bottom chords of the truss system shall be no less than 20.00 feet.

Sign panels shall be installed symmetrically about the centerline of the truss. The bottom of all signs shall be level. Sign panels shall be installed at an angle of 5° from the vertical, with the top edge tilting toward oncoming traffic.

The sign panels and crown panels, if applicable, shall be connected to sign panel support members. The support members shall extend full height of the sign and crown panels. The number and spacing of support members shall be determined by the Contractor based on the width of the sign and crown panels and the support member spacing parameters shown on the plans. Sign panels shall be supported by no less than 3 support members. Crown panels shall be supported by no less than 2 support members. The faying surface between the sign panel support member and the rear face of the sign panel shall be a flange so that panel clips may be placed on both sides of the flange to connect the panel. The outside support members for each sign panel shall include a sign stop at the bottom of the member and a sign hook at the top of the member to support and carry the sign panels.

The sign panel support members shall be designed to be vertically adjustable to compensate for the truss camber. The supports members shall be designed to be installed at any location along the truss. The use of U-bolts and threaded rods is permitted. No less than 2 U-bolts or 4 threaded rods shall be used at each chord connection. The threaded ends of these fasteners shall have double nuts.

The minimum thickness of the sign panel support members and the plate and rolled shape components used in the connection to the sign support shall be 0.25 inches.

The sign support shall be designed for the load effects due to the actual sign panels, including crown panels, as well as any future sign and crown panels that it will carry, as shown on the plans. The sign supports shall also be designed for the load effects of sign and crown panels during all stages of construction which may exist during the project under which the supports are installed. The load effects on the sign support from the sign and crown panels shall include forces and moments due to the eccentricity of the sign and crown panels and the unbalanced lateral loads on the crown panel. The sign support and its component parts shall also be designed for the load effects resulting from the transportation and erection of the support.

The sign support shall be designed so that the 4 chords of the truss fit within the tower posts. Each truss chord shall be connected to a tower post. 100% of the fillet welds used in the truss to post connection shall be non-destructively tested in accordance with the magnetic particle method. All bolts, nuts and washers used in the connection shall be visible. The use of tapped holes in the plates of the connection is not permitted.

Vent and drain holes shall be provided for galvanizing. The number, size and location of vent and drain holes should be coordinated with the galvanizer prior to the submission of the sign support design. The area of vent and drain holes at each end of a member shall be at least 30% of the inside area of the member for members 3.00 inches in diameter and greater and 45% of the inside area of the member for members smaller than 3.00 inches in diameter. The vent and drain holes shall be strategically located for reducing stress and for proper galvanizing. The holes shall be made by drilling. Flame cut holes are not permitted. The edges of all holes shall be rounded by grinding. After galvanizing, exposed holes placed in the sign support components for galvanizing shall be sealed with neoprene plugs.

One post in each tower shall have a handhole located adjacent to base of the post. The handhole shall be reinforced with a frame. The handhole shall be located with a normal direction that is 90° to the plane formed by the post and overhead truss. The clear distance from the top of the baseplate to the outside face of the bottom of the handhole frame shall be no less than the diameter of the tubular member plus 2 inches and no greater than the diameter of the tubular member plus 4 inches.

The handhole frame shall be fabricated from steel plate and bent to form a closed shape and joined with a complete joint penetration groove weld. All surfaces of the groove weld shall be ground smooth and flush with the adjacent base metal. The handhole frame shall have a minimum 4.00 inch wide by minimum 6.00 inch high clear opening. The maximum width of the handhole opening, the clear opening plus twice the frame thickness, shall not be greater than 40% of the post diameter at that section. The inside corners of the handhole frame shall be rounded to a radius of 30% to 50% of the width of the clear opening. The minimum thickness of the handhole frame shall be no less than the thickness of the post or 0.3125 inches, whichever is greater. The handhole frame shall be connected to the post with a partial joint penetration groove weld reinforced with a fillet weld. The handhole weld shall start and end at the point that is coincident with the longitudinal axis of symmetry of the post and the longitudinal axis of symmetry of the handhole frame. 100% of the weld shall be non-destructively tested in accordance with the magnetic particle method. The handhole shall be provided with a cover connected to the frame with no less than 4 stainless steel screws. The cover shall be installed with a neoprene gasket matching the dimensions of the cover. The cover and the gasket and the handhole frame shall be in firm and continuous contact after tightening the fasteners. The cover shall also be attached to the frame with a 1.50 foot long stainless steel chain. The stainless steel chain shall be bolted to the inside face of the cover with a stainless steel bolt with a lock nut and also bolted to the inside side face of the handhole frame with a stainless steel bolt. On post handhole frames, the side face of the handhole opposite of the stainless steel chain connection shall have a hole with a nut welded to outside face for a galvanized steel grounding bolt.

The ends of each chord member shall be sealed with a removable end cap plate attached to the member with a threaded fastener. The joint between the member and cap plate shall be sealed with a neoprene gasket.

The design of the sign support and the anchorage shall be coordinated with the design of the foundation to ensure that the foundation is adequate for the support reactions and to avoid conflicts between the embedded anchorage and the foundation reinforcement.

Prior to performing a field survey for each sign support, the Contractor shall coordinate with the Engineer to locate and stake each support foundation. The foundations shall be located to avoid conflicts with both subsurface and overhead utilities and subsurface drainage structures. In accordance with Article 1.05.15, the Contractor shall contact “Call Before You Dig” to identify the subsurface utilities that are located in the vicinity of each foundation. Once the location of each foundation has been found acceptable to the Engineer, the Contractor shall perform a field survey to obtain the information necessary to prepare a roadway cross-section with details of each sign support and supporting foundation(s).

Prior to designing each sign support, the Contractor shall prepare and submit a cross-section (elevation) drawing based on a field survey for each sign support to the Engineer for review in accordance with 1.05.02. A cross-section drawing is a working drawing for permanent construction. Only one sign support cross-section shall be shown on each drawing.

The cross-sections shall include, but not be limited to the following:

- Project number, town, location (route number, direction, mileage), station, structure number, sign location number, and site number
- Location and dimensions of travel lanes and shoulders
- Location and elevation of the high point of the road
- Top and bottom of slope elevations. Slope of finished grade at foundations
- Locations of utilities (both overhead and subsurface)
- Locations of drainage facilities
- Locations of noise barriers, including elevation of top of wall
- Type of protection (metal beam rail/barrier), and the dimension from the front face of metal beam rail /barrier to the edge of the foundation and centerline of the foundation
- Elevation of the top of the foundation(s). The top of the foundation(s) shall project 6.00 inches to 12.00 inches above the level ground or 6.00 inches to 12.00 inches above the finished grade at the high side of a sloping grade.
- Dimension from top foundation to finish grade (existing or proposed as applicable).
- Span, dimension from centerline to centerline of foundations
- Dimensions of sign panel(s)
- Location of sign panel(s) relative to the centerline of the foundations/posts
- Location of sign panel(s) relative to the roadway travel lanes
- Dimension from top of foundation to centerline of truss
- Minimum dimensions from high point of the road to the centerline of the truss and the bottom of the sign panel(s)

- Elevation of centerline of truss

If there are any changes to the proposed location of the sign support and foundations prior to the construction of the foundations, the cross-section shall be re-submitted for review.

Prior to fabrication, the Contractor shall submit working drawings and design computations for each sign support, **based on the reviewed cross-section,** to the Engineer for review in accordance with Article 1.05.02. The working drawings and design computations for sign supports shall conform to working drawings for permanent construction. An individual, independently packaged set of working drawings and computations, with all details and documents necessary for fabrication and erection of the structure and its components shall be prepared and submitted for **each** support. **A single set of drawings with tabulated data for multiple sign support locations is not permitted.** Combining working drawing submittals for sign structures with submittals for structure foundations is not permitted. Working drawings for the erection of the structure shall conform to Subarticle 6.03.03-2(d).

The packaged set of working drawings and computations for each support shall include the following:

- title sheet
- table of contents
- contact information for designer, fabricator and galvanizer – contact information should include name and address of each firm and the name of contact person with phone number and email address
- copy of fabricator's AISC certification
- copy of the **reviewed** cross-section
- sign support working drawings
- sign support design computations
- welding procedures
- working drawings and supporting calculations for the erection of the structure
- sign support installation procedure, including the method to plumb the tower posts

The sign support working drawings shall include complete details of all sign support components. The drawings shall include, but not be limited to the following:

- the project number, town and alpha-numeric support identification number
- reference to the design specifications, including interim specifications
- reference to the design specifications design criteria, such as design wind speed, minimum design life, etc.
- material specifications/designations for all components
- non-destructive weld testing requirements
- vent and drain holes for galvanizing
- dead load and permanent camber
- a plan view of the anchor bolt layout relative to the orientation of the span
- anchor bolt dimensions, including embedment and projection
- support installation procedure, including the method to plumb the tower posts

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

- the project number, town and alpha-numeric support identification number
- references to design specifications, including interim specifications, and the applicable code section and articles
- description/documentation for all computer programs used in the design
- drawings/models of the structure, components and connections, with dimensions, loads and references to the local and global coordinate systems used (as applicable), to facilitate review of the results
- Tabulation of the section properties of the tubular members at each analyzed section. The tabulated values should include the diameter, D; wall thickness, t; cross-sectional area, A; moment of inertia, I; section modulus, S; radius of gyration, r. AASHTO Table B.2-1 may be used to determine the section properties. If Table B.2-1 is used, the radius measured to the mid-thickness of the wall shall also be provided.
- coefficients and factors used in the design

- results of all applicable limit states
- combined force interaction ratios for all applicable limit states
- maximum vertical deflection resulting from the Service I limit state
- vertical deflection of the truss due to the wind load effects of truck-induced gusts
- total camber and permanent camber

The submitted design computations shall reflect the load effects due to the actual sign panels, including crown panels, to be installed on the sign structure in the final condition. If additional sign and crown panels are shown on the plans for temporary signing during stage construction or for future signing, separate design computations shall be submitted to reflect those loading conditions and document the adequacy of the sign structure design.

The Contractor shall make printed copies of the stamped working drawings and calculations, of the size and number determined by the Engineer, and deliver the copies as directed by the Engineer.

If the as-built condition of the foundation(s), such as the location or elevation, will impact the design, final erection or assembly of the sign support for conformance with the requirements herein, the cross-section shall be re-submitted for review. Subsequently, the working drawings and calculations shall be resubmitted to conform to the revised cross-section and the requirements herein.

If the as-built condition of the foundation(s), such as the location or elevation, will impact the design, final erection or assembly of the sign support for conformance with the requirements herein, the cross-section shall be re-submitted for review. Subsequently, the working drawings and calculations shall be resubmitted to conform to the revised cross-section and the requirements herein.

The support shall be fabricated in accordance with the latest edition of the AASHTO LRFD Bridge Construction Specifications, including the latest interim specifications, amended herein.

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

Fabrication of the support may begin only after the working drawings and design computations have been reviewed and the Engineer has authorized fabrication to begin. The Contractor shall submit to the Engineer, no less than 2 weeks prior to the start of fabrication, the name and location of the fabrication shop where the work will be done so that arrangements can be made for an audit of the facility and the assignment of the Department Quality Assurance (QA) inspector. No

fabrication will be accepted unless the QA inspector is present during fabrication. No changes may be made during fabrication without prior written approval by the Department.

The Contractor shall furnish facilities for the inspection of material and workmanship in the shop by the Engineer. The Engineer and his representative shall be allowed free access to the necessary parts of the premises.

The Engineer will provide QA inspection at the fabrication shop to assure that all applicable Quality Control plans and inspections are adequately adhered to and maintained by the Contractor during all phases of the fabrication. A thorough inspection of a random selection of elements at the fabrication shop may serve as the basis of this assurance.

Prior to shipment to the project, each individual piece of steel shall be marked in a clear and permanent fashion by a representative of the fabricators' Quality Control (QC) Department to indicate complete final inspection by the fabricator and conformance to the project specifications for that piece. The mark must be dated. A Materials Certificate in accordance with Article 1.06.07 may be used in lieu of individual stamps or markings, for all material in a single shipment. The Materials Certificate must list each piece within the shipment and accompany the shipment to the project site.

Following the final inspection by the fabricator's QC personnel, the Engineer may select pieces of steel for re-inspection by the Department's QA inspector. Should non-conforming pieces be identified, all similar pieces must be re-inspected by the fabricator and repair procedure(s) submitted to the Engineer for approval. Repairs will be made at the Contractor's expense.

The pieces selected for re-inspection and found to be in conformance, or adequately repaired pieces, may be marked by the QA inspector. Such markings indicate the Engineer takes no exception to the pieces being sent to the project site. Such marking does not indicate acceptance or approval of the material by the Engineer.

All welding details, procedures and nondestructive testing shall conform to the requirements of AWS D1.1 Structural Welding Code - Steel.

Personnel performing the nondestructive testing shall be certified as a NDT Level II technician in accordance with the American Society for Non Destructive Testing (ASNT), Recommended Practice SNT-TC-1A and approved by the Engineer.

All nondestructive testing shall be witnessed by Engineer. Certified reports of all tests shall be submitted to the Engineer for examination. Each certified report shall identify the structure, member, and location of weld or welds tested. Each report shall also list the length and location of any defective welds and include information on the corrective action taken and results of all retests of repaired welds.

The Department reserves the right to perform additional testing as determined by the Engineer. Should the Engineer require nondestructive testing on welds not designated in the contract, the

cost of such inspection shall be borne by the Contractor if the testing indicates that any weld(s) are defective. If the testing indicates the weld(s) to be satisfactory, the actual cost of such inspection will be paid by the Department.

All members and components shall be hot-dip galvanized in a single dip. Double-dipping of members and components is not permitted. All exterior and interior surfaces of the sign support members and components shall be completely galvanized.

Galvanized members and components shall be free from uncoated areas, blisters, flux deposits, and gross inclusions. Lumps, projections, globules, or heavy deposits of zinc which will interfere with the intended use of the material will not be permitted.

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

Prior to shipping, all galvanized surfaces of the members and components shall be inspected, in the presence of the Engineer, to determine the acceptability of the galvanized coating. Galvanized coatings may be found acceptable by the Engineer if all surfaces of the members and components meet the galvanizing requirements herein. Only sign support members and components with acceptable galvanized coatings shall be shipped. If the galvanized coating on any member or component is found not acceptable, the Contractor shall submit a repair procedure to the Engineer for review.

Unless provisions for the sign support structure number are otherwise included in the contract, the sign support structure number shall be stenciled in black paint on the right side pole (as determined by the direction of traffic traveling below the structure) centered approximately 5.00 feet off the ground and visible from the roadway. The numeric characters shall be 3.00 inches to 4.00 inches high and placed vertically so that they may be read from top to bottom.

After fabrication, the sign support components shall be assembled in the fabricator's shop, in the presence of the Engineer, to determine the acceptability of the bolted connections and to confirm the permanent camber. The faying surfaces of the connections shall be free of dirt, loose scale, burrs, other foreign material and other defects that would prevent solid seating of the parts. Prior to assembly, the galvanized faying surfaces shall be scored by wire brushing. The faying surfaces of the connection plates shall be checked with a straight edge to ensure that the surfaces are not distorted and the entire faying surface of each plate will be in contact when assembled. The high-strength bolts, including nuts and washers, shall be installed and tensioned in accordance with Subarticle 6.03.03-4(f). A connection may be found acceptable by the Engineer if the faying surfaces of the connection plates are in firm, continuous contact after properly tensioning the bolts. Only sign supports with acceptable connections shall be shipped. If a bolted connection is found not acceptable, the Contractor shall submit a procedure to repair the connection to the Engineer for

review. Galvanized surfaces damaged by the repair procedure shall be hot dip galvanized. Repair of the damaged galvanized surfaces in accordance with the requirements of ASTM A780 or with a galvanizing repair stick is not permitted. Bolts, nuts and washers used for the trial shop fit-up shall not be reused in the final field assembly. The permanent camber shall be measured at mid-span and the member shall be rejected if the camber does not meet the following:

$$L/1000 \leq \text{Permanent Camber} \leq L/500$$

where L is the span length of the overhead member measured from centerline to centerline of the tower posts.

The finished members and components shall be protected with sufficient dunnage and padding to protect them from damage and distortion during transportation. Damage to any material during transportation, improper storage, faulty erection, or undocumented fabrication errors may be cause for rejection of said material at the project site. All costs associated with any corrective action will be borne by the Contractor.

Following delivery to the project site, the Engineer will perform a visual inspection of all material to verify shipping documents, fabricator markings, and that there was no damage to the material or coatings during transportation and handling.

The Engineer is not responsible for approving or accepting any fabricated materials prior to final erection and assembly at the project site.

High-strength bolts, nuts and washers shall be stored in accordance with Subarticle 6.03.03-4(f).

The support shall be erected, assembled and installed in accordance with these specifications and the procedures and methods submitted with the working drawings. The Contractor and the support designer are responsible to ensure that the erection and assembly procedures and methods in this specification are acceptable for use with the support. Changes to these methods and procedures shall be submitted with the working drawings and computations.

Prior to installation of the support, the exposed threads of all the embedded anchor bolts shall be cleaned of accumulated dirt and concrete and lubricated. The threads and bearing surfaces of all the anchor bolt nuts shall be cleaned and lubricated. The anchor bolts and nuts are properly lubricated if the nuts can be turned by hand on the anchor bolt threads. The lubricant shall contain a visible dye of any color that contrasts with the color of the galvanizing. Re-lubricate the threads of the anchor bolts and nuts if more than 24 hours has elapsed since earlier lubrication, or if the anchor bolts and nuts have become wet since they were first lubricated.

The space between the bottom of the baseplate and the top of the foundation shall not be sealed with closed cell elastomer or filled with grout, unless otherwise noted.
Install (turn) the leveling nuts onto the anchor bolts and align the nuts to the same elevation or plane. The distance from the bottom of the leveling nuts to the top of the foundation shall not

exceed 1.00 inch. Place a structural hardened washer on top of each leveling nut, 1 washer on each anchor bolt.

The tower shall be erected so that the centerline of the tower will be plumb after the application of all the dead loads.

Install the post base plate atop the washers resting on the leveling nuts, place a structural hardened washer on each anchor bolt resting it on the top of the base plate, and install (turn) a top nut on each anchor bolt until the nut contacts the washer. The leveling nuts and washers shall be inspected, and if necessary the nuts (turned), so that the washers are in full contact with the bottom surface of the base plate.

Tighten the top nuts to a snug tight condition in a star pattern. Snug tight is defined as the maximum rotation resulting from the full effort of one person using a 12.00 inch long wrench or equivalent. A star tightening pattern is one in which the nuts on opposite or near-opposite sides of the bolt circle are successively tightened in a pattern resembling a star (e.g., For an 8-bolt circle with bolt sequentially numbered 1 to 8, tighten nuts in the following bolt order: 1, 5, 7, 3, 8, 4, 6, 2.).

Tighten leveling nuts to a snug tight condition in a star pattern.

Before final tightening of the top nuts, mark the reference position of each top nut in a snug-tight condition with a suitable marking on 1 flat with a corresponding reference mark on the base plate at each bolt. Then incrementally turn the top nuts using a star pattern one-sixth of a turn beyond snug tight. Turn the nuts in at least two full tightening cycles (passes). After tightening, verify the top nut rotation. The top nuts shall have full thread engagement. The distance from the bottom of the leveling nuts to the top of the foundation shall not exceed 1.00 inch.

High-strength bolts, including nuts and washers, shall be installed and tensioned in accordance with Subarticle 6.03.03-4(f). The truss shall be temporarily and fully supported while all the high-strength bolts are installed and tensioned. The temporary support of the truss shall not be removed until the Engineer has confirmed that the faying surfaces of the connection/flange plates are in firm, continuous contact and the high-strength bolts were properly installed and tensioned. All high-strength bolts in the bolted connections shall be inspected (in accordance with Subarticle 6.03.03-4(f)) to confirm the high-strength bolts were properly tensioned.

After erecting the support, the support shall be electrically grounded by attaching the bare copper grounding conductor to the inside of the handhole frame with a galvanized steel bolt and to the ground rod with a ground clamp. The rigid metal conduit shall be electrically grounded by attaching the bare copper grounding conductor to the insulated bonding bushing and to the ground rod with a ground clamp.

After erection of the support and before the installation of the sign panels, if the structure exhibits excessive vibration, oscillations or deflections as determined by the Engineer, the Contractor shall

immediately stabilize the structure to the satisfaction of the Engineer. Stabilizing the structure may require the removal of a portion of the structure or the entire structure.

The sign panels shall be located and mounted on the truss as shown in the working drawings.

After installation of the sign panels, the anchor bolts nuts (leveling and top anchor nut) and washers shall be in full contact with the top and bottom surfaces of the post baseplate and the centerline of the post shall be plumb.

After erection of the support and after the installation of the sign panels, if the structure exhibits excessive vibration, oscillations or deflections as determined by the Engineer, the Contractor shall design and construct devices to mitigate the movements. The Contractor is responsible for immediately stabilizing the structure to the satisfaction of the Engineer. Stabilizing the structure may require the removal of the sign panels or the entire structure. Prior to installation of any mitigation device, the Contractor shall submit drawings, design computations other documentation to the Engineer for review in accordance with Article 1.05.02.

Method of Measurement: This work will be measured for payment by the number of bridge sign structures, completed and accepted in place.

Basis of Payment: This work will be paid for at the contract unit price each for "4 Chord Truss Bridge Sign Structure", complete in place, which price shall include the field survey, equipment, materials, tools and labor incidental to the design, fabrication, quality control, transportation, erection and installation, including anchorage materials, sign panel support members and mitigation devices, if required, of the supports at the locations specified on the plans.

ITEM #1201804A - 4 CHORD TRUSS CANTILEVER SIGN STRUCTURE

Description: Work under this item shall consist of designing, fabricating and installing a sign support structure to carry extruded aluminum traffic signs, on a prepared foundation, in accordance with the details shown on the plans, in accordance with these specifications and as ordered by the Engineer. For the purposes of this specification, the sign support structure shall be composed of a cantilevered 4 chord truss supported by a single linear tubular pole member.

Materials: The poles shall be tubular members with either a round or multisided cross-section. The round tubular members shall be fabricated from steel pipe with a tabulated yield stress no less than 35,000 psi. The multisided tubular members shall be fabricated from steel plate conforming to the requirements of ASTM A709, Grade 50T2.

The truss chord members shall be tubular members with a round cross-section fabricated from steel pipe with a tabulated yield stress no less than 35,000 psi. Truss chord members fabricated from tubular members with a multisided cross-section are not permitted.

The truss bracing members shall be tubular members with a round cross-section fabricated from steel pipe with a tabulated yield stress no less than 35,000 psi.

The structural plate components, such as the baseplates, connection/flange/splice plates, gusset plates, handhole frames and plates in the truss to pole connection, shall be made of steel that conforms to the requirements of ASTM A709, Grade 50T2.

Anchorage plates shall conform to the requirements of ASTM A709, Grade 50T2.

The non-structural components, such as handhole covers and cap plates, shall conform to the requirements of ASTM A709, Grade 50. Sign panel support members shall conform to the requirements of ASTM A709, Grade 50.

The use of steel plate or rolled shapes with a tabulated yield stress less than 50 ksi is not permitted.

The steel for pole, truss chord members, structural plate components, such as the baseplates, connection/flange/splice plates, gusset plates, handhole frames and plates in the truss to pole connection, shall meet the following Charpy V-notch impact testing requirements:

Yield Strength	Thickness in.	Minimum Test Value Energy ft.-lbs.	Minimum Average Energy, ft.-lbs.
$F_y \leq$ 36 ksi	$\leq$ 4	20	25 at 40ºF
36 ksi < $F_y \leq$ 50 ksi	$\leq$ 2	20	25 at 40ºF
36 ksi < $F_y \leq$ 50 ksi	2 < t $\leq$ 4	24	30 at 40ºF
50 ksi < $F_y \leq$ 70 ksi	$\leq$ 4	28	35 at -10ºF

Charpy V-notch sampling and testing shall be in accordance with ASTM A673, "P" piece frequency.

The weld filler metal shall have a matching strength relationship with the base metal.

All high strength bolts shall conform to ASTM F3125 Grade A325, Type 1. Nuts shall conform to ASTM A563, Grade DH. Circular, flat, hardened steel washers shall conform to ASTM F436. The bolts, nuts and washers shall be galvanized in accordance with ASTM F2329 or ASTM B695, Class 55. The nuts shall be overtapped to the minimum amount required for the bolt assembly and all surfaces of the nuts shall be lubricated with a lubricant containing a visible dye of any color that contrasts with the color of the galvanizing. The high strength bolts shall conform to the requirements of Subarticle M.06.02-3.

Compressible-washer-type direct tension indicators shall conform to ASTM F959, Type 325, and shall be galvanized in accordance with ASTM B695, Class 55.

U-bolts and threaded rods shall conform to ASTM A449. The nuts shall conform to ASTM A563, Grade DH. The washers shall conform to ASTM F436. The bolts, nuts and washers shall be galvanized in accordance with ASTM F2329 or ASTM B695, Class 55. The nuts shall be overtapped to the minimum amount required for the fastener assembly and all surfaces of the nuts shall be lubricated with a lubricant containing a visible dye of any color that contrasts with the color of the galvanizing. The threaded ends of all U-bolts and threaded rods shall be supplied with 1 washer and 2 nuts.

The anchor bolts shall conform to ASTM F1554, Grade 105. The nuts shall conform to ASTM A563, Grade DH. The washers shall conform to ASTM F436. The bolts, nuts and washers shall be galvanized in accordance with ASTM F2329. The nuts shall be overtapped to the minimum amount required for the bolt assembly and all surfaces of the nuts shall be lubricated with a lubricant containing a visible dye of any color that contrasts with the color of the galvanizing. Prior to shipping the anchor bolts, the nuts and washers shall be installed by hand on the anchor bolts to ensure that the nuts can be run on the threads. Only anchor bolts on which the nuts are free running shall be shipped. The anchor bolts shall be shipped with the nuts and washers on the threads.

All steel components, including anchor bolts, shall be completely hot-dip galvanized, after fabrication, in accordance with ASTM A123 or ASTM F2329, as applicable. Repairs to damaged areas of the hot-dip galvanized coatings shall conform to the requirements of ASTM A780 amended as follows:

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

The silicone sealant shall be a 1-component, 100% silicone sealant recommended for use with galvanized steel.

Neoprene gasket material for the access openings shall conform to ASTM D1056, Grade 2A2 or 2A3. Other grades of neoprene approved by the Engineer may be used.

Bare copper grounding conductor shall be #8 AWG stranded bare copper wire conforming to M.15.13. The grounding bolt shall be galvanized steel with a hex head.

All materials used in the finished structure shall be new. The use of materials that have been previously used in a structure or salvaged from a structure is not permitted.

The Contractor shall submit Certified Test Reports and Materials Certificates in conformance with Article 1.06.07 for the steel used in the support members and components, high-strength bolts (including nuts and washers), anchor bolts (including nuts and washers), U-bolts (including nuts and washers) and threaded rods (including nuts and washers). In addition, the following shall be submitted:

a. Mill test reports that indicate the place where the material was melted and manufactured.

b. High-strength bolt test results for proof load tests, wedge tests, and rotational-capacity tests that indicate where the tests were performed, date of tests, location of where the components were manufactured and lot numbers.

c. Galvanized material test results that indicate the thickness of the galvanizing.

Prior to incorporation into the work, the Contractor shall submit samples in conformance with Article 1.06.02 for the steel used in the support members and components, high-strength bolts (including nuts and washers), anchor bolts (including nuts and washers), U-bolts (including nuts and washers) and threaded rods (including nuts and washers).

Construction Methods: The design and fabrication of the sign support structure, including its anchorage (into the foundation) and the hardware and structural members required to support the traffic appurtenances, shall conform to the requirements of the latest edition of the AASHTO LRFD Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals, including the latest interim specifications, available prior to the advertising date of the contract, amended as follows:

- The design of the sign support structure shall consider all load effects due to the Strength I, Extreme I, Service I and Fatigue I limit states.

- The unfactored dead load of the sign panels, sign panel support members and hardware shall be no less than the 8 psf.

- The design wind speed shall be 150 mph for the Extreme I limit state and 80 mph for the Service I limit state.

- The design shall investigate the load effects resulting from applying the maximum and minimum load factors for each applicable limit state.

- The wind drag coefficient, C_d, for traffic signs shall be 1.3.

- The height and exposure factor, K_z, shall be determined based on the highest elevation of the structure or the supported sign panels. The factor shall be considered constant in all pressure calculations required for the design of the structure. The height and exposure factor shall be no less than 1.05.

- The sign structure shall be designed for fatigue category I for cantilevered structures. The sign structure shall be designed for the wind load effects due to natural wind gusts and truck-induced gusts. The design pressure for the truck-induced gust shall be based on a truck speed of 65 mph. The sign structure shall be designed assuming that vibration mitigation devices will not be installed.

- The vertical deflection of the free end of the truss due to the wind load effects of truck-induced gusts shall not exceed 8.00 inches.

- The fixity of the structure connections shall be as follows:

  Welded gusset plate, bracing member to chord connections shall be considered rigid in the plane of the gusset plate and pinned perpendicular to the plane of the gusset plate.

  Flange plate chord to chord connections shall be considered rigid with respect to both axes.

  Baseplate to anchor bolt connection shall be considered rigid with respect to both axes.

- The minimum effective length factor, K, shall be as follows:

  For the pole, $k = 2.1$

  For truss chord and bracing, $k \geq 1.0$

- For any structure components subject to combined forces, the combined force interaction ratio due to each limit state shall not exceed 0.75. For any structure components not subject to combined forces, the ratio of the computed force (or stress) to the force (or stress) limit due to each limit state shall not exceed 0.75.

- The truss shall be cambered to compensate for the dead load deflections. The truss shall have a permanent camber no less than $^{L}/_{1000}$ and no greater than $^{L}/_{500}$. L is the span length of the cantilever truss measured from centerline of the pole to the end of the truss. The permanent camber is in addition to the dead load camber. The total camber shall be obtained with the use of through chord connection plates installed at an angle.

- The maximum span length of the truss shall be 45.00 feet, measured from the centerline of the pole to the end of the truss.

- The truss chords shall be fabricated in 1 or more sections and connected with chord flange splices. The chords within the sections shall be fabricated from single pieces of pipe. Chord sections fabricated from multiple pieces of pipe are not permitted. All truss chords shall have the same cross-sectional properties and material designations. The minimum wall thickness of the truss chord members shall be 0.3125 inches.

- The truss bracing shall be fabricated from steel pipe. All truss bracing shall have the same cross-sectional properties and material designations. The bracing shall have a minimum nominal diameter of 2.50 inches. The bracing shall have a minimum thickness of 0.203 inches. The bracing shall be connected to truss chord gusset plates with slotted tube connections. The bracing slot shall have a coped hole at the end of the slot. In a minimum of 25% of the bracing gusset plate to truss chord connections, 100% of the fillet welds on each side of the connection, shall be non-destructively tested in accordance with the magnetic particle method.

- At a minimum, internal diagonal bracing shall be provided at each end of each truss section to maintain the shape and stability the truss sections during shipping and handling of the sections and the erection of the completed truss. At a minimum, additional internal diagonal bracing shall be placed at a panel point at the midspan of the truss sections greater than 25.00 feet in length. The internal diagonal bracing may be provided using either a single member or multiple members.

- The minimum diameter of the pole shall be 2.00 feet. The maximum diameter of the pole shall be 2.50 feet.

- The pole shall be a tubular member with either a round or multisided cross-section. Multisided tubular members with other than 16 sides are not permitted. Multisided tubular member with fluted sides are not permitted.

- The minimum wall thickness of the pole shall be 0.3125 inches. The wall thickness of the pole shall be uniform throughout its length. The use of multiple plies (laminations) to obtain the required member thickness is not permitted. The use of shop-fabricated stepped members is not permitted.

- Joining 2 tubular members together with a circumferential weld to fabricate a pole is not permitted.

- Slip-type field splices are not permitted in any member.

- The poles may be fabricated with no more than 2 longitudinal seam welds. The seam welds shall be ground smooth and flush with the adjacent base metal. The use of external longitudinal reinforcement bars at longitudinal seam welds is not permitted. The use of spiral seam welds is not permitted.

- The longitudinal seam welds within 6.00 inches of the member ends shall be complete joint penetration groove welds.

- 100% of partial joint penetration longitudinal seam welds shall be non-destructively tested in accordance with the magnetic particle method. 100 % of complete joint penetration seam welds shall be non-destructively tested in accordance with the ultrasonic method.

- All tubular member to transverse plate connections shall be made with a complete joint penetration groove weld with a backing ring attached to the plate with a continuous fillet weld. 100% of the complete joint penetration groove welds shall be non-destructively tested by the ultrasonic method after fabrication and prior to galvanizing. 100% of the complete joint penetration groove welds shall also be non-destructively tested by the ultrasonic method for toe cracks after galvanizing. 100% of backing ring fillet welds shall be non-destructively tested by the magnetic particle method after fabrication prior to galvanizing. After galvanizing, the joint between the backing ring and tubular member shall be sealed with silicone sealant to prevent the ingress of moisture.

- The use of stiffeners at tubular member to base plate connection is not permitted.

- The strength of a connection made with a complete joint penetration groove weld shall be no greater than the strength of the base metal. In connections joining base metal with different yield strengths, the base metal with the lower yield strength shall govern the design.

- The minimum flange splice plate thickness shall be 2.00 inches. The determination of the plate thickness in the tubular member to transverse plate connections shall consider the potential for the plate to warp due to the heat from welding. Consideration should be given to the use of thicker plates to allow for subsequent machining of warped plates to a flat surface so that removal of material will not compromise the required strength of the plate.
- All high-strength bolted connections shall be designed as slip critical connections with standard holes, unless otherwise noted. The high-strength bolts shall conform to the maximum spacing requirements for sealing and stitch fasteners. The high-

strength bolts shall conform to the edge distance requirement for fasteners. Consideration should be given to the use of smaller diameter bolts since they require lower specified minimum bolt tensions.

- The minimum number of high-strength bolts in flange splices in the truss chords shall be 6.

- The minimum thickness of the truss to pole connection plates shall be 0.75 inches. The minimum thickness of the truss bracing gusset plates and the stiffener plates shall be 0.50 inches.

- The minimum size fillet weld shall be 0.25 inches, unless noted otherwise. The use of seal and tack welds is not permitted. No welding shall be performed after galvanizing.

- The minimum base plate thickness shall be no less than 2.50 inches, or at least as thick as the anchor bolt diameter, whichever is greater. The determination of the plate thickness in the tubular member to transverse plate connections shall consider the potential for the plate to warp due to the heat from welding. Consideration should be given to the use of thicker plates to allow for subsequent machining of warped plates to a flat surface so that removal of material will not compromise the required strength of the plate.

- The opening in the base plate shall be sized to allow for proper galvanizing and allow conduits projecting from the foundation to pass through it. The size of the opening shall be kept to a minimum to reduce the flexibility of the baseplate.

- The anchor bolt to base plate connection shall be designed as a double-nut connection with shear holes. The minimum distance from the center of the anchor bolt hole to the edge of the base plate shall be no less than 2 times the diameter of the anchor bolt. The anchor bolts shall use an embedded anchorage plate, 0.75 inch minimum thickness, to transmit loads from the pole base to the concrete foundation. The use of hooked anchor bolts is not permitted. The minimum number of anchor bolts shall be 12. The minimum anchor bolt diameter shall be 2.00 inches. The minimum anchor bolt embedment, the distance from the top of the foundation to the top of the embedded anchorage plate, shall be 3.50 feet or the tension development length of the vertical foundation reinforcement plus the end concrete cover, whichever is greater. Each anchor bolt shall be supplied with 5 nuts and 4 washers. Washers shall be placed on the top and bottom surfaces of the pole base plate and anchorage plate. Welding to the anchor bolts is not permitted. The use of lock washers with the anchor bolt assembly is not permitted.

The approximate dimensions of the truss and the pole heights are shown in plan and elevation on the traffic sheets. The actual sign support dimensions shall be determined by the Contractor based on a the horizontal and vertical clearances shown on the plans, a field survey of the finished grade

at the site, the elevation of the top of the finished foundation, the locations of overhead and subsurface utilities, the location of the drainage facilities and noise barrier wall locations.

The minimum vertical clearance from the top of the finished road to the bottom of the sign panels and the centerline of the truss shall be a minimum of 18.00 feet unless shown otherwise on the plans. If shown on the plans, the minimum vertical clearance from the top of the finished road to the bottom of the sign panels and the centerline of the truss shall be as shown on the sign support drawings as amended by the sign support elevation on the traffic sheets. The minimum vertical clearance from the top of the finished road to the lowest point of the bottom chords of the truss system shall be no less than 20.00 feet.

Sign panels shall be installed symmetrically about the centerline of the truss. The bottom of all signs shall be level. Sign panels shall be installed at an angle of 5° from the vertical, with the top edge tilting toward oncoming traffic.

The sign panels and crown panels, if applicable, shall be connected to sign panel support members. The support members shall extend full height of the sign and crown panels. The number and spacing of support members shall be determined by the Contractor based on the width of the sign and crown panels and the support member spacing parameters shown on the plans. Sign panels shall be supported by no less than 3 support members. Crown panels shall be supported by no less than 2 support members. The faying surface between the sign panel support member and the rear face of the sign panel shall be a flange so that panel clips may be placed on both sides of the flange to connect the panel. The outside support members for each sign panel shall include a sign stop at the bottom of the member and a sign hook at the top of the member to support and carry the sign panels.

The sign panel support members shall be designed to be vertically adjustable to compensate for the truss camber. The supports members shall be designed to be installed at any location along the truss. The use of U-bolts and threaded rods is permitted. No less than 2 U-bolts or 4 threaded rods shall be used at each chord connection. The threaded ends of these fasteners shall have double nuts.

The minimum thickness of the sign panel support members and the plate and rolled shape components used in the connection to the sign support shall be 0.25 inches.

The sign support shall be designed for the load effects due to the actual sign panels, including crown panels, as well as any future sign and crown panels that it will carry, as shown on the plans. The sign supports shall also be designed for the load effects of sign and crown panels during all stages of construction which may exist during the project under which the supports are installed. The load effects on the sign support from the sign and crown panels shall include forces and moments due to the eccentricity of the sign and crown panels and the unbalanced lateral loads on the crown panel. The sign support and its component parts shall also be designed for the load effects resulting from the transportation and erection of the support.

The sign support shall be designed so that the pole extends into the truss and is connected at each chord. Connection plates, through each chord, shall be fastened with high-strength bolts to stiffened connection plates fillet welded to the pole. 100% of the fillet welds used in the truss to pole connection shall be non-destructively tested in accordance with the magnetic particle method. All bolts, nuts and washers used in the connection shall be visible. The use of tapped holes in the plates of the connection is not permitted.

Vent and drain holes shall be provided for galvanizing. The number, size and location of vent and drain holes should be coordinated with the galvanizer prior to the submission of the sign support design. The area of vent and drain holes at each end of a member shall be at least 30% of the inside area of the member for members 3.00 inches in diameter and greater and 45% of the inside area of the member for members smaller than 3.00 inches in diameter. The vent and drain holes shall be strategically located for reducing stress and for proper galvanizing. The holes shall be made by drilling. Flame cut holes are not permitted. The edges of all holes shall be rounded by grinding. After galvanizing, exposed holes placed in the sign support components for galvanizing shall be sealed with neoprene plugs.

The pole shall have a handhole located adjacent to base of the pole. The handhole shall be reinforced with a frame. The handhole shall be located with a normal direction that is 90° to the plane formed by the pole and overhead truss. The clear distance from the top of the baseplate to the outside face of the bottom of the handhole frame shall be no less than the diameter of the tubular member plus 2 inches and no greater than the diameter of the tubular member plus 4 inches.

The handhole frame shall be fabricated from steel plate and bent to form a closed shape and joined with a complete joint penetration groove weld. All surfaces of the groove weld shall be ground smooth and flush with the adjacent base metal. The handhole frame shall have a minimum 4.00 inches wide by minimum 6.00 inches high clear opening. The maximum width of the handhole opening, the clear opening plus twice the frame thickness, shall not be greater than 40% of the pole diameter at that section. The inside corners of the handhole frame shall be rounded to a radius of 30% to 50% of the width of the clear opening. The minimum thickness of the handhole frame shall be no less than the thickness of the pole or 0.3125 inches, whichever is greater. The handhole frame shall be connected to the pole with a partial joint penetration groove weld reinforced with a fillet weld. The handhole weld shall start and end at the point that is coincident with the longitudinal axis of symmetry of the pole and the longitudinal axis of symmetry of the handhole frame. 100% of the weld shall be non-destructively tested in accordance with the magnetic particle method. The handhole shall be provided with a cover connected to the frame with no less than 4 stainless steel screws. The cover shall be installed with a neoprene gasket matching the dimensions of the cover. The cover and the gasket and the handhole frame shall be in firm and continuous contact after tightening the fasteners. The cover shall also be attached to the frame with a 1.50 inch long stainless steel chain. The stainless steel chain shall be bolted to the inside face of the cover with a stainless steel bolt with a lock nut and also bolted to the inside side face of the handhole frame with a stainless steel bolt. On pole handhole frames, the side face of the handhole opposite of the stainless steel chain connection shall have a hole with a nut welded to outside face for a galvanized steel grounding bolt.

The ends of each chord member shall be sealed with a removable end cap plate attached to the member with a threaded fastener. The joint between the member and cap plate shall be sealed with a neoprene gasket.

The design of the sign support and the anchorage shall be coordinated with the design of the foundation to ensure that the foundation is adequate for the support reactions and to avoid conflicts between the embedded anchorage and the foundation reinforcement.

Prior to performing a field survey for each sign support, the Contractor shall coordinate with the Engineer to locate and stake each support foundation. The foundations shall be located to avoid conflicts with both subsurface and overhead utilities and subsurface drainage structures. In accordance with Article 1.05.15, the Contractor shall contact "Call Before You Dig" to identify the subsurface utilities that are located in the vicinity of each foundation. Once the location of each foundation has been found acceptable to the Engineer, the Contractor shall perform a field survey to obtain the information necessary to prepare a roadway cross-section with details of each sign support and supporting foundation(s).

Prior to designing each sign support, the Contractor shall prepare and submit a cross-section (elevation) drawing based on a field survey for each sign support to the Engineer for review in accordance with 1.05.02. A cross-section drawing is a working drawing for permanent construction. Only one sign support cross-section shall be shown on each drawing.

The cross-sections shall include, but not be limited to the following:

- Project number, town, location (route number, direction, mileage), station, structure number, sign location number, and site number
- Location and dimensions of travel lanes and shoulders
- Location and elevation of the high point of the road
- Top and bottom of slope elevations. Slope of finished grade at foundations
- Locations of utilities (both overhead and subsurface)
- Locations of drainage facilities
- Locations of noise barriers, including elevation of top of wall
- Type of protection (metal beam rail/barrier), and the dimension from the front face of metal beam rail /barrier to the edge of the foundation and centerline of the foundation

- Elevation of the top of the foundation(s). The top of the foundation(s) shall project 6.00 inches to 12.00 inches above the level ground or 6.00 inches to 12.00 inches above the finished grade at the high side of a sloping grade.

- Dimension from top foundation to finish grade (existing or proposed as applicable).

- Span, dimension from centerline to centerline of foundations

- Dimensions of sign panel(s)

- Location of sign panel(s) relative to the centerline of the foundations/poles

- Location of sign panel(s) relative to the roadway travel lanes

- Dimension from top of foundation to centerline of truss

- Minimum dimensions from high point of the road to the centerline of the truss and the bottom of the sign panel(s)

- Elevation of centerline of truss

If there are any changes to the proposed location of the sign support and foundations prior to the construction of the foundations, the cross-section shall be re-submitted for review.

Prior to fabrication, the Contractor shall submit working drawings and design computations for each sign support, **based on the reviewed cross-section**, to the engineer for review in accordance with Article 1.05.02. The working drawings and design computations for sign supports shall conform to the requirements of working drawings for permanent construction. An individual, independently packaged set of working drawings and computations, with all details and documents necessary for fabrication and erection of the structure and its components shall be prepared and submitted for **each** support. **A single set of drawings with tabulated data for multiple sign support locations is not permitted.** Combining working drawing submittals for sign structures with submittals for structure foundations is not permitted. Working drawings for the erection of the structure shall conform to Subarticle 6.03.03-2(d).

The packaged set of working drawings and computations for each support shall include the following:

- title sheet
- table of contents

- contact information for designer, fabricator and galvanizer – contact information should include name and address of each firm and the name of contact person with phone number and email address

- copy of fabricator's AISC certification
- copy of the **reviewed** cross-section
- sign support working drawings
- sign support design computations
- welding procedures
- working drawings and supporting calculations for the erection of the structure
- sign support installation procedure, including the method to plumb the poles

The sign support working drawings shall include complete details of all sign support components. The drawings shall include, but not be limited to the following:

- the project number, town and alpha-numeric support identification number
- reference to the design specifications, including interim specifications
- reference to the design specifications design criteria, such as design wind speed, minimum design life, etc.
- material specifications/designations for all components
- non-destructive weld testing requirements
- details of the location of the longitudinal seam weld in the pole
- vent and drain holes for galvanizing
- dead load and permanent camber
- a plan view of the anchor bolt layout relative to the orientation of the span
- anchor bolt dimensions, including embedment and projection
- support installation procedure, including the method to plumb the pole

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

- the project number, town and alpha-numeric support identification number

- references to design specifications, including interim specifications, and the applicable code section and articles

- description/documentation for all computer programs used in the design

- drawings/models of the structure, components and connections, with dimensions, loads and references to the local and global coordinate systems used (as applicable), to facilitate review of the results

- Tabulation of the section properties of the tubular members at each analyzed section. The tabulated values should include the diameter, D (if round member); effective width, b (if multisided member, AASHTO 5.5.2); equivalent diameter (if multisided member, AASHTO 5.6), wall thickness, t; inside bend radius, r_b (if multisided member, AASHTO 5.5.2), cross-sectional area, A; moment of inertia, I; section modulus, S; radius of gyration, r. AASHTO Table B.2-1 may be used to determine the section properties. If Table B.2-1 is used, the radius measured to the mid-thickness of the wall shall also be provided.

- coefficients and factors used in the design

- results of all applicable limit states

- combined force interaction ratios for all applicable limit states

- maximum vertical deflection resulting from the Service I limit state

- vertical deflection of the free end of the truss due to the wind load effects of truck-induced gusts

- total camber and permanent camber

The submitted design computations shall reflect the load effects due to the actual sign panels, including crown panels, to be installed on the sign structure in the final condition. If additional sign and crown panels are shown on the plans for temporary signing during stage construction or for future signing, separate design computations shall be submitted to reflect those loading conditions and document the adequacy of the sign structure design.

The Contractor shall make printed copies of the stamped working drawings and calculations, of the size and number determined by the Engineer, and deliver the copies as directed by the Engineer.

If the as-built condition of the foundation(s), such as the location or elevation, will impact the design, final erection or assembly of the sign support for conformance with the requirements herein, the cross-section shall be re-submitted for review. Subsequently, the

working drawings and calculations shall be resubmitted to conform to the revised cross-section and the requirements herein.

The support shall be fabricated in accordance with the latest edition of the AASHTO LRFD Bridge Construction Specifications, including the latest interim specifications, amended herein.

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

Fabrication of the support may begin only after the working drawings and design computations have been reviewed and the Engineer has authorized fabrication to begin. The Contractor shall submit to the Engineer, no less than 2 weeks prior to the start of fabrication, the name and location of the fabrication shop where the work will be done so that arrangements can be made for an audit of the facility and the assignment of the Department Quality Assurance (QA) inspector. No fabrication will be accepted unless the QA inspector is present during fabrication. No changes may be made during fabrication without prior written approval by the Department.

The Contractor shall furnish facilities for the inspection of material and workmanship in the shop by the Engineer. The Engineer and his representative shall be allowed free access to the necessary parts of the premises.

The Engineer will provide QA inspection at the fabrication shop to assure that all applicable Quality Control plans and inspections are adequately adhered to and maintained by the Contractor during all phases of the fabrication. A thorough inspection of a random selection of elements at the fabrication shop may serve as the basis of this assurance.

Prior to shipment to the project, each individual piece of steel shall be marked in a clear and permanent fashion by a representative of the fabricators' Quality Control (QC) Department to indicate complete final inspection by the fabricator and conformance to the project specifications for that piece. The mark must be dated. A Materials Certificate in accordance with Article 1.06.07 may be used in lieu of individual stamps or markings, for all material in a single shipment. The Materials Certificate must list each piece within the shipment and accompany the shipment to the project site.

Following the final inspection by the fabricator's QC personnel, the Engineer may select pieces of steel for re-inspection by the Department's QA inspector. Should non-conforming pieces be identified, all similar pieces must be re-inspected by the fabricator and repair procedure(s) submitted to the Engineer for approval. Repairs will be made at the Contractor's expense.
The pieces selected for re-inspection and found to be in conformance, or adequately repaired pieces, may be marked by the QA inspector. Such markings indicate the Engineer takes no exception to the pieces being sent to the project site. Such marking does not indicate acceptance or approval of the material by the Engineer.

All welding details, procedures and nondestructive testing shall conform to the requirements of AWS D1.1 Structural Welding Code - Steel.

Personnel performing the nondestructive testing shall be certified as a NDT Level II technician in accordance with the American Society for Non Destructive Testing (ASNT), Recommended Practice SNT-TC-1A and approved by the Engineer.

All nondestructive testing shall be witnessed by Engineer. Certified reports of all tests shall be submitted to the Engineer for examination. Each certified report shall identify the structure, member, and location of weld or welds tested. Each report shall also list the length and location of any defective welds and include information on the corrective action taken and results of all retests of repaired welds.

The Department reserves the right to perform additional testing as determined by the Engineer. Should the Engineer require nondestructive testing on welds not designated in the contract, the cost of such inspection shall be borne by the Contractor if the testing indicates that any weld(s) are defective. If the testing indicates the weld(s) to be satisfactory, the actual cost of such inspection will be paid by the Department.

All members and components shall be hot-dip galvanized in a single dip. Double-dipping of members and components is not permitted. All exterior and interior surfaces of the sign support members and components shall be completely galvanized.

Galvanized members and components shall be free from uncoated areas, blisters, flux deposits, and gross inclusions. Lumps, projections, globules, or heavy deposits of zinc which will interfere with the intended use of the material will not be permitted.

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

Prior to shipping, all galvanized surfaces of the members and components shall be inspected, in the presence of the Engineer, to determine the acceptability of the galvanized coating. Galvanized coatings may be found acceptable by the Engineer if all surfaces of the members and components meet the galvanizing requirements herein. Only sign support members and components with acceptable galvanized coatings shall be shipped. If the galvanized coating on any member or component is found not acceptable, the Contractor shall submit a repair procedure to the Engineer for review.

Unless provisions for the sign support structure number are otherwise included in the contract, the sign support structure number shall be stenciled in black paint on the right side pole (as determined by the direction of traffic traveling below the structure) centered approximately 5.00 feet off the ground and visible from the roadway. The numeric characters shall be 3.00 inches to 4.00 inches high and placed vertically so that they may be read from top to bottom.

After fabrication, the sign support components shall be assembled in the fabricator's shop, in the presence of the Engineer, to determine the acceptability of the bolted connections and to confirm the permanent camber. The faying surfaces of the connections shall be free of dirt, loose scale, burrs, other foreign material and other defects that would prevent solid seating of the parts. Prior to assembly, the galvanized faying surfaces shall be scored by wire brushing. The faying surfaces of the connection plates shall be checked with a straight edge to ensure that the surfaces are not distorted and the entire faying surface of each plate will be in contact when assembled. The high-strength bolts, including nuts and washes, shall be installed and tensioned in accordance with Subarticle 6.03.03-4(f). A connection may be found acceptable by the Engineer if the faying surfaces of the connection plates are in firm, continuous contact after properly tensioning the bolts. Only sign supports with acceptable connections shall be shipped. If a bolted connection is found not acceptable, the Contractor shall submit a procedure to repair the connection to the Engineer for review. Galvanized surfaces damaged by the repair procedure shall be hot dip galvanized. Repair of the damaged galvanized surfaces in accordance with the requirements of ASTM A780 or with a galvanizing repair stick is not permitted. Bolts, nuts and washers used for the trial shop fit-up shall not be reused in the final field assembly. The permanent camber shall be measured at the end of the truss and the structure shall be rejected if the camber does not meet the following:

$$L/1000 \leq \text{Permanent Camber} \leq L/500$$

where L is the span length of the overhead member measured from centerline to the end of the truss.

The finished members and components shall be protected with sufficient dunnage and padding to protect them from damage and distortion during transportation. Damage to any material during transportation, improper storage, faulty erection, or undocumented fabrication errors may be cause for rejection of said material at the project site. All costs associated with any corrective action will be borne by the Contractor.

Following delivery to the project site, the Engineer will perform a visual inspection of all material to verify shipping documents, fabricator markings, and that there was no damage to the material or coatings during transportation and handling.

The Engineer is not responsible for approving or accepting any fabricated materials prior to final erection and assembly at the project site.

High-strength bolts, nuts and washers shall be stored in accordance with Subarticle 6.03.03-4(f).

The support shall be erected, assembled and installed in accordance with these specifications and the procedures and methods submitted with the working drawings. The Contractor and the support designer are responsible to ensure that the erection and assembly procedures and methods in this specification are acceptable for use with the support. Changes to these methods and procedures shall be submitted with the working drawings and computations.

Prior to installation of the support, the exposed threads of all the embedded anchor bolts shall be cleaned of accumulated dirt and concrete and lubricated. The threads and bearing surfaces of all the anchor bolt nuts shall be cleaned and lubricated. The anchor bolts and nuts are properly lubricated if the nuts can be turned by hand on the anchor bolt threads. The lubricant shall contain a visible dye of any color that contrasts with the color of the galvanizing. Re-lubricate the threads of the anchor bolts and nuts if more than 24 hours has elapsed since earlier lubrication, or if the anchor bolts and nuts have become wet since they were first lubricated.

The space between the bottom of the baseplate and the top of the foundation shall not be sealed with closed cell elastomer or filled with grout, unless otherwise noted.

Install (turn) the leveling nuts onto the anchor bolts and align the nuts to the same elevation or plane. The distance from the bottom of the leveling nuts to the top of the foundation shall not exceed 1.00 inch. Place a structural hardened washer on top of each leveling nut, 1 washer on each anchor bolt.

The pole shall be erected so that the centerline of the pole will be plumb after the application of all the dead loads. The pole may be initially installed raked in the opposite direction of the overhead member to obtain the plumb condition. Raking the pole may be accomplished by installing the leveling nuts in a plane other than level.

Install the pole base plate atop the washers resting on the leveling nuts, place a structural hardened washer on each anchor bolt resting it on the top of the base plate, and install (turn) a top nut on each anchor bolt until the nut contacts the washer. The leveling nuts and washers shall be inspected, and if necessary the nuts (turned), so that the washers are in full contact with the bottom surface of the base plate.

Tighten the top nuts to a snug tight condition in a star pattern. Snug tight is defined as the maximum rotation resulting from the full effort of one person using a 12.00 inch long wrench or equivalent. A star tightening pattern is one in which the nuts on opposite or near-opposite sides of the bolt circle are successively tightened in a pattern resembling a star (e.g., For an 8-bolt circle with bolt sequentially numbered 1 to 8, tighten nuts in the following bolt order: 1, 5, 7, 3, 8, 4, 6, 2.).

Tighten leveling nuts to a snug tight condition in a star pattern.

Before final tightening of the top nuts, mark the reference position of each top nut in a snug-tight condition with a suitable marking on 1 flat with a corresponding reference mark on the base plate at each bolt. Then incrementally turn the top nuts using a star pattern one-sixth of a turn beyond snug tight. Turn the nuts in at least two full tightening cycles (passes). After tightening, verify the top nut rotation. The top nuts shall have full thread engagement. The distance from the bottom of the leveling nuts to the top of the foundation shall not exceed 1.00 inch.

High-strength bolts, including nuts and washers, shall be installed and tensioned in accordance with Subarticle 6.03.03-4(f). The truss shall be temporarily and fully supported while all the high-

strength bolts are installed and tensioned. The temporary support of the truss shall not be removed until the Engineer has confirmed that the faying surfaces of the connection/flange plates are in firm, continuous contact and the high-strength bolts were properly installed and tensioned. All high-strength bolts in the bolted connections shall be inspected (in accordance with Subarticle 6.03.03-4(f)) to confirm the high-strength bolts were properly tensioned.

After erecting the support, the support shall be electrically grounded by attaching the bare copper grounding conductor to the inside of the handhole frame with a galvanized steel bolt and to the ground rod with a ground clamp. The rigid metal conduit shall be electrically grounded by attaching the bare copper grounding conductor to the insulated bonding bushing and to the ground rod with a ground clamp.

After erection of the support and before the installation of the sign panels, if the structure exhibits excessive vibration, oscillations or deflections as determined by the Engineer, the Contractor shall immediately stabilize the structure to the satisfaction of the Engineer. Stabilizing the structure may require the removal of a portion of the structure or the entire structure.

The sign panels shall be located and mounted on the truss as shown in the working drawings.

After installation of the sign panels, the anchor bolts nuts (leveling and top anchor nut) and washers shall be in full contact with the top and bottom surfaces of the pole baseplate and the centerline of the pole shall be plumb.

After erection of the support and after the installation of the sign panels, if the structure exhibits excessive vibration, oscillations or deflections as determined by the Engineer, the Contractor shall design and construct devices to mitigate the movements. The Contractor is responsible for immediately stabilizing the structure to the satisfaction of the Engineer. Stabilizing the structure may require the removal of the sign panels or the entire structure. Prior to installation of any mitigation device, the Contractor shall submit drawings, design computations other documentation to the Engineer for review in accordance with Article 1.05.02.

Method of Measurement: This work will be measured for payment by the number of cantilever sign structures, completed and accepted in place.

Basis of Payment: This work will be paid for at the contract unit price each for "4 Chord Truss Cantilever Sign Structure", complete in place, which price shall include field survey, equipment, materials, tools and labor incidental to the design, fabrication, quality control, transportation, erection and installation, including anchorage materials, sign panel support members and mitigation devices, if required, of the supports at the locations specified on the plans.

ITEM #1202239A - OVERHEAD TRUSS SIGN SUPPORT FOUNDATION

Description: Work under this item shall consist of the subsurface investigation, design and construction of foundations to support a 4 chord truss bridge sign structure, in accordance with the details shown on the plans, in accordance with these specifications and as ordered by the Engineer. The foundation may be either a spread footing foundation or a drilled shaft foundation as selected by the Contractor, unless a specific foundation type is required by the details shown on the plans.

For the purpose of bidding this item, the Contractor shall assume that the subsurface conditions for each foundation location consists of cohesionless medium dense granular soil (AASHTO A-1 or A-2) with cobbles present and a high groundwater table which requires the use of wet construction/concreting methods.

Materials: The reinforcing steel shall be uncoated unless otherwise noted on the plans. The reinforcing steel shall be ASTM A615, Grade 60 reinforcement conforming to the requirements of Article M.06.01.

Granular fill shall conform to M.02.01.

Temporary Earth Retaining System: Materials of steel sheet piling shall conform to the requirements of ASTM A328. Timber sheet piling shall conform to the requirements of Subarticle M.09.01-1. Materials other than steel or timber, or a combination of these may be used provided they are properly designed for the purpose intended. Systems utilizing other material(s) shall conform to the manufacturer's specifications and project specifications. The parts list shall be furnished for the proprietary system and the Contractor shall provide the material certificates for the parts.

Concrete for the spread footing foundation, both footing and pedestal, and for the formed pedestals of the drilled shaft foundation shall conform to Article M.03 for Class PCC04460. The concrete mix design, including admixtures, shall be submitted to the Engineer for approval.

The concrete for the drilled shaft shall conform to Article M.03 for Class PCC04480. The slump shall be maintained at acceptable levels throughout the concrete placement to ensure appropriate workability for consolidation within the drilled shaft. The concrete shall contain 1% - 7% air entrainment. The concrete mix design, including admixtures, shall be submitted to the Engineer for approval.

The slurry, if used, shall be Contractor designed mineral or polymer slurry that meets the range of values listed herein. The slurry mix design, including admixtures, shall be submitted to the Engineer for approval.

Rigid metal conduit, ground rod sleeves and related hardware, and end caps shall be galvanized steel conduit, conforming to the Plans and Article M.15.09.

Ground rods shall be 0.625 inches in diameter by 12.00 foot long copper clad steel. The copper cladding shall be a minimum thickness of 0.128 inches. The ground clamp shall be a square-head bolt type, approved for direct burial.

Stainless steel mesh shall be comprised of either Grade T316 or Grade T304 stainless steel wire and shall have a minimum of 5 wires per inch in both directions.

Hose clamps shall be stainless steel and shall be adjustable.

Bare copper wire shall conform to Article M.15.13.

Topsoil shall conform to Article M.13.01.

Fertilizer shall conform to Article M.13.03.

Seed mixture shall conform to Article M.13.04.

Mulch shall conform to Article M.13.05.

Erosion control matting shall conform to Article M.13.09.

Construction Methods:

Subsurface Conditions for Foundation Design: As early as possible and prior to preparation of the foundation design, the Contractor **shall** perform a subsurface investigation for **each** sign foundation location. The subsurface data obtained in the exploration program at each site shall be used in the design of the foundation at that site. Use of the assumed subsurface condition (that was provided for the purpose of bidding), an assumed conservative subsurface condition or any other assumed subsurface condition shall not be allowed for use in the foundation design nor shall any assumed subsurface condition relieve the Contractor from their responsibility of obtaining a test boring at each foundation site. The subsurface investigation program should be prepared and executed in accordance with the most recent editions of the AASHTO Manual on Subsurface Investigations and ConnDOT Geotechnical Engineering Manual. The Contractor shall provide a full-time inspector to oversee the subsurface exploration program. The subsurface investigations and all related cost will not be measured for payment and shall be included in the cost of the foundation.

The Contractor shall review results of their subsurface investigation to determine if subsurface conditions for sign foundation locations differ materially from those assumed at the time of bid. Should the subsurface investigation(s) encounter conditions that differ materially, the Contractor shall notify the Engineer in writing prior to the submission of the working drawings and calculations. All matters regarding increased cost relating to an agreed upon change in subsurface conditions will be handled per Section 1.04.04 – Differing Site Conditions.

Design Requirements for Spread Footing Foundations: The design of spread footing traffic structure foundations shall conform to the requirements of the latest edition of the AASHTO LRFD Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals, including the latest interim specifications, available prior to the advertising date of the contract, amended as follows:

- The footing and pedestal shall be designed for the traffic structure support reactions of all applicable limit states.

- The minimum concrete cover for the reinforcement in the footing and pedestal shall be 3.00 inches, unless otherwise indicated on the plans.

- The footing shall have a top and bottom mat of reinforcement. The reinforcement in each mat shall extend full length and width of the footing. Splicing of the footing reinforcement is not permitted. The minimum size and spacing of reinforcement in each direction of each mat shall be #5 @ 12.00 inches.

- The foundation shall have a single rectangular pedestal connected to the footing with dowels cast into the footing. The minimum size and spacing of reinforcement in each face of the pedestal shall be #5 @ 12.00 inches.

- For eccentrically loaded footings, the location of the resultant factored eccentric vertical load shall be located within the middle two thirds of the footing for footings bearing on soil, and within the middle nine-tenths of the footing for footings bearing on rock. This location requirement of the factored eccentric vertical load shall be investigated due to the effects of all applicable limit states.

- Footings under eccentric loads shall be designed to ensure that the factored bearing resistance is not less than the effects of factored loads at all applicable limit states.

- Footings that are subjected to horizontal or inclined loads shall be designed to ensure that the factored sliding resistance is not less than the effects of factored horizontal loads at all applicable limit states. The resistance factor for shear resistance between the underlying soil and the foundation, φ_τ, shall be taken as 0.80.

- The use of soil or rock anchors to increase stability is not permitted.

- If ground water is present, the design of the foundation shall include the effects of buoyancy.

- The footing shall be founded on entirely on either level soil or level rock. Constructing a footing on a sloping substrate is not permitted. Footings founded on a combination of soil and rock and soil are not permitted.

- Footings on soil shall be placed on a minimum of 12.00 inches of granular fill.

- The minimum embedment for a foundation, founded entirely on soil, shall be no less than 4' below the finished grade at the low side of a sloping grade. The minimum embedment for a foundation, founded entirely on rock, shall be no less than 6.00 inches below the finished grade at the low side of a sloping grade.

- The design of the foundation shall account for the slope of the finished grade.

- The top of the pedestal shall project 6.00 inches to 12.00 inches above the level ground or 6.00 inches to 12.00 inches above the finished grade at the high side of a sloping grade, unless otherwise shown on the plans.

- The design of the foundation shall be coordinated with the traffic structure support to avoid conflicts between the embedded support anchorage and the reinforcement.

Design Requirements for Drilled Shaft Foundations: The design of drilled shaft traffic structure foundations shall conform to the requirements of the latest edition of the AASHTO LRFD Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals, including the latest interim specifications, available prior to the advertising date of the contract, amended as follows:

- The foundation shall be designed for the soils and rock properties and parameters based on the subsurface conditions (character of the soil and rock, presence of ground water, etc.) in the location of, adjacent to and below the drilled shaft foundation excavation determined by the subsurface investigation.

- The compressive strength, f'_c, of the concrete used in the design shall be 4,000 psi. The concrete cover for reinforcing in a drilled shaft shall conform to the following, unless otherwise indicated on the plans:

Shaft Diameter	Minimum Cover
Less than or equal to 3.00 feet	3.00 inches
Greater than 3.00 feet and less than 5.00 feet	4.00 inches
Greater than or equal to 5.00 feet	6.00 inches

- The reinforcement shall be uncoated and conform to ASTM A615, Grade 60.

- The foundation shall be designed for the traffic structure support reactions of all applicable limit states. The reactions shall include axial, shear, flexural and torsional load effects.

- For sign support foundations, the minimum drilled shaft diameter shall be 3.00 feet, unless otherwise indicated on the plans.

- The design of the drilled shaft foundation shall include embedment of the foundation in soil, the embedment of the foundation in rock or the embedment of the foundation partially in soil and partially in rock, as applicable based on the findings of the required subsurface investigations at each foundation location.

- The design of the drilled shaft embedment depth shall account for the slope of the finished grade.

- The minimum embedment for a drilled shaft foundation, excavated entirely in soil, shall be no less than 15.00 feet below the finished grade at the low side of a sloping grade. The minimum embedment for a drilled shaft foundation, excavated entirely in rock shall be no less than 10.00 feet below the finished grade at the low side of a sloping grade.

- For sign support foundations, the top of the drilled shaft pedestal shall project 6.00 inches to 12.00 inches above the level ground or 6.00 inches to 12.00 inches above the finished grade at the high side of a sloping grade, unless otherwise shown on the plans.

- The drilled shaft foundation shall be reinforced with longitudinal and transverse reinforcement. The area of longitudinal reinforcement should be no less than the sum of the reinforcement required for flexure and the longitudinal reinforcement required for torsion. The area of transverse reinforcement should be no less than the sum of the reinforcement required for shear and the transverse reinforcement required for torsion. Additional transverse reinforcement may be required at the top of the drilled shaft within the limits of the pedestal due to the torsional load on the anchor bolt group.

- The minimum number of longitudinal reinforcing bars shall be 16. The minimum size of longitudinal reinforcing bars shall be #8. The minimum area of longitudinal reinforcing bars shall be no less than 1% of the gross cross-sectional area of the shaft. The minimum clear distance between longitudinal reinforcing bars shall be no less than 5 times the maximum aggregate size or 5.00 inches, whichever is greater. The reinforcement shall extend full length of the drilled shaft foundation, including the pedestal, less cover requirements. Splicing of the longitudinal reinforcement is not permitted.

- The drilled shaft shall be transversely reinforced with spirals or circular, one piece, enclosed ties. The minimum size of the reinforcement shall be #4. The maximum spacing/pitch of the reinforcement shall be no more than 6.00 inches. The spiral reinforcement shall be terminated at the top and the bottom with 1 ½ turns of the reinforcing and a 135° standard hook. Spirals may be spliced with lap

splices or mechanical connectors. For spirals, the minimum lap splice length shall be 1.7 times the tension development length (including modification factors) of the bar or 48 bar diameters, whichever is greater. For spirals, the mechanical connectors shall develop both in tension and compression 125% of the specified yield strength of the bar and conform to the latest edition of the AASHTO LRFD Bridge Design Specifications, including the latest interim specifications. For ties, the minimum lap splice length shall be no less than 1.7 times the tension development length (including modification factors) of the bar. Tie lap splices shall be alternated. The ends of the bars in lap splices shall be anchored with a 135° standard hook around longitudinal reinforcement.

- For sign support foundations utilizing the drilled shaft option, the top of the drilled shafts shall be designed with a rectangular pedestal to facilitate the installation of the anchor bolts and rigid metal conduits. Unless specific geometry is indicated on the plans, the dimensions of the pedestal shall be designed such that the pedestal sides match tangentially into the limits of the diameter of the drilled shaft. The top and sides of the pedestal shall be reinforced with a grillage of reinforcement. The minimum size reinforcement shall be #5. The minimum concrete cover shall be 3.00 inches, unless otherwise indicated on the plans.

- The design of the foundation shall be coordinated with the traffic structure support to avoid conflicts between the embedded support anchorage and the foundation reinforcement.

Submittal Requirements for Foundations: Prior to excavating for the foundation, the Contractor shall submit working drawings and design computations for the foundation(s) at each sign support, **based on the reviewed sign structure cross-section**, to the Engineer for review in accordance with Article 1.05.02. The working drawings and design computations for foundations shall conform to working drawings for permanent construction. An individual, independently packaged set of working drawings and computations, with all details and documents necessary for fabrication and construction shall be prepared and submitted for the foundation(s) at **each** support. **A single set of drawings with tabulated data for multiple foundation locations is not permitted.** Combining working drawing submittals for sign structures with submittals for structure foundations is not permitted.

The packaged set of working drawings and computations for the foundations at each support shall be submitted in an individual file in electronic portable document format (.pdf) with appropriate bookmarks commenting enabled. The packaged set shall include the following:

- title sheet

- table of contents

- contact information for designer – contact information should include name and address of design firm, name of contact person with phone number and email address

- copy of the **reviewed** cross-section

- results of subsurface investigation, including boring logs and geotechnical design recommendations

- foundation working drawings

- foundation design computations

The working drawings shall include complete details of all foundation components. The drawings shall include, but not be limited to the following:

- the project number, town and alpha-numeric support identification number

- selected type of foundation (spread footing or drilled shaft)

- reference to the design specifications, including interim specifications

- material specifications for all components

- embedment depths for foundation in soil, rock and a combination of soil and rock

- anchor bolt details, including dimensions, embedment and projection

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

- the project number, town and alpha-numeric support identification number

- references to design specifications, including interim specifications, and the applicable code section and articles

- description/documentation for all computer programs used in the design

- drawings/models of the foundation with dimensions, loads and references to the local and global coordinate systems used (as applicable), to facilitate review of the results

- coefficients and factors used in the design

- sign support reactions of all applicable limit states

- soil and rock design parameters

- computations demonstrating the geotechnical and structural capacity of the foundation for all applicable limit states

The submitted foundation design computations shall reflect the load effects due to the actual sign panels, including crown panels, of the supported sign structure in the final condition. If additional sign and crown panels are shown on the plans for temporary signing during stage construction or for future signing, separate foundation design computations shall be submitted to reflect those loading conditions and document the adequacy of the foundation.

The Contractor shall make printed copies of the stamped working drawings and calculations, of the size and number determined by the Engineer, and deliver the copies as directed by the Engineer.

Prior to excavating for the foundation, the Contractor shall submit the following:

Reinforcing Steel Shop Drawings: Based on the accepted foundation design, reinforcing steel shop drawings shall be prepared for each foundation. A copy of the reviewed and stamped reinforcing steel shop drawings shall be submitted in accordance with Subarticle 1.05.02.

Concrete Mix Design: The Contractor shall submit the concrete mix design, including admixtures, for review in accordance with Subarticle 1.05.02.

Slurry Mix Design: If the Foundation Construction Procedure involves the use of slurry, the Contractor shall submit the slurry mix design for review in accordance with Subarticle 1.05.02.

Drilled Shaft Foundation Construction Personnel: The Contractor performing the work described in this specification shall have installed drilled shafts of both diameter and length similar to those required for the traffic structures for a minimum of 3 years prior to the bid date for this project. The Contractor shall submit a list containing at least 3 projects completed in the last 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. The Contractor shall provide 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 2 years of 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 1 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. All documentation for review shall be submitted in accordance with Subarticle 1.05.02

Drilled Shaft Foundation Construction Procedure: The Contractor shall submit a written foundation construction procedure outlining the equipment; drilling procedure for soil and rock, including how spoils will be handled; temporary casing placement and removal; slurry placement; reinforcement, anchor bolt and conduit placement; and concrete placement required for the drilled shaft foundation construction for review in accordance with Subarticle 1.05.02. The procedure should include contingencies for the various soil, rock and subsurface water conditions that may be encountered during the foundation construction. Also required in this submission are the following:

- 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.

- details of overall construction operation sequence and the sequence of shaft construction in bents or groups

- details of shaft excavation methods

- 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

- details of methods to clean the shaft excavation

- details of reinforcement placement, including support and centralization methods

- 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

- 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

- details of casing installation and removal methods

- 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 foundation construction procedure for conformance with the plans, specifications and special provisions and will then notify the Contractor of any additional information required and/or changes necessary to meet the contract requirements. All procedural approvals given by the Engineer shall be subject to trial in the field and shall not relieve the Contractor of the responsibility to satisfactorily complete the work as detailed in the plans and specifications. The Contractor shall not commence construction of the drilled shafts until the Engineer has accepted the foundation construction procedure.

A Foundation Construction Procedure may be accepted by the Engineer without inclusion of slurry if the Contractor chooses to use permanent or temporary casings in accordance with the permanent or temporary casing method, described below. However, a slurry procedure and slurry mix design shall be required if the Contractor chooses to advance excavation ahead of the casings or if the Engineer determines that application of slurry is required to maintain soil stability. The Contractor shall be responsible for any delays to the project resulting from slurry construction procedure and mix design reviews submitted after approval of a dry and permanent or temporary casing method.

Construction of Drilled Shaft Foundations: Construction methods for drilled shaft foundations shall conform to the following:

Excavations required for shafts shall be performed through whatever materials are encountered, to the dimensions and elevations in the working drawings or as ordered by the Engineer. The methods and equipment used shall be suitable for the intended purpose and materials encountered. Shaft excavation may be performed by combinations of augering, rotary drilling, down-the-hole hammer, reverse circulation drilling, clamming, scraping, or other means approved by the Engineer. Generally, either the dry method, wet method, or temporary casing method may be used, as necessary, to produce sound, durable concrete foundation shafts free of defects. The Contractor shall select and use the method that is needed to properly accomplish the work, as determined by site conditions and subject to the approval of the Engineer. The Contractor is responsible for maintaining the stability of the shaft excavation during all phases of construction.

The dry method consists of drilling the shaft excavation, removing accumulated water and loose material from the excavation, and placing the shaft concrete in a relatively dry excavation. The dry construction method shall be used only at sites where the groundwater table and site conditions are suitable to permit construction of the shaft in a relatively dry excavation, and where the sides and bottom of the shaft are stable and may be visually inspected prior to placing the concrete. The use of the dry construction method is permitted if less than one foot of water

accumulates in the bottom of a hole without pumping over a one hour period, the excavation remains stable and any loose material and water can be removed prior to placement of concrete.

The wet construction method shall be used at sites where a dry excavation cannot be maintained for placement of the shaft concrete. Wet construction methods consist of using a mineral or polymer slurry to maintain stability of the hole's perimeter while advancing the excavation to final depth, placing the reinforcing cage and shaft concrete. This procedure may require desanding and cleaning the slurry; final cleaning of the excavation by means of a bailing bucket, air lift, submersible pump or other devices; and placing the shaft concrete with a tremie. Unless it is demonstrated to the satisfaction of the Engineer that the surface casing is not required, temporary surface casings shall be provided to aid shaft alignment and position, and to prevent sloughing of the top of the shaft excavation. Surface casing is defined as the amount of casing required from the ground surface to a point in the shaft excavation where sloughing of the surrounding soil does not occur.

The temporary or permanent casing construction methods may be used in lieu of the dry or wet construction methods or where the dry or wet construction methods are inappropriate. Temporary or permanent casing construction methods consist of advancing the excavation through caving material with or without slurry. Casings may be installed by driving or vibratory procedures in advance of excavation to the lower limits of the caving material. When a nearly impervious formation is reached, a casing is placed in the hole and sealed in the nearly impervious formation. After the drilling fluid is removed from the casing, drilling may proceed as with the dry method. The temporary casing is withdrawn when the shaft concrete is placed. If seepage conditions prevent use of the dry method, excavation is completed using the wet method. Slurry may be omitted if the casing is advanced ahead of drilling and only if minor caving of the hole is observed. Slurry shall be used in installation if drilling is to advance ahead of the casing or if the Engineer determines that the application of the slurry is required in order to maintain soil stability around the hole.

If the Engineer determines that the foundation material encountered during excavation is unsuitable or differs from that anticipated in the design of the shaft, or if rock is encountered at an unanticipated elevation, the Contractor's foundation designer shall determine if the foundation embedment should be revised from that shown on the working drawings. If rock is encountered, the Engineer shall be notified to inspect and determine the elevation of the top of competent rock. Any revisions to the foundation embedment during construction shall be reviewed by the Engineer.

Excavated materials which are removed from the shaft excavation and any drilled fluids used shall be disposed of by the Contractor as directed by the Engineer and in accordance with Section 1.10.

Permanent and temporary casings shall be metal, smooth, clean, watertight, and of ample strength to withstand both handling and driving stresses and the pressure of both concrete and the surrounding earth materials. The outside diameter of casing shall not be less than the specified size of the shaft. Temporary casings shall be removed while the concrete remains workable (i.e.,

a slump of 4.00 inches or greater). Before the casing is withdrawn and while the casing is being withdrawn, a 5.00 foot minimum head of fresh concrete in the casing shall be maintained so that all the fluid trapped behind the casing is displaced upward without contaminating the shaft concrete. The required minimum concrete head may have to be increased to counteract groundwater head outside the casing. Separation of the concrete by hammering or otherwise vibrating the casing, during withdrawal operations, shall be avoided. Casing extraction shall be at a slow, uniform rate with the pull in line with the shaft axis.

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

The slurry shall be premixed thoroughly with clean fresh water at a temperature above 41° F and adequate time allotted for hydration prior to introduction into the shaft excavation. The elevation of the slurry within the shaft foundation shall be maintained within 24.00 inches of the top casing and at least 48.00 inches above the existing water level during drilling and until the concrete placement is essentially complete. The slurry properties shall be maintained at all times, including non-working periods and stoppages. The slurry shall be circulated and agitated, continuously if necessary, to maintain the slurry properties and to prevent it from setting up in the shaft.

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

Range of Values (at 68°F)

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

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

Prior to placing shaft concrete, slurry samples shall be taken from the bottom and at intervals not exceeding 10.00 feet for the full height of slurry. Any heavily contaminated slurry that has accumulated at the bottom of the shaft shall be eliminated. The slurry shall be within specification requirements immediately before shaft concrete placement.

The hole shall be covered when left unattended.

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

Prior to placing the reinforcement into the shaft, the Contractor, in the presence of the Engineer, shall determine the shaft dimensions, depth and alignment of the shaft. The concrete shaft shall not be out of plumb by more than ¼ inch per foot of depth. The Contractor shall provide all equipment necessary for checking the shaft excavation. The Engineer shall inspect the shaft and verify that it has been properly cleaned.

The reinforcing steel shall be fabricated and assembled in accordance with Article 6.02.03. All reinforcement shall be assembled with wire ties. Welding to assemble the reinforcement is not permitted.

Immediately after the shaft excavation has been inspected and approved by the Engineer and prior to placement of the concrete, the assembled reinforcing steel cage, including cage stiffener bars, spacers, centralizers, and other necessary appurtenances, shall be carefully placed into the shaft excavation as a unit. Dropping or forcing cages into the shaft will not be allowed. The reinforcing steel in the shaft shall be tied and supported so that the reinforcing steel will remain within allowable tolerances of its intended position until the concrete will support the reinforcing steel. When concrete is placed by tremie methods, temporary hold-down devices shall be used to prevent uplifting of the reinforcing steel cage during concrete placement. Concrete spacers or other approved noncorrosive spacing devices shall be used at sufficient intervals not exceeding 5.00 feet along the shaft to insure concentric location of the cage within the shaft excavation. When the size of the longitudinal reinforcing steel is larger than a #8 bar, such spacing shall not exceed 10.00 feet. After placement of the reinforcing cage, the Engineer shall inspect the shaft to ensure that it has remained clean. If the inspection indicates that loose material has accumulated at the bottom of shaft excavation, the Contractor shall remove the reinforcing cage and reclean the shaft.

Concrete shall be placed in the shaft excavation as soon as possible, but no more than 4 hours after completion of excavation and cleaning of the bottom of the excavation, and no more than 2 hours after placement of the reinforcing steel cage. Concrete shall be placed in a continuous operation to the top of the shaft. The concrete level shall be horizontal during the pouring operations. Concrete placement shall continue after the shaft is full until good quality concrete is evident at the top of the shaft. The elapsed time from the beginning of concrete placement in the shaft to the completion of placement shall not exceed 2 hours.

In dry construction, concrete shall be placed in a single continuous operation with the flow of concrete down the center of the shaft excavation so as to consolidate the concrete on impact. During placement operations, the concrete is not permitted to hit the reinforcing steel. A dropchute, consisting of a hopper and flexible hose, may be used to direct the concrete down the center of the foundation and prevent the concrete from hitting the reinforcing steel. Accumulated water shall be removed before placing the concrete. At the time of concrete placement, no more than 2.00 inches of water may exist at the bottom of the excavation and loose sediment no more than 0.50 inches over one-half the base is acceptable.

In wet (slurry) construction, concrete to be placed by the tremie method, where the concrete displaces the slurry from bottom of the excavation to the top. The concrete shall be placed through a top metal hopper and into a rigid leak-proof elephant trunk tremie tube, sufficiently large enough to permit free flow of concrete. The tremie tube shall be positioned so that it can be removed without disturbing the reinforcing. Initially, the discharge end of the tremie tube shall be sealed closed (plugged) to prevent slurry from entering the tube after it is placed in the excavation and before the tube is filled with concrete. After concrete placement has started, the tremie tube shall be kept full of concrete to the bottom of the hopper to maintain a positive concrete head. The flow of concrete shall be induced by slightly raising the discharge end of the tube, always keeping the tube end in the deposited concrete. No horizontal movement of the tremie tube will be permitted.

The shaft concrete shall be vibrated or rodded to a depth of 5.00 feet below the ground surface except where soft uncased soil or slurry remaining in the excavation will possibly mix with the concrete.

Exposed concrete shall be cured and finished in accordance with Subarticle 6.01.03-7, 9 and 10.

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

The top of the foundations shall be backfilled and the adjacent disturbed ground surfaces restored to match the surrounding area after the concrete has cured and the forms are removed. Placement of topsoil shall conform to Articles 9.44.01 and 9.44.03. Turf establishment shall conform to Article 9.50.03.

Construction of Spread Footing Foundations: Construction methods for spread footing foundations shall conform to the following:

Temporary earth retaining system shall be safely designed and shall be carried to adequate depths and braced as necessary for proper performance of the work. Construction shall be such as to permit excavation or fill as required. Interior dimensions shall be such as to give sufficient clearance for construction of forms and their inspection and for battered pile clearance when necessary. Movements of the system or bracing which prevent the proper completion of the substructure shall be corrected at the sole expense of the Contractor. No part of the temporary

earth retaining system or bracing shall be allowed to extend into the substructure without written permission of the Engineer.

Working drawings and design calculations for temporary earth retaining system shall be submitted in accordance with the requirements of Article 1.05.02.

Unless otherwise ordered by the Engineer, all parts of the temporary earth retaining system shall be removed upon completion of the work for which it was provided. The excavation shall be backfilled and properly compacted, prior to removal of the system unless otherwise permitted by the Engineer. Temporary earth retaining system may be left in place at the option of the Contractor if so permitted by the Engineer, provided that it is cut off at an elevation as directed by the Engineer and the cutoffs removed from the site.

Excavation: Article 2.03.03.

Granular Fill: Article 2.13.03.

Class "F" Concrete: Article 6.01.03.

Deformed Steel Bars: Subarticles 6.02.03-2,3,4,7, and 8.

Additional construction provisions for all foundation types: Anchor bolt assemblies shall be embedded in the concrete as shown on the working drawings. A template plate shall be used to hold the anchor bolt assemblies, conduits and ground rod sleeve in the correct position until concrete has set. The anchor bolts shall be installed plumb.

All conduit ends terminating below grade shall be capped with a malleable iron caps. All above-grade conduit ends shall be terminated with an insulated bonding bushing with tinned insert. The rigid metal conduit sweeps shall extend a minimum of 2.00 feet from the side of the foundation and shall be placed a minimum of 2.50 feet below finished grade.

Stainless steel wire mesh shall be installed tight to the top of the foundations and attached to sign support structure baseplates to provide a barrier against possible entry of rodents, birds, insects, and reptiles. The mesh shall be attached to the baseplate with the use of an adjustable stainless steel hose clamp of a diameter that is compatible with the geometry of the baseplate.

Ground rod and ground wire shall be installed as shown on the plans.

After the foundation has cured, the Contractor shall submit the top of foundation elevations based on a field survey.

The traffic structures shall not be erected on the foundation unit until **all** concrete has attained a compressive strength, f'_c, greater than or equal to 4,000 psi based on physical testing.

Method of Measurement: This work will be measured for payment by the number of foundation units, each completely installed and accepted. Two foundation units are required to support each overhead truss sign support.

Basis of Payment: The work will be paid for at the contract unit price each for "Overhead Truss Sign Support Foundation," completed and accepted in place, which price shall include all equipment, materials, tools and labor incidental to the design, fabrication, construction and disposal of drilling spoils, of the foundations at the locations specified on the plans.

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

The removal of existing roadside barrier systems, installation and removal of temporary roadside barrier systems and resetting existing roadside barrier systems will not be paid for separately, but will be included as part of the work.

The support of excavation areas by temporary earth retaining system will not be paid for separately, but will be included as part of the work.

The temporary support, protection and restoration of utilities (if necessary), including existing underground wiring, conduits, drainage structures, pipes and underdrain systems within the excavation limits will not be paid for separately, but will be included as part of the work.

Backfilling and restoration of adjacent ground surfaces (pavement, slope protection, topsoil & seed, etc.) in all areas disturbed by the work will not be paid for separately, but will be included as part of the work. The Engineer will determine the type, thickness and horizontal limits of the surface treatments to be restored.

The installation of new or upgraded permanent roadside barrier systems, if required, will not be paid for as part of this work, but will be paid for under separate items.

ITEM #1202999A - DRILLED SHAFT TRAFFIC STRUCTURE FOUNDATION

Description: Work under this item shall consist of the subsurface investigation, design and construction of drilled shaft foundations for traffic structures, in accordance with the details shown on the plans, in accordance with these specifications and as ordered by the Engineer. For the purposes of this specification, a traffic structure support may be an overhead cantilever or bridge type sign support structure.

Materials: The reinforcing steel shall be uncoated unless otherwise noted on the plans. The reinforcing steel shall be ASTM A615, Grade 60 reinforcement conforming to the requirements of Article M.06.01.

The concrete for the drilled shaft shall conform to Article M.03 for Class PCC04480. The slump shall be maintained at acceptable levels throughout the concrete placement to ensure appropriate workability for consolidation within the drilled shaft. The concrete shall contain 1% - 7% air entrainment. The concrete mix design, including admixtures, shall be submitted to the Engineer for approval.

The concrete for the formed pedestal shall conform to Article M.03 for Class PCC04460. The concrete mix design, including admixtures, shall be submitted to the Engineer for approval.

The slurry, if used, shall be Contractor designed mineral or polymer slurry that meets the range of values listed herein. The slurry mix design, including admixtures, shall be submitted to the Engineer for approval.

Rigid metal conduit, ground rod sleeves and related hardware, and end caps shall be galvanized steel conduit, and shall conform to Article M.15.09.

Ground rods shall be 0.625 inches in diameter by 12.00 foot long copper clad steel. The copper cladding shall be a minimum thickness of 0.128 inches. The ground clamp shall be a square-head bolt type, approved for direct burial.

Stainless steel mesh shall be comprised of either Grade T316 or Grade T304 stainless steel wire and shall have a minimum of 5 wires per inch in both directions.

Hose clamps shall be stainless steel and shall be adjustable.

Bare copper wire shall conform to Article M.15.13.

Topsoil shall conform to Article M.13.01.

Fertilizer shall conform to Article M.13.03.

Seed mixture shall conform to Article M.13.04.

Mulch shall conform to Article M.13.05.

Erosion control matting shall conform to Article M.13.09.

Construction Methods:

Subsurface Conditions for Bidding: For the purpose of bidding this item, the Contractor shall assume that the subsurface conditions for each foundation location consists of cohesionless medium dense granular soil (AASHTO A-1 or A-2) with cobbles present and a high groundwater table which requires the use of wet construction/concreting methods.

Subsurface Conditions for Foundation Design: As early as possible and prior to preparation of the foundation design, the Contractor **shall** perform a subsurface investigation for **each** sign foundation location. The subsurface data obtained in the exploration program at each site shall be used in the design of the foundation at that site. Use of the assumed subsurface condition (that was provided for the purpose of bidding), an assumed conservative subsurface condition or any other assumed subsurface condition shall not be allowed for use in the foundation design nor shall any assumed subsurface condition relieve the Contractor from their responsibility of obtaining a test boring at each foundation site. The subsurface investigation program should be prepared and executed in accordance with the most recent editions of the AASHTO Manual on Subsurface Investigations and ConnDOT Geotechnical Engineering Manual. The Contractor shall provide a full-time inspector to oversee the subsurface exploration program. The subsurface investigations and all related cost will not be measured for payment and shall be included in the cost of the foundation.

The Contractor shall review results of their subsurface investigation to determine if subsurface conditions for sign foundation locations differ materially from those assumed at the time of bid. Should the subsurface investigation(s) encounter conditions that differ materially, the Contractor shall notify the Engineer in writing prior to the submission of the working drawings and calculations. All matters regarding increased cost relating to agreed upon change in subsurface conditions will be handled per Section 1.04.04 – Differing Site Conditions.

Foundation Design Requirements: The design of drilled shaft traffic structure foundations shall conform to the requirements of the latest edition of AASHTO LRFD Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals, including the latest interim specifications, available prior to the advertising date of the contract, amended as follows:

- The foundation shall be designed for the soils and rock properties and parameters based on the subsurface conditions (character of the soil and rock, presence of ground water, etc.) in the location of, adjacent to and below the drilled shaft foundation excavation determined by the subsurface investigation.

- The compressive strength, f'_c, of the concrete used in the design shall be 4,000 psi. The concrete cover for reinforcing in a drilled shaft shall conform to the following:

Shaft Diameter	Minimum Cover
Less than or equal to 3.00 feet	3.00 inches
Greater than 3.00 feet and less than 5.00 feet	4.00 inches
Greater than or equal to 5.00 feet	6.00 inches

- The reinforcement shall be uncoated and conform to ASTM A615, Grade 60.

- The foundation shall be designed for the traffic structure support reactions for all applicable limit states. The reactions shall include axial, shear, flexural and torsional load effects.

- For sign support foundations, the minimum drilled shaft diameter shall be 3.00 feet, unless otherwise noted on the plans.

- The design of the drilled shaft foundation shall include embedment of the foundation in soil, the embedment of the foundation in rock or the embedment of the foundation partially in soil and partially in rock, as applicable based on the findings of the required subsurface investigation at each foundation location.

- The design of the drilled shaft foundation embedment depth shall account for the slope of the finished grade.

- The minimum embedment for a drilled shaft foundation, excavated entirely in soil, shall be no less than 15.00 feet below the finished grade at the low side of a sloping grade. The minimum embedment for a drilled shaft foundation, excavated entirely in rock shall be no less than 10.00 feet below the finished grade at the low side of a sloping grade.

- For sign support foundations, the top of the drilled shaft pedestal shall project 6.00 inches to 12.00 inches above the level ground or 6.00 inches to 12.00 inches above the finished grade at the high side of a sloping grade, unless otherwise shown on the plans.

- The drilled shaft foundation shall be reinforced with longitudinal and transverse reinforcement. The area of longitudinal reinforcement should be no less than the sum of the reinforcement required for flexure and the longitudinal reinforcement required for torsion. The area of transverse reinforcement should be no less than the sum of the reinforcement required for shear and the transverse reinforcement required for torsion.

- In drilled shaft foundations for cantilever sign structures, the area of transverse reinforcement provided shall prevent the concrete breakout at the edge of the foundation due to the torsional load on the anchor bolt group. The area of transverse reinforcement provided shall be considered adequate to prevent this condition if the nominal torsional strength of the foundation is greater than the concrete breakout strength. The concrete breakout strength shall be determined in accordance with the latest edition of the "Building Code Requirements for Reinforced Concrete", ACI 318, Appendix D.

- The minimum number of longitudinal reinforcing bars shall be 16. The minimum size of longitudinal reinforcing bars shall be #8. The minimum area of longitudinal reinforcing bars shall be no less than 1% of the gross cross-sectional area of the shaft. The minimum clear distance between longitudinal reinforcing bars shall be no less than 5 times the maximum aggregate size or 5.00 inches, whichever is greater. The reinforcement shall extend full length of the drilled shaft foundation, including the pedestal, less cover requirements. Splicing of the longitudinal reinforcement is not permitted.

- The drilled shaft foundation shall be transversely reinforced with spirals or circular, one piece, enclosed ties. The minimum size of the transverse reinforcement shall be #4. The maximum spacing/pitch of the transverse reinforcement shall be no more than 6.00 inches. The minimum spacing/pitch of the transverse reinforcement shall be no less than 4.00 inches. The maximum spacing/pitch of the transverse reinforcement in the top 2.00 feet of the foundation shall be no more than 4.00 inches. The spiral reinforcement shall be terminated at the top and the bottom with 1 ½ turns of the reinforcing and a 135° standard hook. Spirals may be spliced with lap splices or mechanical connectors. For spirals, the minimum lap splice length shall be 1.7 times the tension development length (including modification factors) of the bar or 48 bar diameters, whichever is greater. For spirals, the mechanical connectors shall develop both in tension and compression 125% of the specified yield strength of the bar and conform to the latest edition of the AASHTO LRFD Bridge Design Specifications, including the latest interim specifications. For ties, the minimum lap splice length shall be no less than 1.7 times the tension development length (including modification factors) of the bar. Tie lap splices shall be alternated. The ends of the bars in lap splices shall be anchored with a 135° standard hook around longitudinal reinforcement.

- For sign support foundations, the top of the drilled shaft shall be designed with a square pedestal to facilitate the installation of the anchor bolts and rigid metal conduits. The plan dimensions of the pedestal shall equal the diameter of the drilled shaft. The top and sides of the pedestal shall be reinforced with a grillage of reinforcement. The minimum size reinforcement shall be #5. The minimum concrete cover shall be 3.00 inches, unless otherwise indicated on the plans.

- The design of the foundation shall be coordinated with the traffic structure support to avoid conflicts between the embedded support anchorage and the foundation reinforcement.

Submittal Requirements for Foundations: Prior to excavating for the foundation, the Contractor shall submit working drawings and design computations for the foundation(s) at each sign support, **based on the reviewed sign structure cross-section**, to the Engineer for review in accordance with Article 1.05.02. The working drawings and design computations for foundations shall conform to working drawings for permanent construction. An individual, independently packaged set of working drawings and computations, with all details and documents necessary for fabrication and construction shall be prepared and submitted for the foundation(s) at **each** support. **A single set of drawings with tabulated data for multiple foundation locations is not permitted.** Combining working drawing submittals for sign structures with submittals for structure foundations is not permitted.

The packaged set of working drawings and computations for the foundations at each support shall be submitted in an individual file in electronic portable document format (.pdf) with appropriate bookmarks commenting enabled. The packaged set shall include the following:

- title sheet
- table of contents
- contact information for designer – contact information should include name and address of design firm, name of contact person with phone number and email address
- copy of the **reviewed** cross-section
- results of subsurface investigation, including boring logs and geotechnical design recommendations
- foundation working drawings
- foundation design computations

The working drawings shall include complete details of all foundation components. The drawings shall include, but not be limited to the following:

- the project number, town and alpha-numeric support identification number
- reference to the design specifications, including interim specifications

- material specifications for all components
- embedment depths for foundation in soil, rock and a combination of soil and rock
- anchor bolt details, including dimensions, embedment and projection

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

- the project number, town and alpha-numeric support identification number
- references to design specifications, including interim specifications, and the applicable code section and articles
- description/documentation for all computer programs used in the design
- drawings/models of the foundation with dimensions, loads and references to the local and global coordinate systems used (as applicable), to facilitate review of the results
- coefficients and factors used in the design
- sign support reactions of all applicable limit states
- soil and rock design parameters
- computations demonstrating the geotechnical and structural capacity of the foundation for all applicable limit states

The submitted foundation design computations shall reflect the load effects due to the actual sign panels, including crown panels, of the supported sign structure in the final condition. If additional sign and crown panels are shown on the plans for temporary signing during stage construction or for future signing, separate foundation design computations shall be submitted to reflect those loading conditions and document the adequacy of the foundation.

The Contractor shall make printed copies of the stamped working drawings and calculations, of the size and number determined by the Engineer, and deliver the copies as directed by the Engineer.

Prior to excavating for the foundation, the Contractor shall submit the following:

Reinforcing Steel Shop Drawings: Based on the accepted foundation design, reinforcing steel shop drawings shall be prepared for each foundation. A copy of the reviewed and stamped reinforcing steel shop drawings shall be submitted in accordance with Subarticle 1.05.02.

Concrete Mix Design: The Contractor shall submit the concrete mix design, including admixtures, for review in accordance with Subarticle 1.05.02.

Slurry Mix Design: If the Foundation Construction Procedure involves the use of slurry, the Contractor shall submit the slurry mix design for review in accordance with Subarticle 1.05.02.

Drilled Shaft Foundation Construction Personnel: The Contractor performing the work described in this specification shall have installed drilled shafts of both diameter and length similar to those required for the traffic structures for a minimum of 3 years prior to the bid date for this project. The Contractor shall submit a list containing at least 3 projects completed in the last 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. The Contractor shall provide 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 2 years of 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 1 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. All documentation for review shall be submitted in accordance with Subarticle 1.05.02

Drilled Shaft Foundation Construction Procedure: The Contractor shall submit a written foundation construction procedure outlining the equipment; drilling procedure for soil and rock, including how spoils will be handled; temporary casing placement and removal; slurry placement; reinforcement, anchor bolt and conduit placement; and concrete placement required for the drilled shaft foundation construction for review in accordance with Subarticle 1.05.02. The procedure should include contingencies for the various soil, rock and subsurface water conditions that may be encountered during the foundation construction. Also required in this submission are the following:

- 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.

- details of overall construction operation sequence and the sequence of shaft construction in bents or groups

- details of shaft excavation methods
- 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
- details of methods to clean the shaft excavation
- details of reinforcement placement, including support and centralization methods
- 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
- 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
- details of casing installation and removal methods
- 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 foundation construction procedure for conformance with the plans, specifications and special provisions and will then notify the Contractor of any additional information required and/or changes necessary to meet the contract requirements. All procedural approvals given by the Engineer shall be subject to trial in the field and shall not relieve the Contractor of the responsibility to satisfactorily complete the work as detailed in the plans and specifications. The Contractor shall not commence construction of the drilled shafts until the Engineer has accepted the foundation construction procedure.

A Foundation Construction Procedure may be accepted by the Engineer without inclusion of slurry if the Contractor chooses to use permanent or temporary casings in accordance with the permanent or temporary casing method, described below. However, a slurry procedure and slurry mix design shall be required if the Contractor chooses to advance excavation ahead of the casings or if the Engineer determines that application of slurry is required to maintain soil stability. The Contractor shall be responsible for any delays to the project resulting from slurry construction procedure and mix design reviews submitted after approval of a dry and permanent or temporary casing method.

Excavations required for shafts shall be performed through whatever materials are encountered, to the dimensions and elevations in the working drawings or as ordered by the Engineer. The methods and equipment used shall be suitable for the intended purpose and materials encountered. Shaft excavation may be performed by combinations of augering, rotary drilling, down-the-hole hammer, reverse circulation drilling, clamming, scraping, or other means approved by the Engineer. Generally, either the dry method, wet method, or temporary casing method may be used, as necessary, to produce sound, durable concrete foundation shafts free of defects. The Contractor shall select and use the method that is needed to properly accomplish the work, as determined by site conditions and subject to the approval of the Engineer. The Contractor is responsible for maintaining the stability of the shaft excavation during all phases of construction.

The dry method consists of drilling the shaft excavation, removing accumulated water and loose material from the excavation, and placing the shaft concrete in a relatively dry excavation. The dry construction method shall be used only at sites where the groundwater table and site conditions are suitable to permit construction of the shaft in a relatively dry excavation, and where the sides and bottom of the shaft are stable and may be visually inspected prior to placing the concrete. The use of the dry construction method is permitted if less than one foot of water accumulates in the bottom of a hole without pumping over a one hour period, the excavation remains stable and any loose material and water can be removed prior to placement of concrete.

The wet construction method shall be used at sites where a dry excavation cannot be maintained for placement of the shaft concrete. Wet construction methods consist of using a polymer or mineral slurry to maintain stability of the hole perimeter while advancing the excavation to final depth, placing the reinforcing cage and shaft concrete. This procedure may require desanding and cleaning the slurry; final cleaning of the excavation by means of a bailing bucket, air lift, submersible pump or other devices; and placing the shaft concrete with a tremie. Unless it is demonstrated to the satisfaction of the Engineer that the surface casing is not required, temporary surface casings shall be provided to aid shaft alignment and position, and to prevent sloughing of the top of the shaft excavation. Surface casing is defined as the amount of casing required from the ground surface to a point in the shaft excavation where sloughing of the surrounding soil does not occur.

The temporary or permanent casing construction methods may be used in lieu of the dry or wet construction methods or where the dry or wet construction methods are inappropriate. Temporary or permanent casing construction methods consist of advancing the excavation through caving material with or without slurry. Casings may be installed by driving or vibratory procedures in advance of excavation to the lower limits of the caving material. When a nearly impervious formation is reached, a casing is placed in the hole and sealed in the nearly impervious formation. After the drilling fluid is removed from the casing, drilling may proceed as with the dry method. The temporary casing is withdrawn when the shaft concrete is placed. If seepage conditions prevent use of the dry method, excavation is completed using the wet method. Slurry may be omitted if the casing is advanced ahead of drilling and only if minor caving of the hole is observed. Slurry shall be used in installation if drilling is to advance ahead

of the casing or if the Engineer determines that the application of the slurry is required in order to maintain soil stability around the hole.

If the Engineer determines that the foundation material encountered during excavation is unsuitable or differs from that anticipated in the design of the shaft, or if rock is encountered at an unanticipated elevation, the Contractor's foundation designer shall determine if the foundation embedment should be revised from that shown on the working drawings. If rock is encountered, the Engineer shall be notified to inspect and determine the elevation of the top of competent rock. Any revisions to the foundation embedment during construction shall be reviewed by the Engineer.

Excavated materials which are removed from the shaft excavation and any drilled fluids used shall be disposed of by the Contractor as directed by the Engineer and in accordance with Section 1.10.

Permanent and temporary casings shall be metal, smooth, clean, watertight, and of ample strength to withstand both handling and driving stresses and the pressure of both concrete and the surrounding earth materials. The outside diameter of casing shall not be less than the specified size of the shaft. Temporary casings shall be removed while the concrete remains workable (i.e., a slump of 4.00 inches or greater). Before the casing is withdrawn and while the casing is being withdrawn, a 5.00 foot minimum head of fresh concrete in the casing shall be maintained so that all the fluid trapped behind the casing is displaced upward without contaminating the shaft concrete. The required minimum concrete head may have to be increased to counteract groundwater head outside the casing. Separation of the concrete by hammering or otherwise vibrating the casing, during withdrawal operations, shall be avoided. Casing extraction shall be at a slow, uniform rate with the pull in line with the shaft axis.

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

The slurry shall be premixed thoroughly with clean fresh water at a temperature above 41° F and adequate time allotted for hydration prior to introduction into the shaft excavation. The elevation of the slurry within the shaft foundation shall be maintained within 24.00 inches of the top casing and at least 48.00 inches above the existing water level during drilling and until the concrete placement is essentially complete. The slurry properties shall be maintained at all times, including non-working periods and stoppages. The slurry shall be circulated and agitated, continuously if necessary, to maintain the slurry properties and to prevent it from setting up in the shaft.

The Contractor, in the presence of the Engineer, shall perform control tests on the slurry to ensure that the density, viscosity, and pH fall within the acceptable limits tabulated below. The

Contractor shall provide all equipment required to perform the tests. If desanding is required, sand content shall not exceed 4% (by volume) at any point in the shaft excavation as determined by the American Petroleum Institute sand content test.

Range of Values (at 68°F)

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

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

Prior to placing shaft concrete, slurry samples shall be taken from the bottom and at intervals not exceeding 10.00 feet for the full height of slurry. Any heavily contaminated slurry that has accumulated at the bottom of the shaft shall be eliminated. The mineral slurry shall be within specification requirements immediately before shaft concrete placement.

The hole shall be covered when left unattended.

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

Prior to placing the reinforcement into the shaft, the Contractor, in the presence of the Engineer, shall determine the shaft dimensions, depth and alignment of the shaft. The concrete shaft shall not be out of plumb by more than ¼ inch per foot of depth. The Contractor shall provide all equipment necessary for checking the shaft excavation. The Engineer shall inspect the shaft and verify that it has been properly cleaned.

The reinforcing steel shall be fabricated and assembled in accordance with Article 6.02.03. All reinforcement shall be assembled with wire ties. Welding to assemble the reinforcement is not permitted.

Immediately after the shaft excavation has been inspected and approved by the Engineer and prior to placement of the concrete, the assembled reinforcing steel cage, including cage stiffener bars, spacers, centralizers, and other necessary appurtenances, shall be carefully placed into the shaft excavation as a unit. Dropping or forcing cages into the shaft will not be allowed. The reinforcing steel in the shaft shall be tied and supported so that the reinforcing steel will remain within allowable tolerances of its intended position until the concrete will support the reinforcing steel. When concrete is placed by tremie methods, temporary hold-down devices shall be used to

prevent uplifting of the reinforcing steel cage during concrete placement. Concrete spacers or other approved noncorrosive spacing devices shall be used at sufficient intervals not exceeding 5.00 feet along the shaft to ensure concentric location of the cage within the shaft excavation. When the size of the longitudinal reinforcing steel is larger than a #8 bar, such spacing shall not exceed 10.00 feet. After placement of the reinforcing cage, the Engineer shall inspect the shaft to ensure that it has remained clean. If the inspection indicates that loose material has accumulated at the bottom of shaft excavation, the Contractor shall remove the reinforcing cage and reclean the shaft.

Concrete shall be placed in the shaft excavation as soon as possible, but no more than 4 hours after completion of excavation and cleaning of the bottom of the excavation, and no more than 2 hours after placement of the reinforcing steel cage. Concrete shall be placed in a continuous operation to the top of the shaft. The concrete level shall be horizontal during the pouring operations. Concrete placement shall continue after the shaft is full until good quality concrete is evident at the top of the shaft. The elapsed time from the beginning of concrete placement in the shaft to the completion of placement shall not exceed 2 hours.

In dry construction, concrete shall be placed in a single continuous operation with the flow of concrete down the center of the shaft excavation so as to consolidate the concrete on impact. During placement operations, the concrete is not permitted to hit the reinforcing steel. A dropchute, consisting of a hopper and flexible hose, may be used to direct the concrete down the center of the foundation and prevent the concrete from hitting the reinforcing steel. Accumulated water shall be removed before placing the concrete. At the time of concrete placement, no more than 2.00 inches of water may exist at the bottom of the excavation and loose sediment no more than 0.50 inches over one-half the base is acceptable.

In wet (slurry) construction, concrete to be placed by the tremie method, where the concrete displaces the slurry from bottom of the excavation to the top. The concrete shall be placed through a top metal hopper and into a rigid leak-proof elephant trunk tremie tube, sufficiently large enough to permit free flow of concrete. The tremie tube shall be positioned so that it can be removed without disturbing the reinforcing. Initially, the discharge end of the tremie tube shall be sealed closed (plugged) to prevent slurry from entering the tube after it is placed in the excavation and before the tube is filled with concrete. After concrete placement has started, the tremie tube shall be kept full of concrete to the bottom of the hopper to maintain a positive concrete head. The flow of concrete shall be induced by slightly raising the discharge end of the tube, always keeping the tube end in the deposited concrete. No horizontal movement of the tremie tube will be permitted.

The shaft concrete shall be vibrated or rodded to a depth of 5.00 feet below the ground surface except where soft uncased soil or slurry remaining in the excavation will possibly mix with the concrete.

Exposed concrete shall be cured and finished in accordance with Subarticle 6.01.03-7, 9 and 10.

Anchor bolt assemblies shall be embedded in the concrete as shown on the working drawings. A template plate shall be used to hold the anchor bolt assemblies, conduits and ground rod sleeve in the correct position until the concrete has set. The anchor bolts shall be installed plumb.

All conduit ends terminating below grade shall be capped with a malleable iron caps. All above-grade conduit ends shall be terminated with an insulated bonding bushing with tinned insert. The rigid metal conduit sweeps shall extend a minimum of 2.00 feet from the side of the foundation and shall be placed a minimum of 2.50 feet below finished grade.

Stainless steel wire mesh shall be installed tight to the top of the foundations and attached to sign support structure baseplates to provide a barrier against possible entry of rodents, birds, insects, and reptiles. The mesh shall be attached to the baseplate with the use of an adjustable stainless steel hose clamp of a diameter that is compatible with the geometry of the baseplate.

Ground rod and ground wire shall be installed as shown on the plans.

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

The top of the foundations shall be backfilled and the adjacent disturbed ground surfaces restored to match the surrounding area after the concrete has cured and the forms are removed. Placement of topsoil shall conform to Articles 9.44.01 and 9.44.03. Turf establishment shall conform to Article 9.50.03.

After the foundation has cured, the Contractor shall obtain the as-built top of foundation elevations based on a field survey.

The traffic structures shall not be erected on the foundation until both the pedestal concrete and the shaft concrete has attained a compressive strength, f'_c, greater than or equal to 4,000 psi based on physical testing.

Method of Measurement: This work will be measured for payment by the number of foundation units, each completely installed and accepted. One foundation unit is required to support each cantilever sign support. Two foundation units are required to support each bridge sign support.

Basis of Payment: The work will be paid for at the contract unit price each for "Drilled Shaft Traffic Structure Foundation," completed and accepted in place, which price shall include all equipment, materials, tools and labor incidental to the design, fabrication, construction and disposal of drilling spoils, of the foundations at the locations specified on the plans.

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

The removal of existing roadside barrier systems, installation and removal of temporary roadside barrier systems and resetting existing roadside barrier systems will not be paid for separately, but will be included as part of the work.

The temporary support, protection and restoration of utilities (if necessary), including existing underground wiring, conduits, drainage structures, pipes and underdrain systems within the excavation limits will not be paid for separately, but will be included as part of the work.

Backfilling and restoration of adjacent ground surfaces (pavement, slope protection, topsoil & seed, etc.) in all areas disturbed by the work will not be paid for separately, but will be included as part of the work. The Engineer will determine the type, thickness and horizontal limits of the surface treatments to be restored.

The installation of new or upgraded permanent roadside barrier systems, if required, will not be paid for as part of this work, but will be paid for under separate items.

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.

Pay Item	Pay Unit
Removal and Relocation of Existing Signs	l.s.

ITEM #1206025A - REMOVAL AND RELOCATION OF EXISTING OVERHEAD SIGNS

Section 12.06 is supplemented as follows:

12.06.01 – Description is supplemented with the following:
Work under this item shall consist of the removal and/or relocation of designated existing overhead signs, sign supports and foundations, where indicated on the plans or as directed by the Engineer.

12.06.03 - Construction Methods is supplemented with the following:
Overhead sign supports, foundations, and other materials designated for removal shall be removed and disposed of by the Contractor as directed by the Engineer and in accordance with existing standards for Removal of Existing Overhead Signing.

For overhead signs designated for reinstallation and/or relocation, the Contractor shall accomplish the work in a manner so as not to cause twisting, bending or deforming of sign panels, or scratching of the sign face. Any sign panel damaged shall be repaired or replaced at the Contractor's expense. The signs shall be level, correctly aligned as indicated on the plans and shall be properly fastened to the structure or supports with the necessary hardware as indicated on the plans.

12.06.04 - Method of Measurement is supplemented with the following:
This work will be paid for at the contract lump sum price for "Removal and Relocation of Existing Overhead Signs" which price shall include overhead signs designated for relocation, overhead extruded aluminum signs, overhead sign supports, foundations, and other materials designated for removal, and all equipment, material, tools and labor incidental thereto.

12.06.05 - Basis of Payment is supplemented with the following:
This work will be paid for at the contract lump sum price for "Removal and Relocation of Existing Overhead Signs". This price shall include the removal, relocation, and permanent installation of overhead signs. Also, the price shall include all necessary hardware required for the reinstallation of the existing sign panels onto existing or new sign supports, unless such hardware is paid for under separate pay items. The price shall include all equipment, material, labor and tools necessary to complete this work. This price shall also include removing, loading, transporting, and unloading of overhead extruded aluminum signs designated for removal and all equipment, material, tools and labor incidental thereto. This price shall also include removing and disposing of sign supports, foundations, and other materials, and all equipment, material, tools and labor incidental thereto.

Pay Item	Pay Unit
Removal and Relocation of Existing Overhead Signs	l.s.

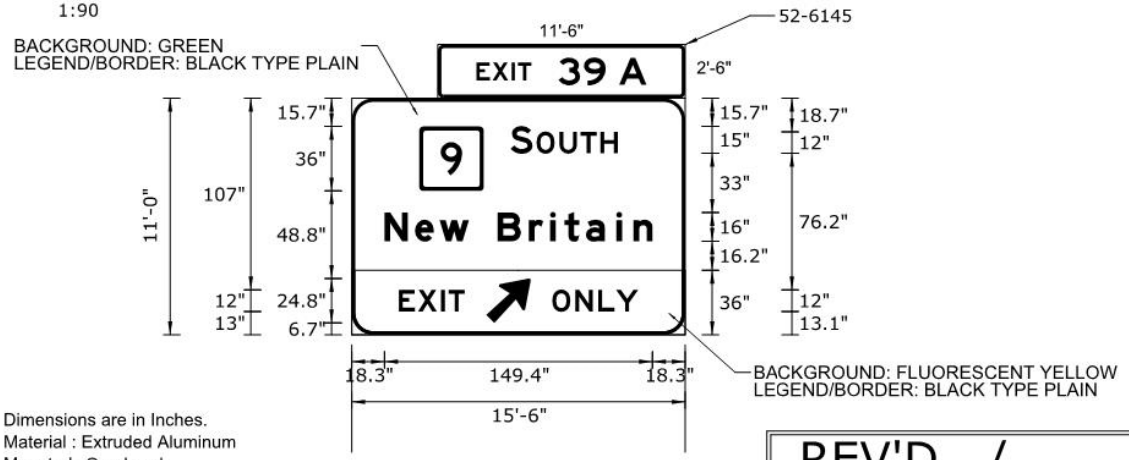
ITEM #1207039A - SIGN FACE - EXTRUDED ALUMINUM (TYPE IX RETROREFLECTIVE SHEETING)

Article 12.07.01 – Description is revised as follows: Sign Face – Extruded Aluminum is supplemented with the sign details that follow.

155-171

SIGN DETAIL

1:90



Dimensions are in Inches.
Material : Extruded Aluminum
Mounted : Overhead
Sign Support No. 21686
Location : New Britain Route West Hartford Route I-84 W.B. Mileage : 56.00
Project No. 0155-0171
Engineer : S. Bruno / Designed by : S. Bruno / Checked by : M. Chachakis

SIGN NUMBER	084W_155_56.00_A
SIGN PANEL	170.5 Sq.Ft.
EXIT CROWN	28.75 Sq.Ft.
TOTAL AREA	199.25 Sq.Ft.
BDR INSET/WIDTH	0" / 2"
CORNER RADIUS	12"
BACKGROUND	TYPE: IX
	COLOR: See Sign
LEGEND/BORDER	TYPE: IX
	COLOR: See Sign

SYMBOL	ROT	X	Y	WID	HT
M1_5_1	0	37.6	80.3	36	36
AR_Type A	315	75	6.6	20	31.5

REV'D /

PLOTTED : 1/2/2019

LETTER POSITIONS (X)																				LENGTH	SERIES/SIZE
S	O	U	T	H																	E 2000
88.6	103	115.9	127.6	138.7																59.8	15,12
N	e	w		B	r	i	t	a	i	n											EM 2000
18.3	35.2	49	65.3	81.3	98.8	110.6	118.6	130.6	147.6	157.2										149.4	16/12
E	X	I	T																		E 2000
26.3	37	49.8	54																	36.7	12
O	N	L	Y																		E 2000
111.8	124.7	137.5	147.5																	47.9	12

ITEM #1207039A

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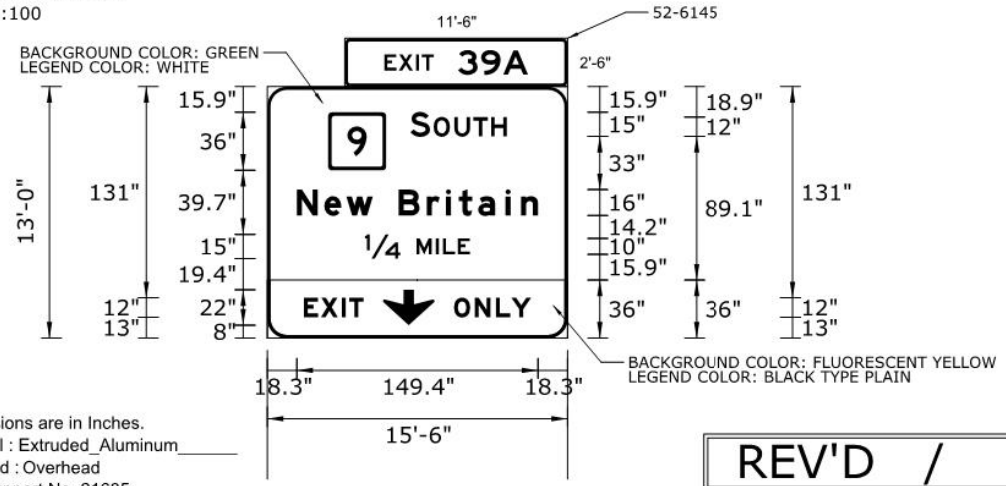
Rev. Date 07/18

SIGN DETAIL

1:100



Dimensions are in Inches.
Material : Extruded_Aluminum_____
Mounted : Overhead
Sign Support No. 21685
Location : West Hartford Route I-84 W.B. Mileage : 56.29
Project No. 0155-0171
Engineer : S. Bruno / Designed by : S. Bruno / Checked by : M. Chachakis

SIGN NUMBER	084W_155_56.29_A
SIGN PANEL	201.5 Sq.Ft.
EXIT CROWN	28.75 Sq.Ft.
TOTAL AREA	230.25 Sq.Ft.
BDR INSET/WIDTH	0" / 2"
CORNER RADIUS	12"
BACKGROUND	TYPE: IX
	COLOR: See Sign
LEGEND/BORDER	TYPE: IX
	COLOR: See Sign

SYMBOL	ROT	X	Y	WID	HT
M1.5.1	0	37.6	104.1	36	36
ARDOWN	0	71.6	8	32	22

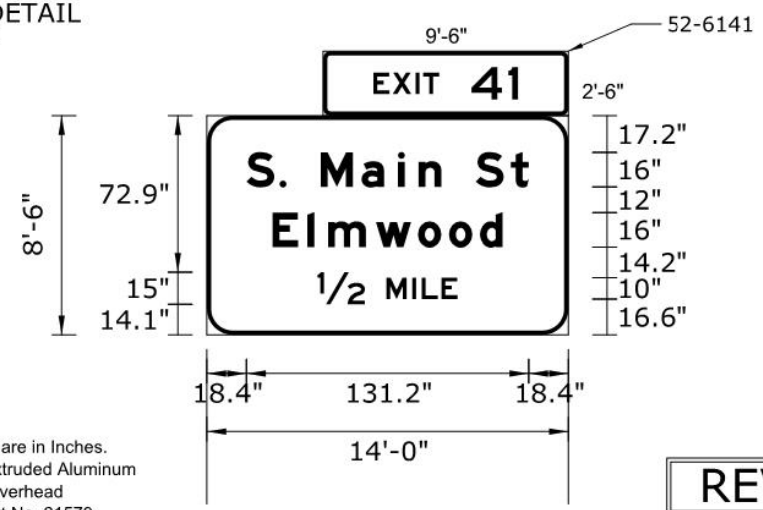
REV'D /

PLOTTED : 2/20/2019

LETTER POSITIONS (X)																					LENGTH	SERIES/SIZE
S	O	U	T	H																		E 2000
88.6	103	115.9	127.6	138.7																	59.8	15,12
N	e	w		B	r	i	t	a	i	n												EM 2000
18.3	35.2	49	65.3	81.3	98.8	110.6	118.6	130.6	147.6	157.2											149.4	16/12
1/4	M	I	L	E																		E 2000
60.5	92.4	104.4	108.8	118																	65.1	15,10
E	X	I	T																			EM 2000
22.6	33.2	46.2	50.7																		37	12
O	N	L	Y																			EM 2000
115.6	128.6	141.6	151.2																		47.8	12

155-171

SIGN DETAIL
1:75



Dimensions are in Inches.
Material : Extruded Aluminum
Mounted : Overhead
Sign Support No. 21579
Location : West Hartford Route I-84 E.B. Mileage : 56.47
Project No. 0155-0171
Engineer : S. Bruno / Designed by : S. Bruno / Checked by : M. Chachakis

SIGN NUMBER	084E_155_56.47_A
SIGN PANEL	119.0 Sq.Ft.
EXIT CROWN	23.75 Sq.Ft.
TOTAL AREA	142.75 Sq.Ft.
BDR INSET/WIDTH	0" / 2"
CORNER RADIUS	12"
BACKGROUND	TYPE: IX
	COLOR: Green
LEGEND/BORDER	TYPE: IX
	COLOR: White/White

SYMBOL	ROT	X	Y	WID	HT

REV'D /

PLOTTED : 2/20/2019

LETTER POSITIONS (X)

																					LENGTH	SERIES/SIZE
S	.		M	a	i	n		S	t													EM 2000
18.4	33.8	37	53	71.8	88.8	98.4	109	125	141.3												131.2	16/12
E	l	m	w	o	o	d																EM 2000
30.6	46.7	56.3	78.6	98.1	112.5	126.9															106.9	16/12
1/2	M	I	L	E																		E 2000
51.5	83.4	95.4	99.8	109																	65.1	15,10

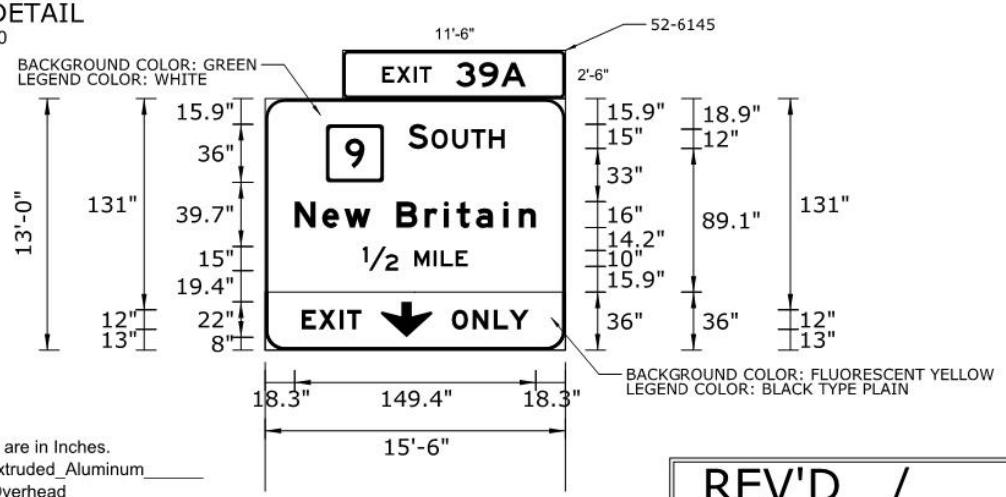
ITEM #1207039A

773

Rev. Date 07/18

SIGN DETAIL

1:100



Dimensions are in Inches.
Material : Extruded_Aluminum_____
Mounted : Overhead
Sign Support No. 21579
Location : West Hartford Route I-84 W.B. Mileage : 56.47
Project No. 0155-0171
Engineer : S. Bruno / Designed by : S. Bruno / Checked by : M. Chachakis

SIGN NUMBER	084W_155_56.47_B
SIGN PANEL	201.5 Sq.Ft.
EXIT CROWN	28.75 Sq.Ft.
TOTAL AREA	230.25 Sq.Ft.
BDR INSET/WIDTH	0" / 2"
CORNER RADIUS	12"
BACKGROUND	TYPE: IX
	COLOR: See Sign
LEGEND/BORDER	TYPE: IX
	COLOR: See Sign

SYMBOL	ROT	X	Y	WID	HT
M1.5.1	0	37.6	104.1	36	36
ARDOWN	0	71.6	8	32	22

REV'D /

PLOTTED : 2/20/2019

LETTER POSITIONS (X)																					LENGTH	SERIES/SIZE
S	O	U	T	H																		E 2000
88.6	103	115.9	127.6	138.7																	59.8	15,12
N	e	w		B	r	i	t	a	i	n												EM 2000
18.3	35.2	49	65.3	81.3	98.8	110.6	118.6	130.6	147.6	157.2											149.4	16/12
1/2	M	I	L	E																		E 2000
60.5	92.4	104.4	108.8	118																	65.1	15,10
E	X	I	T																			EM 2000
22.6	33.2	46.2	50.7																		37	12
O	N	L	Y																			EM 2000
115.6	128.6	141.6	151.2																		47.8	12

155-171

SIGN DETAIL
1:90

Dimensions are in Inches.
Material : Extruded_Aluminum_____
Mounted : Overhead
Sign Support No. 21580
Location : West Hartford Route I-84 E.B. Mileage : 56.70
Project No. 0155-0171
Engineer : S. Bruno / Designed by : S. Bruno / Checked by : M. Chachakis

SIGN NUMBER	084E_155_56.70_A
SIGN PANEL	192.5 Sq.Ft.
EXIT CROWN	42.75 Sq.Ft.
TOTAL AREA	235.25 Sq.Ft.
BDR INSET/WIDTH	0" / 2"
CORNER RADIUS	12"
BACKGROUND	TYPE: IX
	COLOR: Green
LEGEND/BORDER	TYPE: IX
	COLOR: White/White

SYMBOL	ROT	X	Y	WID	HT

REV'D /

PLOTTED : 2/20/2019

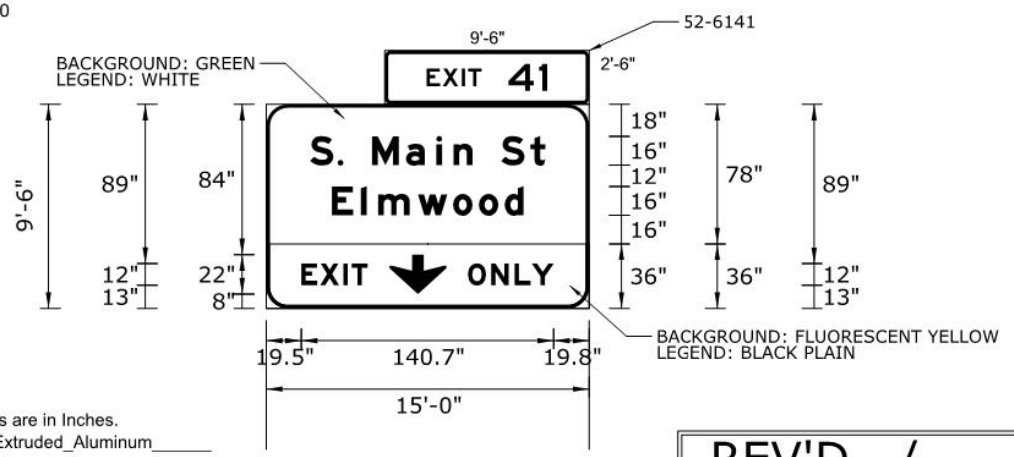
LETTER POSITIONS (X)																					LENGTH	SERIES/SIZE
P	a	r	k		R	o	a	d														EM 2000
41.5	56.8	73.8	85.6	96.2	112.2	128	142.4	158													127	16/12
W	e	s	t		H	a	r	t	f	o	r	d										EM 2000
17.8	37.2	50.9	64.8	73.2	89.2	106.1	123.1	133.3	145.2	155.4	171.2	181.6									174.4	16/12
C	e	n	t	e	r																	EM 2000
63.8	79.8	95.3	110.7	122.7	138.2																82.4	16/12
1	M	I	L	E																		E 2000
81.2	95.7	107.7	112.1	121.3																	47.6	15,10

ITEM #1207039A

Rev. Date 07/18

SIGN DETAIL

1:90



SIGN NUMBER	084E_155_56.70_B
SIGN PANEL	142.5 Sq.Ft.
EXIT CROWN	23.75 Sq.Ft.
TOTAL AREA	166.25 Sq.Ft.
BDR INSET/WIDTH	0" / 2"
CORNER RADIUS	12"
BACKGROUND	TYPE: IX
	COLOR: See Sign
LEGEND/BORDER	TYPE: IX
	COLOR: See Sign

SYMBOL	ROT	X	Y	WID	HT
ARDOWN	0	68.5	8	32	22

Dimensions are in Inches.
Material : Extruded_Aluminum_____
Mounted : Overhead
Sign Support No. 21580
Location : West Hartford Route I-84 E.B. Mileage : 56.70
Project No. 0155-0171
Engineer : S._Bruno_ / Designed by : S._Bruno___ / Checked by : M._Chachakis

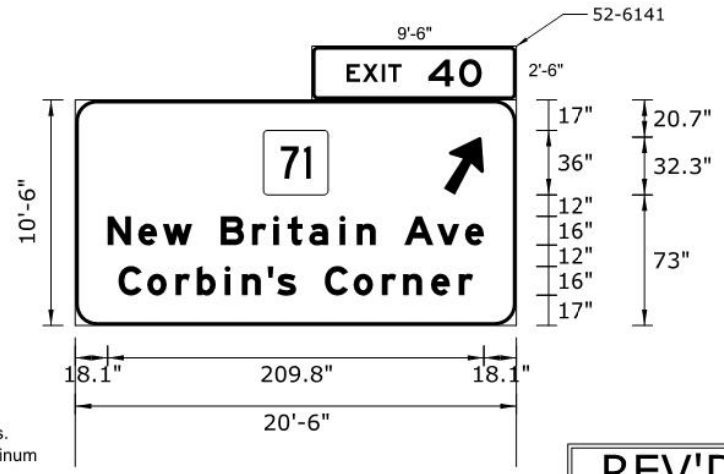
REV'D /

PLOTTED : 2/28/2019

LETTER POSITIONS (X)																					LENGTH	SERIES/SIZE
S	.		M	a	i	n		S	t													EM 2000
24.4	39.8	43	59	77.8	94.8	104.4	115	131	147.3												131.2	16/12
E	l	m	w	o	o	d																EM 2000
36.6	52.7	62.3	84.6	104.1	118.5	132.9															106.9	16/12
E	X	I	T																			EM 2000
19.5	30.1	43	47.6																		37	12
O	N	L	Y																			EM 2000
112.4	125.4	138.5	148.1																		47.8	12

155-171

SIGN DETAIL
1:90



Dimensions are in Inches.
Material : Extruded Aluminum
Mounted : Overhead
Sign Support No. 21580
Location : West Hartford Route I-84 W.B. Mileage : 56.70
Project No. 0155-0171
Engineer : S. Bruno / Designed by : S. Bruno / Checked by : M. Chachakis

SIGN NUMBER	084W_155_56.70_C
SIGN PANEL	215.25 Sq.Ft.
EXIT CROWN	23.75 Sq.Ft.
TOTAL AREA	239.0 Sq.Ft.
BDR INSET/WIDTH	0" / 2"
CORNER RADIUS	12"
BACKGROUND	TYPE: IX
	COLOR: Green
LEGEND/BORDER	TYPE: IX
	COLOR: White/White

SYMBOL	ROT	X	Y	WID	HT
M152CT	0	105	73	36	36
AR..Type A	330	205.5	73	22.2	35

REV'D /

PLOTTED : 2/20/2019

LETTER POSITIONS (X)

																					LENGTH	SERIES/SIZE
N	e	w		B	r	i	t	a	i	n		A	v	e								EM 2000
18.1	35.1	48.8	65.2	81.2	98.6	110.4	118.4	130.4	147.4	157	167.6	183.6	201.8	217.3							209.8	16/12
C	o	r	b	i	n	'	s		C	o	r	n	e	r								EM 2000
24.1	40.1	56	67.8	83.3	92.9	107.3	112.6	123.2	139.2	155.2	171	182.8	198.4	213.9							197.8	16/12

ITEM #1207039A

Rev. Date 07/18

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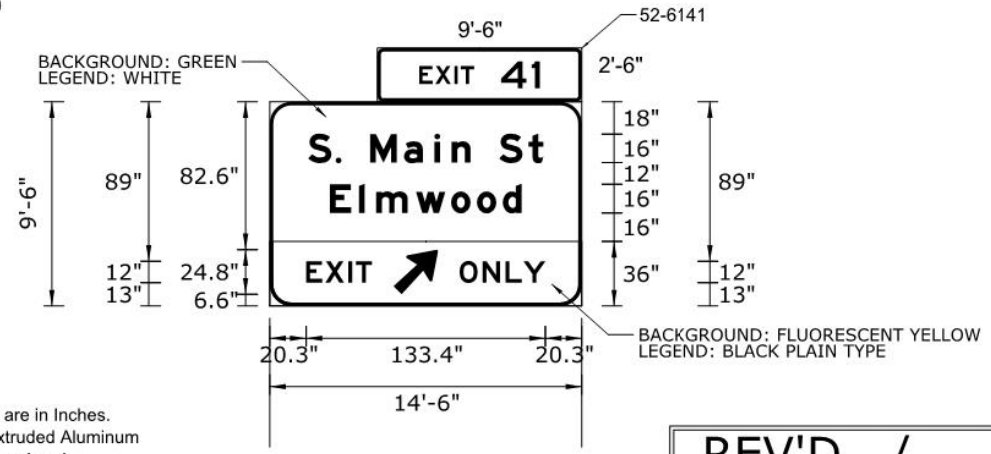
SIGN DETAIL

1:90



Dimensions are in Inches.
Material : Extruded Aluminum
Mounted : Overhead
Sign Support No. 21581
Location : West Hartford Route I-84 E.B. Mileage : 57.00
Project No. 0155-0171
Engineer : S. Bruno / Designed by : S. Bruno / Checked by : M. Chachakis

SIGN NUMBER	084E_155_57.00_A
SIGN PANEL	137.75 Sq.Ft.
EXIT CROWN	23.75 Sq.Ft.
TOTAL AREA	161.5 Sq.Ft.
BDR INSET/WIDTH	0" / 2"
CORNER RADIUS	12"
BACKGROUND	TYPE: IX
	COLOR: See Sign
LEGEND/BORDER	TYPE: IX
	COLOR: See Sign

SYMBOL	ROT	X	Y	WID	HT
AR_Type A	315	69	6.6	20	31.5

REV'D /

PLOTTED : 2/20/2019

LETTER POSITIONS (X)																					LENGTH	SERIES/SIZE
S	.		M	a	i	n		S	t													EM 2000
21.4	36.8	40	56	74.8	91.8	101.4	112	128	144.3												131.2	16/12
E	l	m	w	o	o	d																EM 2000
33.6	49.7	59.3	81.6	101.1	115.5	129.9															106.9	16/12
E	X	I	T																			E 2000
20.3	31	43.8	48																		36.7	12
O	N	L	Y																			E 2000
105.8	118.7	131.5	141.5																		47.9	12

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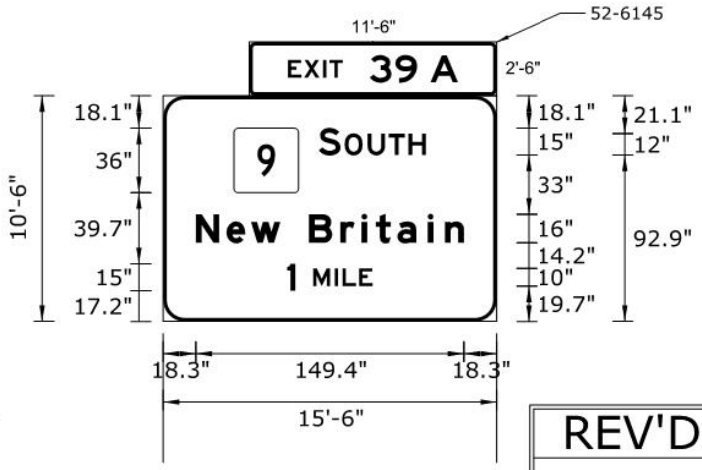
SIGN DETAIL
1:90



Dimensions are in Inches.
Material : Extruded Aluminum
Mounted : Overhead
Sign Support No. 21581
Location : West Hartford Route I-84 W.B. Mileage : 57.00
Project No. 0155-0171
Engineer : S. Bruno / Designed by : S. Bruno / Checked by : M. Chachakis

REV'D /

SIGN NUMBER	084W_155_57.00_B
SIGN PANEL	162.75 Sq.Ft
EXIT CROWN	28.75 Sq.Ft.
TOTAL AREA	191.5 Sq.Ft.
BDR INSET/WIDTH	0" / 2"
CORNER RADIUS	12"
BACKGROUND	TYPE: IX
	COLOR: Green
LEGEND/BORDER	TYPE: IX
	COLOR: White/White

SYMBOL	ROT	X	Y	WID	HT
M152CT	0	39.5	71.9	36	36

PLOTTED : 2/20/2019

LETTER POSITIONS (X)																					LENGTH	SERIES/SIZE
S	O	U	T	H																		E 2000
86.8	101.2	114	125.8	136.8																	59.8	15,12
N	e	w		B	r	i	t	a	i	n												EM 2000
18.3	35.2	49	65.3	81.3	98.8	110.6	118.6	130.6	147.6	157.2											149.4	16/12
1	M	I	L	E																		E 2000
69.2	83.7	95.7	100.1	109.3																	47.6	15,10

ITEM #1207039A

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Rev. Date 07/18

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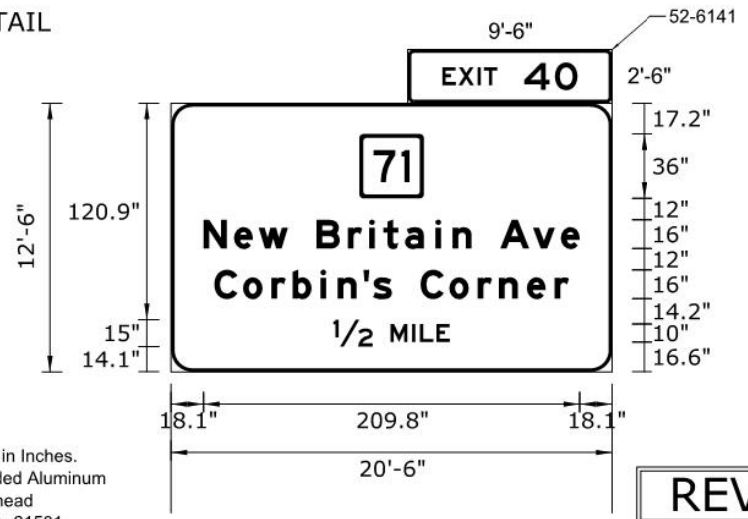
SIGN DETAIL
1:90



Dimensions are in Inches.
Material : Extruded Aluminum
Mounted : Overhead
Sign Support No. 21581
Location : West Hartford Route I-84 W.B. Mileage : 57.00
Project No. 0155-0171
Engineer : S. Bruno / Designed by : S. Bruno / Checked by : M. Chachakis

REV'D /

SIGN NUMBER	084W_155_57.00_C
SIGN PANEL	256.25 Sq.Ft.
EXIT CROWN	23.75 Sq.Ft.
TOTAL AREA	280.0 Sq.Ft.
BDR INSET/WIDTH	0" / 2"
CORNER RADIUS	12"
BACKGROUND	TYPE: IX
	COLOR: Green
LEGEND/BORDER	TYPE: IX
	COLOR: White/White

SYMBOL	ROT	X	Y	WID	HT
M1.5.1	0	105	96.9	36	36

PLOTTED : 2/20/2019

LETTER POSITIONS (X)																					LENGTH	SERIES/SIZE
N	e	w		B	r	i	t	a	i	n		A	v	e								EM 2000
18.1	35.1	48.8	65.2	81.2	98.6	110.4	118.4	130.4	147.4	157	167.6	183.6	201.8	217.3							209.8	16/12
C	o	r	b	i	n	'	s		C	o	r	n	e	r								EM 2000
24.1	40.1	56	67.8	83.3	92.9	107.3	112.6	123.2	139.2	155.2	171	182.8	198.4	213.9							197.8	16/12
1/2	M	I	L	E																		E 2000
90.5	122.4	134.4	138.8	148																	65.1	15,10

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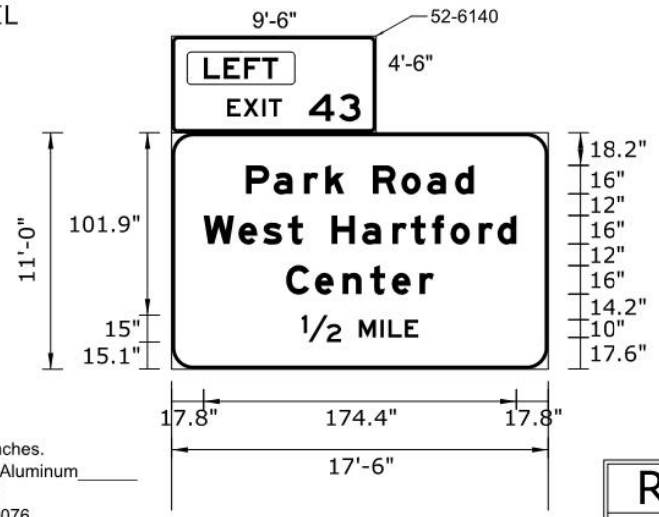
Rev. Date 07/18

SIGN DETAIL
1:90



Dimensions are in Inches.
Material : Extruded_Aluminum_____
Mounted : Overhead
Sign Support No. 22076
Location : West Hartford Route I-84 E.B. Mileage : 57.54
Project No. 0155-0171
Engineer : S. Bruno / Designed by : S. Bruno / Checked by : M. Chachakis

SIGN NUMBER	084E_155_57.54_A
SIGN PANEL	192.5 Sq.Ft.
EXIT CROWN	42.75 Sq.Ft.
TOTAL AREA	235.25 Sq.Ft.
BDR INSET/WIDTH	0" / 2"
CORNER RADIUS	12"
BACKGROUND	TYPE: IX
	COLOR: Green
LEGEND/BORDER	TYPE: IX
	COLOR: White/White

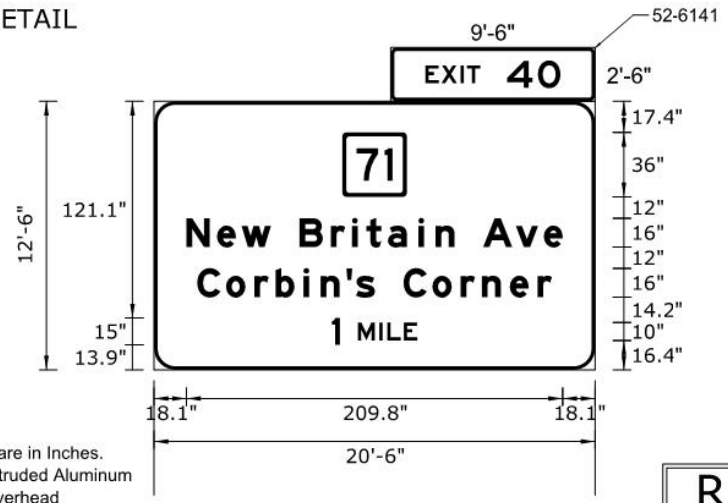
SYMBOL	ROT	X	Y	WID	HT

REV'D /

PLOTTED : 2/20/2019

LETTER POSITIONS (X)																					LENGTH	SERIES/SIZE
P	a	r	k		R	o	a	d														EM 2000
41.5	56.8	73.8	85.6	96.2	112.2	128	142.4	158													127	16/12
W	e	s	t		H	a	r	t	f	o	r	d										EM 2000
17.8	37.2	50.9	64.8	73.2	89.2	106.1	123.1	133.3	145.2	155.4	171.2	181.6									174.4	16/12
C	e	n	t	e	r																	EM 2000
63.8	79.8	95.3	110.7	122.7	138.2																82.4	16/12
1/2	M	I	L	E																		E 2000
72.5	104.4	116.4	120.8	130																	65.1	15,10

SIGN DETAIL
1:90



Dimensions are in Inches.
Material : Extruded Aluminum
Mounted : Overhead
Sign Support No. 21682
Location : West Hartford Route I-84 W. B. Mileage : 57.57
Project No. 0155-0171
Engineer : S. Bruno / Designed by : S. Bruno / Checked by : M. Chachakis

SIGN NUMBER	084W_155_57.57_A
SIGN PANEL	256.25 Sq.Ft.
EXIT CROWN	23.75 Sq.Ft.
TOTAL AREA	280.0 Sq.Ft.
BDR INSET/WIDTH	0" / 2"
CORNER RADIUS	12"
BACKGROUND	TYPE: IX
	COLOR: Green
LEGEND/BORDER	TYPE: IX
	COLOR: White/White

SYMBOL	ROT	X	Y	WID	HT
M1.5.1	0	105	96.6	36	36

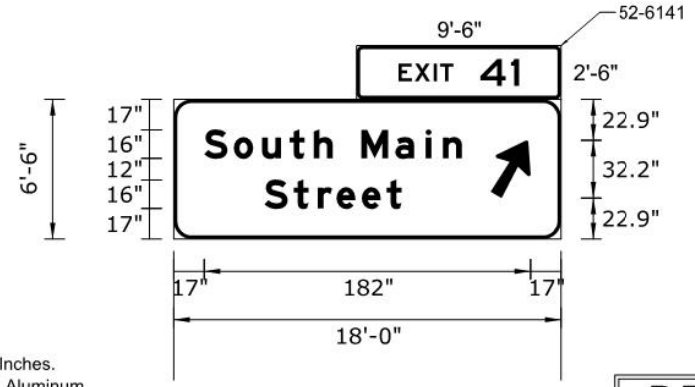
REV'D /

PLOTTED : 2/20/2019

LETTER POSITIONS (X)

																					LENGTH	SERIES/SIZE
N	e	w		B	r	i	t	a	i	n		A	v	e								EM 2000
18.1	35.1	48.8	65.2	81.2	98.6	110.4	118.4	130.4	147.4	157	167.6	183.6	201.8	217.3							209.8	16/12
C	o	r	b	i	n	'	s		C	o	r	n	e	r								EM 2000
24.1	40.1	56	67.8	83.3	92.9	107.3	112.6	123.2	139.2	155.2	171	182.8	198.4	213.9							197.8	16/12
1	M	I	L	E																		E 2000
99.2	113.7	125.7	130.1	139.3																	47.6	15,10

SIGN DETAIL
1:90



Dimensions are in Inches.
Material : Extruded Aluminum
Mounted : Overhead
Sign Support No. 21682
Location : West Hartford Route I-84 W.B. Mileage : 57.57
Project No. 0155-0171
Engineer : S. Bruno / Designed by : S. Bruno / Checked by : M. Chachakis

SIGN NUMBER	084W_155_57.57_B
SIGN PANEL	117.0 Sq.Ft.
EXIT CROWN	23.75 Sq.Ft.
TOTAL AREA	140.75 Sq.Ft.
BDR INSET/WIDTH	0" / 2"
CORNER RADIUS	10"
BACKGROUND	TYPE: IX
	COLOR: Green
LEGEND/BORDER	TYPE: IX
	COLOR: White/White

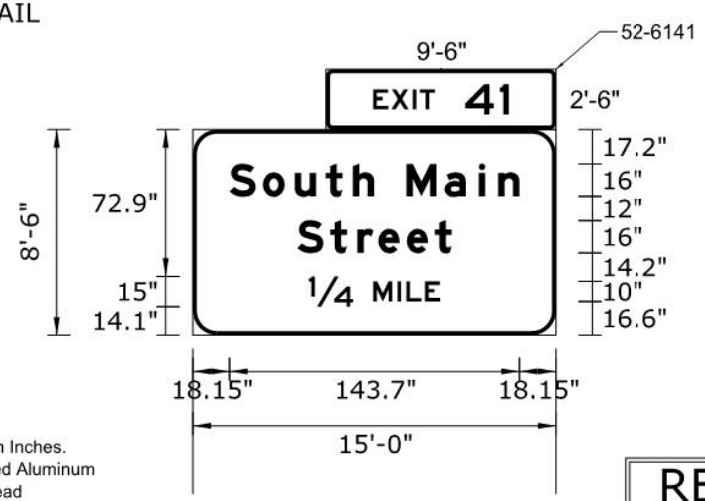
SYMBOL	ROT	X	Y	WID	HT
AR_Type A	330	176.7	22.9	22.2	35

REV'D /

PLOTTED : 2/20/2019

LETTER POSITIONS (X)																					LENGTH	SERIES/SIZE
S	o	u	t	h		M	a	i	n													EM 2000
17	33.5	49.3	64.7	78.1	88.7	104.7	123.5	140.5	150.1												143.7	16/12
S	t	r	e	e	t																	EM 2000
50.6	66.9	80.3	90.7	104.8	118.7																76.5	16/12

SIGN DETAIL
1:80



Dimensions are in Inches.
Material : Extruded Aluminum
Mounted : Overhead
Sign Support No. 21681
Location : West Hartford Route I-84 W.B. Mileage : 57.82
Project No. 0155-0171
Engineer : S. Bruno / Designed by : S. Bruno / Checked by : M. Chachakis

SIGN NUMBER	084W_155_57.82_A
SIGN PANEL	127.5 Sq.Ft.
EXIT CROWN	23.75 Sq.Ft.
TOTAL AREA	151.25 Sq.Ft.
BDR INSET/WIDTH	0" / 2"
CORNER RADIUS	12"
BACKGROUND	TYPE: IX
	COLOR: Green
LEGEND/BORDER	TYPE: IX
	COLOR: White/White

SYMBOL	ROT	X	Y	WID	HT

REV'D /

PLOTTED : 2/20/2019

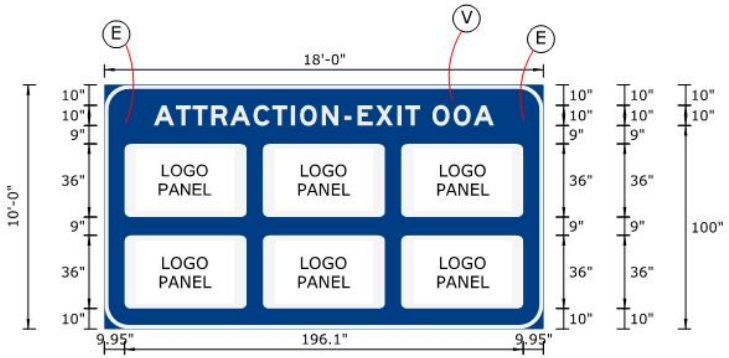
LETTER POSITIONS (X)

																					LENGTH	SERIES/SIZE
S	o	u	t	h		M	a	i	n													EM 2000
18.2	34.6	50.5	65.8	79.3	89.8	105.8	124.7	141.7	151.3												143.7	16/12
S	t	r	e	e	t																	EM 2000
51.8	68.1	81.5	91.9	106	119.9																76.5	16/12
1/4	M	I	L	E																		E 2000
57.5	89.4	101.4	105.8	115																	65.1	15,10

155-171

SIGN DETAIL
1:80

(E) EQUAL SPACING
(V) VARIABLE EXIT NO.



SIGN NUMBER	52-6747
PANEL SIZE	18'-0" x 10'-0"
SIGN AREA	180.0 Sq.Ft.
MUTCD	
BDR INSET/WIDTH	0" / 2"
CORNER RADIUS	12"
BACKGROUND	TYPE: *
	COLOR: Blue
LEGEND/BORDER	TYPE: *
	COLOR: White/White

* REFER TO CATALOG OF SIGNS FOR SHEETING TYPE.
WHEN COLOR IS BLACK TYPE IS "PLAIN".

SYMBOL	ROT	X	Y	WID	HT
M1_53A	0	9.9	55	60	36
M1_53A	0	78	55	60	36
M1_53A	0	146	55	60	36
M1_53A	0	9.9	10	60	36
M1_53A	0	78	10	60	36
M1_53A	0	146	10	60	36

REV'D 7/18
Removed the "S" from "ATTRACTIONS".

Dimensions are in Inches
Material : Extruded Aluminum
Engineer : B. Schilling / Designed By: J. Fascione / Checked By:_____
Ground Mounted

LETTER POSITIONS (X)

	A	T	T	R	A	C	T	I	O	N		-		E	X	I	T				LENGTH	SERIES/SIZE
24.3	10.9	8.2	9.2	9.2	11.5	9.3	9.2	4.4	10.8	8.1	3	3.5	3	8.8	10.8	3.8	7.4	6				
																	0	0	A			EM 2000
																	10.4	9.8	10.1	24.3	167.4	10

Rev. Date 07/18

ITEM #1207039A

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Pay Item	Pay Unit
Sign Face - Extruded Aluminum (Type IX Retroreflective Sheeting)	s.f.

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

ITEM #1208932A - SIGN FACE - SHEET ALUMINUM (TYPE IV RETROREFLECTIVE SHEETING)

Section 12.08 is supplemented and amended as follows:

12.08.01—Description:

Add the following:

This item shall also include field testing of metal sign base posts as directed by the Engineer.

12.08.03—Construction Methods:

Delete the last sentence and add the following:

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

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

12.08.04—Method of Measurement:

Add the following:

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

12.08.05—Basis of Payment:

Replace the entire Article with the following:

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

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

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

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

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

ITEM #1303230A - FIRE SUPPRESSION STANDPIPE SYSTEM

Description:

Work under this item shall consist of furnishing and installing a complete fire suppression standpipe system, mounted to the bridge at the locations shown on the plans. All work shall conform to these specifications and the requirements of the National Fire Protection Association (NFPA) "Standard for the Installation of Stand Pipe and Hose Systems".

Materials:

Pipe shall be Schedule 40, hot dip galvanized, welded and seamless pipe conforming to the requirements of ASTM A53, Grade B. Pipe bends may be used to eliminate elbows. The minimum bend shall be 12 times the diameter of the pipe (inside diameter of bend). Couplings may be used to join straight sections of pipe. Couplings shall conform to the requirement of ASTM A865 and shall be hot dip galvanized.

Elbows and fittings shall be malleable iron conforming to the requirements of ASTM A197 (ANSI B16.3 Class 300) and shall be galvanized according to the requirements of ASTM A153. All connections shall be threaded to match the adjoining pipe. Elbows and fittings shall be rated for 300 psi pressure.

Steel for pipe supports and shims shall conform to the requirements of ASTM A709 Grade 50 and shall be galvanized according to the requirements of ASTM A123.

Bolts shall conform to the requirements of ASTM F3125 Grade A325, and shall be supplied with matching nuts and washers. Anchor rods shall conform to the requirements of ASTM A449 and shall be supplied with matching nuts and washers. All bolts, anchor rods, nuts, and washers shall be galvanized in accordance with the requirements of ASTM A153.

The adhesive bonding material shall be a resin compound specially formulated to anchor steel bars in holes drilled into concrete for the purpose of resisting tension pull-out. The Contractor shall select one of the product systems listed in the Standard Specifications, Subarticle M.03.07 – Chemical Anchors.

A Materials Certificate shall be supplied in accordance with Article 1.06.07, confirming the conformance of the adhesive bonding material to the requirements set forth in the manufacturer's specification.

End Connections of standpipe system shall be:

Lower End of Standpipe: Storz X NPT Rig F 30° Elbow with Cap (Model SFDCEB56N)

Upper End of Standpipe: Storz X NPT Rig F with Cap (Model SFDC56N)

As manufactured by:

Kochek Co Inc.
75 Highland Drive
Putnam, CT 06260
(860) 963-3377

Couplings at both ends of the standpipe shall be secured to the steel pipe by means of set screws through the collar of the Storz Coupling.

All hardware shall be constructed of T6160 aluminum with a chrome plate finish.

Installation of piping shall conform to standard plumbing practice to ensure no leakage under operating pressures.

Fire Department sign shall conform to an aluminum thickness of 0.1 inches. Color of sign shall have red background with white lettering or as directed by the Town of West Hartford Fire Chief.

Testing: After the system has been installed, the Contractor shall test the system in the following manner:

a. The system shall be pressurized with water to 200 psi for two (2) hours. The system shall be inspected for leaks at the joints and connections. If any leaks are detected, the Contractor shall repair the leaks and retest the system.

b. The Contractor shall perform a low-pressure flow test to ensure that there are no clogs in the system. If any clogs are detected, the Contractor shall repair the clog and retest the system.

The Contractor shall coordination with the Town of West Hartford Fire Department the date and time of the testing, so the necessary personnel are present to witness the testing. Testing shall not be performed until the Fire Department is present. The contact information for the Fire Department is as follows:

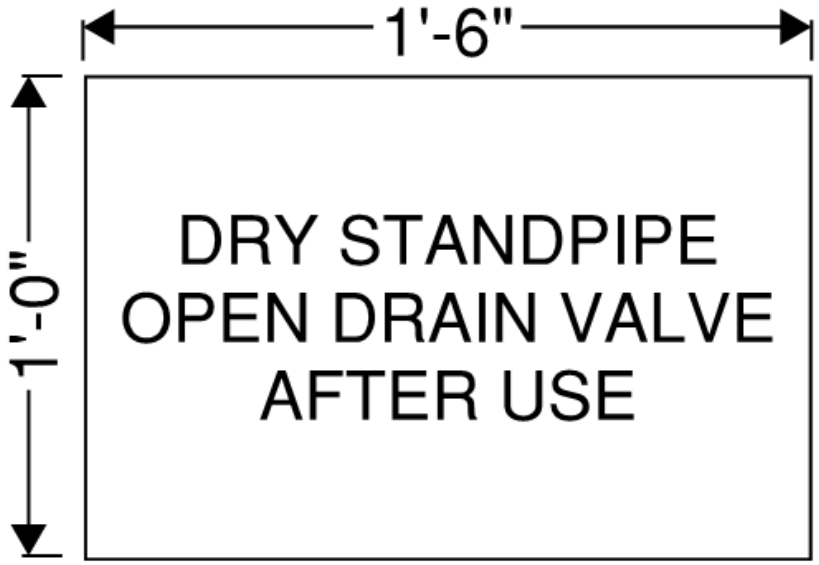
Mr. Greg H. Priest
Fire Chief
(860) 561-8300

Construction Methods:

The Contractor shall furnish shop drawings, including all field verified measurements at each location for the standpipe system, in accordance with Article 1.05.02.

Installation of adhesive anchors shall be according to the recommendations of the manufacturer. The Contractor shall take care not to drill through or damage existing reinforcing steel.

Fire Suppression Stand Pipe System sign shall be sized according to the following dimensions and have the following lettering:



Method of Measurement:

This item shall be measured for payment by the actual number of Fire Suppression Standpipe Systems installed and accepted. A system consists of all materials from the inlet of the pipe to the outlet of the pipe including, but not limited to, the pipe, fittings, couplings, end connections, locking caps, expansion devices, support brackets, drilling and grouting of anchors, installation of the fire suppression standpipe system signs, and all the necessary hardware.

Basis of Payment:

This work will be paid for at the contract unit price, per each, for "Fire Suppression Standpipe System", complete in place, which price shall include all materials, equipment, tools and labor incidental thereto.

PAY ITEM	PAY UNIT
Fire Suppression Standpipe System	ea.

ITEM #1806226A - PRE-WARNING VEHICLE

Description: Work under this item shall include furnishing, deploying and maintaining a Truck-Mounted Impact Attenuator equipped with a changeable message sign (CMS) for use as a Pre-Warning Vehicle (PWV) in a rolling road block operation on limited access highways. Impact attenuators shall only be truck-mounted. The message on the sign shall warn motorists of slow or stopped traffic conditions.

Materials: The Truck-Mounted Impact Attenuator shall meet the requirements of Article 18.06.02, except replace all instances of "flashing arrow," "arrow sign," and "arrow" with "CMS".

The CMS shall meet the requirements of Article 11.31.02, with the following amendments:

1. **Physical Characteristics of the CMS**
   a) Mounting – The CMS shall be truck mounted only
   b) Sign Display Dimensions – Width of 6 feet, height of 4 feet
2. **Visual Characteristics of the CMS Display**
   a) Sign Type – CMS shall have a LED display only
   b) Color – CMS shall have black background with orange, yellow, or amber legend
   c) Characters – Letter height shall be 13 inches; Single stroke
   d) Visibility– CMS brightness must provide for visibility at 1/2 mile
   e) Message – The message shall read as follows, or shall be as directed by the Engineer:

Frame 1: SLOWED TRAFFIC AHEAD
Frame 2: BE PREPARED TO STOP
Or
Frame 1: STOPPED TRAFFIC AHEAD
Frame 2: BE PREPARED TO STOP

Construction Methods: The PWV shall be initially positioned in the right shoulder ½ mile prior to the rolling road block operation.

If a traffic queue reaches the PWV's initial location, the Contractor shall slowly reverse the PWV along the shoulder to position itself prior to the new back of queue.

The Contractor shall meet the requirements of Article 18.06.03.

Method of Measurement: This work will be measured for payment by the actual number of hours that the Pre-Warning Vehicle is used in a rolling road block operation.

Basis of Payment: This work will be paid for at the Contract unit price per hour for "Pre-Warning Vehicle," which shall include the furnishing and use of the pre-warning vehicle and a driver, attenuator reflector, flashing lights, changeable message sign, and all equipment, materials, tools, labor, disposal of damaged Truck-Mounted Impact Attenuator components and work incidental thereto.

Pay Item	Pay Unit
Pre-warning Vehicle	hr.

PERMITS AND PERMIT APPLICATIONS

Flood Management General Certification

CTDEEP Stormwater Construction General Permit

CTDEEP Inland Wetlands and Watercourses General Permit

Army Corps of Engineers Self Verification (SV)

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

m e m o r a n d u m

FLOOD MANAGEMENT GENERAL CERTIFICATION
Project No.: 155-171
Description: Safety and Operational Improvements on I-84

Town: West Hartford
Date: February 6, 2019

to: Mr. Michael E. Masayda
Trans. Principal Engineer
Hydraulics and Drainage
Bureau of Engineering and Highway Operations

from: Susan M. Libatique
Trans. Principal Engineer
Highway Design
Bureau of Engineering and Construction

Please review this request for Flood Management General Certification and indicate your concurrence below.

Certification (to be completed by designer)

I have read the Flood Management General Certification and the descriptions for the approved DOT minor activities. This project qualifies for the Flood Management General Certification under:

( ) Minor Safety Improvements and Streetscape Projects
( ) Roadway Repaving, Maintenance & Underground Utilities
(X) Minor Stormwater Drainage Improvements
( ) Removal of Sediment or Debris from a Floodplain
( ) Wetland Restoration Creation or Enhancement
( ) Scour Repairs at Structures; (*Must acquire DEEP Fisheries Concurrence to be eligible*)
( ) Guide Rail Installation
( ) Deck and Superstructure Replacements
( ) Minor Bridge Repairs and Access
( ) Fisheries Enhancements
( ) Surveying and Testing
( ) Bicycle / Pedestrian, Multi Use Trails and Enhancement Projects

The following required documentation is attached in support of this certification:

- Project description
- Location plan
- Description of Floodplain involvement and how project qualifies for general certification
- 8-1/2" by 11" excerpt copy of the FEMA Flood Insurance Rate Map (FIRM) and Floodway Boundary Map (if applicable)
- Design plans, (dated 2/6/19) with FEMA floodplain and floodway boundaries plotted, cross sections and profiles, as necessary, that clearly depict the floodplain involvement
- FEMA 100-year flood elevation plotted on elevation view (for structures)

Print Name: Michael W. Dion	Title: Senior Project Manager
Signature	Date: 2/6/2019

Concurrence (to be completed by Hydraulics and Drainage)

Based on the documentation submitted, I hereby concur that the project qualifies for Flood Management General Certification.

If there are any changes to the proposed activities within the floodplain or floodway, the project must be re-submitted for review and approval.

Signature Michael Masayda Michael Masayda, P.E. 2019.03.28	Date 3-28-19

cc: Theodore Nezames
DEEP Flood Management Cert. File
File Environmental Permit Coordination Unit
Environmental Planning File
Hydraulics and Drainage

Rev 03/15

INTERDEPARTMENTAL MESSAGE **STATE OF CONNECTICUT**

To	NAME, TITLE Central Permit Processing Unit, 1st Floor	DATE
	AGENCY, ADDRESS Department of Energy and Environmental Protection, 79 Elm Street, Hartford, CT 06106	
From	NAME, TITLE Kimberly C. Lesay, Transportation Assistant Planning Director	TELEPHONE 860-594-2931
	AGENCY, ADDRESS Department of Transportation, 2800 Berlin Turnpike, Newington, CT 06131	

Subject: **State Project No. 155-171**
Safety and Operational Improvements on I-84
Exit 39A to Exit 41
Town of West Hartford

Attached is the original Request for Authorization Form for the General Permit for Water Resource Activities for the subject project.

The Flood Management General Certification was submitted to CTDOT Hydraulics on February 6, 2019 and was approved on March 28, 2019.

Any questions pertaining to this application may be directed to Mr. Andrew H. Davis, Transportation Supervising Planner of my staff, at 860-594-2157.

CT Dept of Energy & Environmental Protection
Central Permit Processing Unit

SEP 03 2019

RECEIVED BY B.C

Attachments:

Connecticut Department of
Energy & Environmental Protection

CPPU USE ONLY
App #:
Doc #:
Check #:

Permit Application Transmittal Form

Please complete this transmittal form in accordance with the instructions in order to ensure the proper handling of your application(s) and the associated fee(s). Print legibly or type.

Part I: Applicant Information:

- ***If an applicant is a corporation, limited liability company, limited partnership, limited liability partnership, or a statutory trust, it must be registered with the Secretary of State. If applicable, applicant's name shall be stated **exactly** as it is registered with the Secretary of State.*
- *If an applicant is an individual, provide the legal name (include suffix) in the following format: First Name; Middle Initial; Last Name; Suffix (Jr, Sr., II, III, etc.).*

Applicant: **Connecticut Department of Transportation**

Mailing Address: **2800 Berlin Turnpike**

City/Town: **Newington** State: **CT** Zip Code: **06131**

Business Phone: **860-594-2931** ext.:

Contact Person: **Kimerly C. Lesay** Phone: **860-594-2931** ext.

E-Mail: **kimberly.lesay@ct.gov**

Applicant (check one): ☐ individual ☐ *business entity ☐ federal agency ☒ state agency ☐ municipality ☐ tribal
*If a business entity, list type (e.g., corporation, limited partnership, etc.):

☐ Check if any co-applicants. If so, attach additional sheet(s) with the required information as supplied above.

Please provide the following information to be used for *billing purposes only*, if different:

Company/Individual Name:

Mailing Address:

City/Town: State: Zip Code:

Contact Person: Phone: ext.

Part II: Project Information

Brief Description of Project: *(Example: Development of a 50 slip marina on Long Island Sound)*

Safety and operational Improvements along I-84 Westbound and Eastbound (Exit 39A to Exit 41)

Location (City/Town): **West Hartford**

Other Project Related Permits (*not* included with this form):

Permit Description	Issuing Authority	Submittal Date	Issuance Date	Denial Date	Permit #
Self-Verification	**ACOE**	**Concurrent Submission**			
Stormwater Discharge	**CT DEEP**	**Pre-Construction**			

Part III: Individual Permit Application and Fee Information

New, Mod. or Renew	Individual Permit Applications	Initial Fees	No. of Permits Applied For	Total Initial Fees	Original + Required Copies
	AIR EMISSIONS				
	New Source Review ☐ Revision ☐ minor mod	$940.00			1 + 0
	Title V Operating Permits ☐ Revision ☐ minor mod ☐ non-minor mod	none			1 + 0
	Title IV	none			1 + 0
	Clean Air Interstate Rule (CAIR)	none			1 + 0
	WATER DISCHARGES				
	To Groundwater	$1300.00			1 + 1
	To Sanitary Sewer (POTW)	$1300.00			1 + 1
	To Surface Water (NPDES)	$1300.00			1 + 1
	WATER PLANNING AND MANAGEMENT				
	Dam Safety	none			1 + 2
	Domestic Sewage Treatment Works (For municipal and private sewage treatment facilities discharging to surface waters)	$1300.00/ Mod = $940			1 + 1
	Water Diversion (consumptive) and Registrations	★			1 + 5
	LAND AND WATER RESOURCES				
	Flood Management Certification	none			1 + 1
	Flood Management Certification Exemption	none			1 + 1
	Inland Wetlands and Watercourses (State Agencies Only)	none			1 + 5
	Inland 401 Water Quality Certification	none			1 + 5
	FERC- Hydropower Projects- 401 Water Quality Certification	none			
	Water Diversion (non-consumptive)	★			1 + 5
	Certificate of Permission	$375.00			1 + 2
	Coastal 401 Water Quality Certification	none			1 + 2
	Structures and Dredging/and Fill/Tidal Wetlands	$660.00			1 + 2
	WASTE MANAGEMENT				
	Aerial Pesticide Application	★			1 + 2
	Aquatic Pesticide Application	$200.00			1 + 0
	CGS Section 22a-454 Waste Facilities	★			1 + 1
	Disruption of a Solid Waste Disposal Area	$0			1 + 1
	Hazardous Waste Treatment, Storage and Disposal Facilities	★			1 + 1
	Marine Terminal License	$100.00			1 + 0
	Stewardship	$4000.00			1 + 1
	Solid Waste Facilities	★			1 + 1
	Waste Transportation	★			1 + 0
		Subtotal ➡	0	0	
	GENERAL PERMITS and AUTHORIZATIONS	Subtotals Page 3 &4 ➡	1	0	
	Enter subtotals from Part IV, pages 3 - 6 of this form	Subtotals Page 5 ➡	0	0	
		Subtotals Page 6 ➡	0	0	
		TOTAL ➡	1	0	
	☐ Indicate whether municipal discount or state waiver applies.	Less Applicable Discount ➡		0	
		AMOUNT REMITTED ➡		0	

Check # ➡ _____

Check or money order should be made payable to:
"Department of Energy and Environmental Protection"

★ **See fee schedule on individual application.**

Part IV: General Permit Registrations and Requests for Other Authorizations Application and Fee Information

✓	General Permits and Other Authorizations	Initial Fees	No. of Permits Applied For	Total Initial Fees	Original + Required Copies
	AIR EMISSIONS				
☐	Limit Potential to Emit from Major Stationary Sources of Air Pollution	$2760.00			1 + 0
☐	Diagnostic and Therapeutic X-Ray Devices (Medical X-Ray) Registration	$190.00/Xray device			1 + 0
☐	Radioactive Materials and Industrial Device Registration (Ionizing Radiation)	$200.00			1 + 0
☐	Emergency/Temporary Authorization	★★			★★
☐	License Revocation Request	$0			★★
☐	Other, (please specify):				
	WATER DISCHARGES				
	Categorical Industry User to a POTW				
☐	Discharges ≥ 10,000 gpd	$6250.00			1 + 0
☐	Discharges < 10,0000 gpd	$3125.00			
	Comprehensive Discharges to Surface Water and Groundwater				
☐	Registration Only	$625.00			1 + 0
☐	Approval of Registration by DEEP	$1250.00			
☐	Domestic Sewage	$625.00			1 + 0
☐	Food Service Establishment Wastewater	No Registration			
	Groundwater Remediation Wastewater				
☐	Registration Only	$625.00			1 + 0
☐	Approval of Registration by DEEP	$1250.00			
	Miscellaneous Discharges of Sewer Compatible Wastewater				
☐	Registration Only	$500.00			1 + 0
☐	Approval of Registration by DEEP	$1000.00			
☐	Nitrogen Discharges	No Registration			
☐	Point Source Discharges from Application of Pesticides	$200.00			1 + 0
☐	Stormwater Associated with Commercial Activities	$300.00			1 + 0
	Stormwater Associated with Industrial Activities				
☐	No Exposure Certification	$250.00			1 + 0
☐	<50 employees–see general permit for additional requirements	$500.00			
☐	>50 employees–see general permit for additional requirements	$1000.00			
☐	Stormwater & Dewatering Wastewaters-Construction Activities	★			1 + 0
☐	Stormwater from Small Municipal Separate Storm Sewer Systems (MS4)	$625.00			1 + 0
☐	Stormwater from DOT Separate Storm Sewer Systems (DOT MS4)	$0			1 + 0
☐	Subsurface Sewage Disposal Systems Serving Existing Facilities	★★			1 + 0
☐	Swimming Pool Wastewater - Public Pools and Contractors	$500.00			1 + 0
	Vehicle Maintenance Wastewater				
☐	Registration Only	$625.00			1 + 0
☐	Approval of Registration by DEEP	$1250.00			
☐	Emergency/Temporary Authorization - Discharge to POTW	$1500.00			1 + 0
☐	Emergency/Temporary Authorization - Discharge to Surface Water	$1500.00			1 + 0
☐	Emergency/Temporary Authorization - Discharge to Groundwater	$1500.00			1 + 0
☐	Other, (please specify):				
	Note: Carry subtotals over to Part III, page 2 of this form.	Subtotal ➡	0	0	

★ See fee schedule on registration/application.

★★ Contact the specific permit program for this information. (Contact numbers are provided in the instructions)

Part IV: General Permit Registrations and Requests for Other Authorizations (continued)

✓	General Permits and Other Authorizations	Initial Fees	No. of Permits Applied For	Total Initial Fee	Original + Required Copies
	AQUIFER PROTECTION PROGRAM				
☐	Registration for Regulated Activities	$625.00			1 + 0
☐	Permit Application to Add a Regulated Activity	$1250.00			1 + 0
☐	Exemption Application from Registration	$1250.00			1 + 0
	WATER PLANNING AND MANAGEMENT				
☐	Dam Safety Repair and Alteration: Non Filing	No Registration			
☐	Dam Safety Repair and Alteration: Filing – No PE	$100.00			1 + 0
☐	Dam Safety Repair and Alteration: Filing – PE	$200.00			1 + 0
☐	Dam Safety Repair and Alteration: Approval of Filing	$250.00			1 + 0
☐	Diversion of Remediation Groundwater	No Registration			
☐	Diversion of Water for Consumptive Use: Reauthorization Categories	$2500.00			1 + 0
☐	Diversion of Water for Consumptive Use: Authorization Required	$2500.00			1 + 4
☐	Diversion of Water for Consumptive Use: Filing Only	$1500.00			1 + 1
☒	Water Resource Construction Activities	★	1	0	1 +0
☐	Emergency/Temporary Authorization	★★			★★
☐	Notice of High Hazard Dam or a Significant Hazard Dam	$0			1 +0
☐	Other, (please specify):				
	LAND AND WATER RESOURCES				
	Minor Coastal Structures				
☐	4/40 Docks/Access Stairs	$700.00			1 + 1
☐	Beach Grading	No Registration			
☐	Buoys or Markers	No Registration			
☐	Experimental Activities/Scientific Monitoring Devices	No Registration			
☐	Harbor Moorings	No Registration			
☐	Non-harbor Moorings	$250.00			1 + 1
☐	Osprey Platforms and Perch Poles	No Registration			
☐	Pump-out Facilities	No Registration			
☐	Swim Floats	No Registration			
	Coastal Maintenance				
☐	Backflow Prevention Structure	No Registration			
☐	Beach Grading/Raking	No Registration			
☐	Catch Basin Cleaning	No Registration			
☐	Coastal Remedial Activities Required by Order	$700.00			1 + 1
☐	Coastal Restoration	No Registration			
☐	DEEP Boat Launch Infrastructures	No Registration			
☐	DOT Infrastructures	No Registration			
☐	Marina and Mooring Field Reconfiguration	$700.00			1 + 1
☐	Minor Seawall Repair	No Registration			
☐	Placement of Cultch	No Registration			
☐	Reconstruction of Legally Existing Structure/Obstruction/Encroachment	$300.00			1 + 1
☐	Removal of Derelict Structures	No Registration			
☐	Residential Flood Hazard Mitigation	$100.00			1 + 1
☐	Temporary Access of Construction Vehicles/Equipment	No Registration			
☐	Programmatic General Permit	★			1 + 1
☐	Emergency/Temporary Authorization				
☐	Other, (please specify):				
	Note: Carry subtotals over to Part III, page 2 of this form.	Subtotal ➡	1	0	

★ See fee schedule on registration/application.

★★ Contact the specific permit program for this information. (Contact numbers are provided in the instructions)

Part IV: General Permit Registrations and Requests for Other Authorizations (continued)

✓	General Permits and Other Authorizations	Initial Fees	No. of Permits Applied For	Total Initial Fee	Original + Required Copies
	WASTE MANAGEMENT				
☐	Addition of Grass Clippings at Registered Leaf Composting Facilities	$500.00			1 + 0
☐	Beneficial Use Determination	★			1 + 0
☐	Collection and Storage of Post Consumer Paint	$0			1 + 0
☐	Connecticut Solid Waste Demonstration Project	$1000.00			1 + 0
	Construct and Operate a Commercial Facility for the Management of Recyclable Materials and Certain Solid Wastes (Commercial GP)	Initial/Mod Fee			
☐	Asbestos Containing Materials	$1,250.00/$ 625			1 + 0
☐	Ash Residue	$1,250.00/$ 625			1 + 0
☐	Clean Wood: Tier III	$500.00/$250			1 + 0
☐	Clean Wood: Tier II	$250.00/$125			1 + 0
☐	Construction and Demolition Waste: Tier III	$1,250.00/$625			1 + 0
☐	Construction and Demolition Waste: Tier II	$500.00/$250			1 + 0
☐	Non-RCRA Hazardous Waste/Compatible Solid Wastes	$1,250.00/$625			1 + 0
☐	Recyclables	$500.00/$250			1 + 0
☐	Universal Wastes/Compatible Solid Wastes	$1,250.00/$625			1 + 0
	Contaminated Soil and/or Staging Management (Staging/Transfer)				
☐	New Registrations	$250.00			1 + 0
☐	New Approval of Registrations	$1500.00			1 + 0
☐	Renewal of Registrations	$250.00			1 + 0
☐	Renewal of Approval of Registrations	$750.00			1 + 0
☐	Disassembling Used Electronics	$2000.00			1 + 0
☐	Leaf Composting Facility	$0			1 + 1
☐	Municipal Transfer Station	$800.00			1 + 1
☐	One Day Collection of Certain Wastes and Household Hazardous Waste	$1000.00			1 + 0
☐	Sheet Leaf Composting Notification	$0			★★
	Special Waste Authorization				
☐	Landfill or RRF Disposal	$660.00			
☐	Asbestos Disposal	$300.00			1 + 0
☐	homeowner	$0			
☐	Storage and Processing of Asphalt Roofing Shingle Waste	$2500.00			1 + 0
☐	Storage and Processing of Scrap Tires for Beneficial Use	$1250.00			1 + 0
☐	Emergency/Temporary Authorization	★★			★★
☐	Other, (please specify):				
	REMEDIATION				
☐	In Situ Groundwater Remediation: Enhance Aerobic Biodegradation	★			1 + 2
☐	In Situ Groundwater Remediation: Chemical Oxidation	$500.00			1 + 0
☐	Emergency/Temporary Authorization	★			★★
	Note: Carry subtotals over to Part III, page 2 of this form.	Subtotal ➡	0	0	

★See fee schedule on registration/application.

★★Contact the specific permit program for this information. (Contact numbers are provided in the instructions)

Affirmative Action, Equal Employment Opportunity and Americans with Disabilities

The Connecticut Department of Energy and Environmental Protection is an Affirmative Action/Equal Opportunity Employer that is committed to complying with the requirements of the Americans with Disabilities Act (ADA). Please contact us at (860) 418-5910 or deep.accommodations@ct.gov if you: have a disability and need a communication aid or service; have limited proficiency in English and may need information in another language; or if you wish to file an ADA or Title VI discrimination complaint.

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

2800 BERLIN TURNPIKE, P.O. BOX 317546
NEWINGTON, CONNECTICUT 06131-7546
Phone: 860-594-2931

September 3, 2019

TO: West Hartford Inland Wetlands and Watercourses Agency
50 South Main Street
West Hartford, CT 06107

FROM: Kimberly C. Lesay
Transportation Assistant Planning Director
Bureau of Policy and Planning

SUBJECT: Notification of Submittal of Application to the Department of Energy and Environmental Protection (DEEP) for a General Permit for Water Resource Construction Activities

PROJECT: State Project No. 155-171
I-84 Auxiliary Lanes project
Exits 39A to 41
Town of West Hartford

Enclosed is a copy of our Request for Authorization under the State of Connecticut Department of Energy and Environmental Protection's General Permit for Water Resources Construction Activities. If your agency wishes to comment on the enclosed application, comments must be submitted to the State Department of Energy and Environmental Protection.

Comments should be directed to:

Land and Water Resources Division
Department of Energy and Environmental Protection
79 Elm Street
Hartford, CT 06106-5127

If we can provide additional information, please contact Mr. Andrew H. Davis at 860-594-2157.

Enclosures

cc: DEEP Permit File

Ken S. Kittredge/ksk

bcc: Kimberly C. Lesay – Andrew H. Davis – Amanda M. Saul – Chris W. Samorajczyk
Gregory M. Dorosh – Susan M. Labatique – Nilesh Patel – Ahsan Saghir
Michael W. Dion (BL Companies)

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

2800 BERLIN TURNPIKE, P.O. BOX 317546
NEWINGTON, CONNECTICUT 06131-7546
Phone: 860-594-2931

September 3, 2019

TO: West Hartford Planning and Zoning Division
50 South Main Street
West Hartford, CT 06107

FROM: Kimberly C. Lesay
Transportation Assistant Planning Director
Bureau of Policy and Planning

SUBJECT: Notification of Submittal of Application to the Department of Energy and Environmental Protection (DEEP) for a General Permit for Water Resource Construction Activities

PROJECT: State Project No. 155-171
I-84 Auxiliary Lanes project
Exits 39A to 41
Town of West Hartford

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Comments should be directed to:

Land and Water Resources Division
Department of Energy and Environmental Protection
79 Elm Street
Hartford, CT 06106-5127

If we can provide additional information, please contact Mr. Andrew H. Davis at 860-594-2157.

Enclosures

cc: DEEP Permit File

Ken S. Kittredge/ksk

bcc: Kimberly C. Lesay – Andrew H. Davis – Amanda M. Saul – Chris W. Samorajczyk
Gregory M. Dorosh – Susan M. Labatique – Nilesh Patel – Ahsan Saghir
Michael W. Dion (BL Companies)

Connecticut Department of
Energy & Environmental Protection
Bureau of Water Protection & Land Reuse
Inland Water Resources Division

Request for Authorization Form for the General Permit for Water Resource Construction Activities

Please complete this form in accordance with the general permit (DEEP-IWRD-GP-013) to ensure the proper handling of your request. Print or type unless otherwise noted. You must submit the fee along with this completed form.

CPPU USE ONLY

App #: _____

Doc #: _____

Check #: _____

Program: GP IWRD Construction Activities

Part I: Request and Fee Type

Check the appropriate box identifying the request type.

☐ *$5000* [#1757] for each **Request for Authorization** for Section 3(a)(1), (a)(2), (a)(3), (a)(4), (a)(5), (a)(6), or (a)(7) activities under the subject general permit, unless you qualify as one of the following: ☐ *$2500* for any municipality ☐ *$2500* for electronic filing*****	☒ *$2500* [#1758] for each **Request for Authorization** for Section 3(a)(8) or 3(a)(9) activities under the subject general permit, unless you qualify as one of the following: ☐ *$1250* for any municipality ☐ *$1250* for electronic filing*****

In order to file electronically, ALL** supporting documents under Part VI of this application must be submitted in an electronic format on a CD, along with this original completed application in hard copy**.

The request will not be processed without the fee. The fee shall be non-refundable and shall be paid by check or money order to the Department of Energy and Environmental Protection.

Town where site is located: West Hartford

Brief Description of Project: The project includes the addition of one travel lane for approximately 9,500 feet along the I-84 Westbound lanes and approximately 2,800 feet along the I-84 Eastbound lanes. The shoulders will be brought up to current design standards. Bridge Nos. 01744 and 01745 will be completely replaced. Bridge No. 01743B will be widened and the superstructure will be replaced. A noise barrier wall will be installed on Bridge No. 01746 and the haunches over I-84 Eastbound and Westbound will be removed on Bridge No. 01747.

Part II: Requestor Information

- *If a requester is a corporation, limited liability company, limited partnership, limited liability partnership, or a statutory trust, it must be registered with the Secretary of State. If applicable, requester's name shall be stated **exactly** as it is registered with the Secretary of State. Please note, for those entities registered with the Secretary of State, the registered name will be the name used by DEEP. This information can be accessed at the Secretary of State's database (CONCORD).* **(www.concord-sots.ct.gov/CONCORD/index.jsp)**
- *If a requester is an individual, provide the legal name (include suffix) in the following format: First Name; Middle Initial; Last Name; Suffix (Jr, Sr., II, III, etc.).*
- *If there are any changes or corrections to your company/facility or individual mailing or billing address or contact information, please complete and submit the Request to Change Company/Individual Information to the address indicated on the form. If there is a change in name of the entity holding a DEEP license or a change in ownership, contact the Office of Planning and Program Development (OPPD) at 860-424-3003. For any other changes you must contact the specific program from which you hold a current DEEP license.*

1. Requester Name: Connecticut Department of Transportation

Mailing Address: 2800 Berlin Turnpike

City/Town: Newington State: CT Zip Code: 06131

Business Phone: 860-594-2931 ext.:

Contact Person: Kimberly Lesay Phone: 860-594-2931 ext.

E-mail: kimberly.Lesay@ct.gov

*By providing this e-mail address you are agreeing to receive official correspondence from the department, at this electronic address, concerning the subject request. Please remember to check your security settings to be sure you can receive e-mails from "ct.gov" addresses. Also, please notify the department if your e-mail address changes.

a) Requester Type (check one):

☐ individual ☐ federal agency ☒ state agency ☐ municipality ☐ tribal

☐ ***business entity (*If a business entity complete i through iii):**

i) check type: ☐ corporation ☐ limited liability company ☐ limited partnership
☐ limited liability partnership ☐ statutory trust ☐ Other: _____

ii) provide Secretary of the State business ID #:_____This information can be accessed at *database (CONCORD).* **(www.concord-sots.ct.gov/CONCORD/index.jsp)**

iii) ☐ Check here if your business is **not** registered with the Secretary of State's office.

☐ Check here if any co-registrants. If so, attach additional sheet(s) with the required information as requested above.

b) Requester's interest in property at which the proposed activity is to be located:

☒ site owner ☐ option holder ☐ lessee ☐ easement holder ☐ operator

☐ other (specify): _____

Part II: Requestor Information (continued)

2. Billing contact, if different than the requester.

Name:

Mailing Address:

City/Town: State: Zip Code:

Business Phone: ext.

Contact Person: Title:

Email:

3. Primary contact for departmental correspondence and inquiries, if different than the requester.

Name:

Mailing Address:

City/Town: State: Zip Code:

Business Phone: ext.

Contact Person: Title:

Email:

*By providing this e-mail address you are agreeing to receive official correspondence from the department, at this electronic address, concerning the subject request. Please remember to check your security settings to be sure you can receive e-mails from "ct.gov" addresses. Also, please notify the department if your e-mail address changes.

4. Attorney or other representative, if applicable:

Firm Name:

Mailing Address:

City/Town: State: Zip Code:

Business Phone: ext.

Attorney:

Email:

5. Site Owner, if different than the requester.

Name:

Mailing Address:

City/Town: State: Zip Code:

Business Phone: ext.

Contact Person: Title:

Email:

Part II: Requestor Information (continued)

6. Engineer(s) or other consultant(s) employed or retained to assist in preparing the request or in designing or constructing the activity.

Name: **BL Companies**

Mailing Address: **355 Research Parkway**

City/Town: **Meriden** State: **CT** Zip Code: **06450**

Business Phone: **203-630-2416** ext.

Contact Person: **Michael W. Dion, PE** Title: **Senior Project Manager**

Email: **mdion@blcompanies.com**

Service Provided: **Roadway and Structure Design, Permitting**

☐ Check here if additional sheets are necessary, and label and attach them to this sheet.

Part III: Site Information

1. SITE NAME AND LOCATION

Name of Site : **State Project No. 155-171**

Street Address or Location Description: **I-84 Eastbound and Westbound (Interchange 39A to Interchange 41)**

City/Town: **West Hartford** State: **CT** Zip Code: **06110**

Tax Assessor's Reference: Map **N/A** Block Lot

Latitude and longitude of the exact location of the proposed activity in degrees, minutes, and seconds or in decimal degrees: Latitude: **41.730900** Longitude: **-72.754359**

Method of determination (check one):

☐ GPS ☐ USGS Map ☒ Other (please specify): **Google Maps**

If a USGS Map was used, provide the quadrangle name:

2. INDIAN LANDS: Is or will the facility be located on federally recognized Indian lands? ☐ Yes ☒ No

3. COASTAL BOUNDARY: Is the activity which is the subject of this registration located within the coastal boundary as delineated on DEEP approved coastal boundary maps? ☐ Yes ☒ No

If yes, and this registration is for a new authorization, or a modification of an existing authorization where the physical footprint of the subject activity is modified, you must submit a *Coastal Consistency Review Form* (DEEP-APP-004) with your registration as Attachment C.

Information on the coastal boundary is available at www.cteco.uconn.edu/map_catalog.asp (Select the town and then select coastal boundary. If the town is not within the coastal boundary you will not be able to select the coastal boundary map.) or the local town hall or on the "Coastal Boundary Map" available at DEEP Maps and Publications (860-424-3555).

Part III: Site Information (continued)

4. ENDANGERED OR THREATENED SPECIES: According to the most current "State and Federal Listed Species and Natural Communities Map", is the project site located within an area identified as a habitat for endangered, threatened or special concern species? ☐ Yes ☒ No Date of Map: **June 2019**

If yes, complete and submit a *Request for NDDB State Listed Species Review Form* (DEEP-APP-007) to the address specified on the form. **Please note NDDB review generally takes 4 to 6 weeks and may require additional documentation from the registrant.**

A **copy** of the completed *Request for NDDB State Listed Species Review Form* **and** the CT NDDB response ***must*** be submitted with this completed registration as Attachment D.

For more information visit the DEEP website at www.ct.gov/deep/nddbrequest or call the NDDB at 860-424-3011.

5. AQUIFER PROTECTION AREAS: Is the site located within a mapped Level A or Level B Aquifer Protection Area, as defined in CGS section 22a-354a through 22a-354bb?

☐ Yes ☒ No If **yes**, check one: ☐ Level A **or** ☐ Level B

If **Level A**, are any of the regulated activities, as defined in RCSA section 22a-354i-1(34), conducted on this site? ☐ Yes ☐ No

If **yes**, and your business is **not** already registered with the Aquifer Protection Program, contact the local aquifer protection agent or DEEP to take appropriate actions.

For more information on the Aquifer Protection Area Program visit the DEEP website at www.ct.gov/deep/aquiferprotection or contact the program at 860-424-3020.

6. CONSERVATION OR PRESERVATION RESTRICTION: Is the property subject to a conservation or preservation restriction? ☐ Yes ☒ No

If Yes, proof of written notice of this registration to the holder of such restriction or a letter from the holder of such restriction verifying that this registration is in compliance with the terms of the restriction, must be submitted as Attachment E.

Part IV: Construction Activity Details

1. Proposed Date of Initiation of Activity: **April 1, 2020**
2. Anticipated Date of Completion: **June 30, 2023**
3. Name of the wetland or watercourse involved with or adjacent to the subject activity:

   Rockledge Brook, unnamed watercourses, and associated wetlands

4. Is the subject activity within a watercourse or floodplain? ☒ Yes ☐ No
5. Will the subject activity be within a FEMA floodway? ☐ Yes ☒ No
6. If the project requires a Flood Management Certification for the subject activity, provide the Flood Management Certification Number: **CT DOT Flood Management General Certification approved by CTDOT Hydraulics on 3/28/19.**

Part IV: Construction Activity Details (continued)

7. Disturbance to wetlands, watercourses and flood plains:

   Wetlands (acres):

   excavation: **0.071 (Temp)** fill: **0.003 (Perm)** total disturbance: **0.074 (0.003 perm)**

   Floodplain (cubic yards):

   excavation: **40 CY** fill: **11 CY** net: **29 CY (Cut)**

   Watercourse (linear feet): **7 feet (All others are Wetlands or Floodplain)**

8. Describe the present and intended use(s) of the property at which the subject activity will be conducted and the reason for conducting or maintaining the activity.

   The site currently accomodates three lanes of traffic, eastbound and westbound, along Interstate 84 between Interchange 39A and Interchange 41 in the town of West Hartford. This area is often heavily congested.

   The proposed scope of work for this project will provide an additional lane of travel for each bound of traffic. The widening of I-84 Eastbound and Westbound would be towards the existing median to minimize impacts to surrounding properties and wetlands.

   Bridge Nos. 01744 and 01745 (I-84 over Berkshire Road) will be completely replaced. Bridge No. 01743B (I-84 over Ridgewood Drive) will be widened and the superstructure will be replaced. A noise barrier wall will be installed on Bridge No. 01746 (I-84 over Rockledge Brook) and the haunches over I-84 Eastbound and Westbound will be removed on Bridge No. 01747 (South Main Street over I-84).

9. Describe all natural and manmade features impacted by the subject activity, including wetlands, watercourses, fish and wildlife habitat, floodplains, and structures and appurtenances thereto, and the impact of the subject activity on such features.

   Please see the attached sheet.

☒ Check here if additional sheets are necessary, and label and attach them to this sheet.

IW General Permit

Applicant: Connecticut Department of Transportation
Project: State Project No. 155-171
Safety and Operational Improvements on I-84
Exit 39A to Exit 41
Town of West Hartford

Part IV, Question 9
Describe all natural and manmade features impacted by the subject activity, including wetlands, watercourses, fish and wildlife habitat, floodplains, and structures and appurtenances thereto, and the impact of the subject activity on such features.

This project is located on Interstate 84 Eastbound and Westbound in the town of West Hartford. In the westbound direction the highway work begins at the Farmington – West Hartford Town Line (MP 55.99) and ends at the Park Road on-ramp (MP 57.86). In the eastbound direction, the highway work begins approximately 525 feet east of the Ridgewood Road overpass (MP 56.34) and extends approximately 200 feet east of Interchange 41 (South Main Street) on-ramp (MP 57.59).

The proposed improvements include the addition of a travel lane in the westbound direction from the Park Road on-ramp to the Interchange 39A off-ramp to Route 9 Southbound for approximately 9,500-feet. In the eastbound direction the improvements include the addition of an auxiliary lane beginning at the Interchange 40 on-ramp from New Britain Avenue and terminating at the Interchange 41 off-ramp to South Main Street for approximately 2,800-feet. These improvements will provide significant safety and operational benefits in both directions of I-84.

Several elements related to the existing highway cross section will be brought to current standards as part of the safety improvements proposed within the project limits. The inside and outside shoulders will be brought to current design standards. The existing travel lanes will be milled and overlaid, concrete barrier curb will be installed where warranted, guide railing will be upgraded to current standards, highway drainage improvements will be made within the project limits, overhead and side mounted sign structures will be relocated to accommodate the auxiliary lanes, and minor relocation of highway luminaires will be required to accommodate the proposed work. The existing noise barrier walls in select locations will be replaced and new noise barrier walls are proposed in other locations.

To accommodate the additional lanes, Bridge Nos. 01744 and 01745 on I-84 Eastbound and Westbound respectively over Berkshire Road will be replaced completely. I-84 westbound Bridge No. 01743B over Ridgewood Road will be widened and the superstructure will be replaced. Haunch removal will be completed on Bridge No. 01747 carrying South Main Street over I-84 and installation of noise barrier wall will be installed at Bridge No. 01746 carrying I-84 over Rockledge Brook.

Trees found in this area include Acer rubrum, Quercus palustris, Ulmus Americana, Franxinus Americana, Salix nigra, Pinus strobus and Picea abies. The following saplings were also present: Acer rubrum and Quercus palustris. Shrubs present on the site were Viburnum dentatum, Franxinus pennsylvanica and Lonicera. A vine, Rhus Radicans, was also found in the area.

This project is not within an area identified by the CT DEEP NDDB (map dated June 2019) as a habitat for endangered, threatened or special concern species.

This project will take three construction seasons to complete. The anticipated start of construction is April 1, 2020 and the anticipated end of construction is June 30, 2023.

Part V: Supporting Documents

Check the applicable box below for each attachment being submitted with this request. When submitting any supporting documents, please label the documents as indicated in this part (e.g., Attachment A, etc.) and be sure to include the requester's name as indicated on this request. ***In order to file electronically, ALL supporting documents must be submitted in an electronic format on a CD with this original completed application in hard copy.***

☒	Attachment A:	Location Map: A depiction, on an 8.5" x 11" copy of the relevant portion of the most recent version of the United States Geologic Survey topographic map (Scale 1:24,000), of the exact location of the property at which such activity will be conducted.
☒	Attachment B:	Site plan pursuant Section 4(c) (2) (I) of the subject general permit.
☐	Attachment C:	*Coastal Consistency Review Form* (DEEP-APP-004), if applicable.
☒	Attachment D:	Copy of the completed *Request for NDDB State Listed Species Review Form* (DEEP-APP-007) and the NDDB response, if applicable.
☐	Attachment E:	Conservation or Preservation Restriction Information, if applicable.
☒	Attachment F:	A copy of the Category 2 approval letter from the Army Corps of Engineers, or a copy of the Appendix 1A: Category 1 Certification Form filed with the US Army Corps of Engineers, if applicable.
☐	Attachment G:	Drainage Maintenance Plan, Trail Maintenance Plan, Boat Launch Maintenance Plan, or Beach Maintenance Plan for Inland Beaches as defined in Section 2 of the subject general permit, if applicable.
☒	Attachment H:	Other information provided by requester (list): **Photographs**

Part VI: Requester Certification

The requester *and* the individual(s) responsible for actually preparing the request must sign this part. A request will be considered incomplete unless all required signatures are provided. If the requester is the preparer, please mark N/A in the spaces provided for the preparer.

"I have personally examined and am familiar with the information submitted in this document and all attachments thereto, and I certify that based on reasonable investigation, including my inquiry of the individuals responsible for obtaining the information, the submitted information is true, accurate and complete to the best of my knowledge and belief.

I certify that this general permit request for authorization is on complete and accurate forms as prescribed by the commissioner without alteration of the text.

I understand that the subject activity is authorized only on or after the date the commissioner issues a written approval of registration with respect to such activity.

I certify that a complete copy of this request for authorization, including all documents attached thereto, was sent by regular or certified mail or was hand delivered to the municipal wetlands agency, zoning commission, planning commission or combined planning and zoning commission, and conservation commission of each municipality which is or may be affected by the subject activity.

I understand that a false statement in the submitted information may be punishable as a criminal offense, in accordance with section 22a-6 of the General Statutes, pursuant to section 53a-157b of the General Statutes, and in accordance with any other applicable statute."

Thomas J. Maziarz Signature of Requester	9-3-2019 Date
Thomas J. Maziarz Name of Requester (print or type)	**Bureau Chief, Policy & Planning** Title (if applicable)
Michael W. Dion Signature of Preparer (if different than above)	9.3.2019 Date
Michael W. Dion Name of Preparer (print or type)	**Senior Project Manager, BL Companies** Title (if applicable)

☐ Check here if additional signatures are required. If so, please reproduce this sheet and attach signed copies to this sheet. You must include signatures of any person preparing any report or parts thereof required in this registration (i.e., professional engineers, surveyors, soil scientists, consultants, etc.)

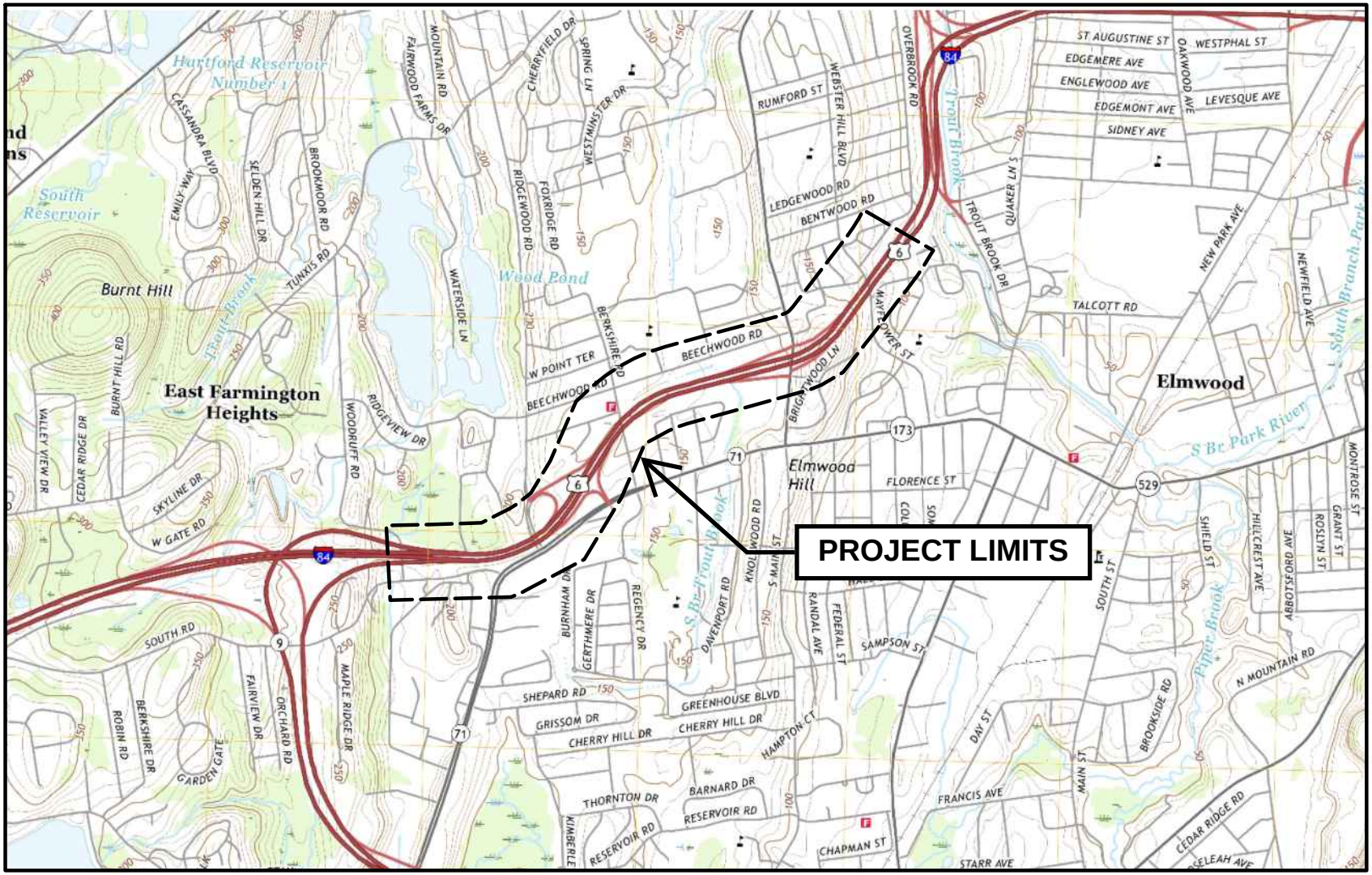
Note: Please submit this completed Request for Authorization, Fee, and all Supporting Documents to:

CENTRAL PERMIT PROCESSING UNIT
DEPARTMENT OF ENERGY AND ENVIRONMENTAL PROTECTION
79 ELM STREET
HARTFORD, CT 06106-5127

You must submit a complete copy of this completed request for authorization, including supporting documents, to the municipal wetlands agency, zoning commission, planning commission or combined planning and zoning commission, and conservation commission of each municipality which is or may be affected by the subject activity.

IWGP
Attachment A: USGS Map - Location Plan

Applicant: Connecticut Department of Transportation
Project: State Project No. 155-171
Safety and Operational Improvements on I-84
Exit 39A to Exit 41
Town of West Hartford



SCALE IN FEET

1000 0 1000 2000

STATE PROJECT NO.: 0155-0171 CITY/TOWN: WEST HARTFORD	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION I-84 SAFETY AND OPERATIONAL IMPROVEMENTS	BL Companies ARCHITECTURE ENGINEERING ENVIRONMENTAL LAND SURVEYING	DATE: FEB 2019 LOC-01

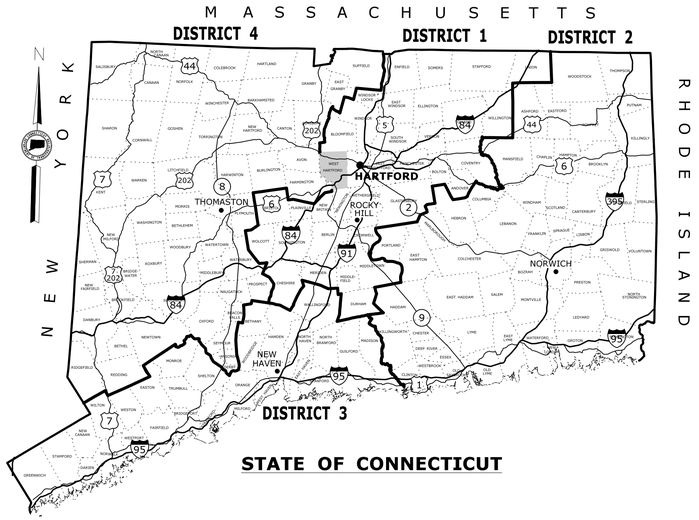
FIGURE 2 - USGS MAP

IWGP
Attachment B: Site Plans

Applicant: Connecticut Department of Transportation
Project: State Project No. 155-171
Safety and Operational Improvements on I-84
Exit 39A to Exit 41
Town of West Hartford

Drawing No.	Drawing Title
PMT-01	Title Sheet
PMT-02 to PMT-06	General Site Plans Impact Areas
PMT-07	Miscellaneous Details
PMT-08	Elev. & Wall Details
PMT-09 TO PMT-10	Landscape Plans

ENVIRONMENTAL PERMIT PLANS
STATE PROJECT 155-171
SAFETY AND OPERATIONAL IMPROVEMENTS ON I-84



STATE OF CONNECTICUT

GENERAL NOTES:

1. THESE PLANS ARE INTENDED ONLY FOR ENVIRONMENTAL PERMITTING PURPOSES. THESE PLANS HOLD AUTHORITY FOR ALL ACTIVITIES CONCERNING THE REGULATED AREA. FOR DETAILED PLANIMETRIC INFORMATION AND PAYMENT REFER TO THE APPLICABLE CONTRACT DOCUMENTS.

2. THE DEPARTMENT OF TRANSPORTATION WILL ONLY SUBMIT REVISIONS TO DEEP AND USACE FOR CHANGES TO THE DESIGN THAT WILL AFFECT REGULATED AREAS.

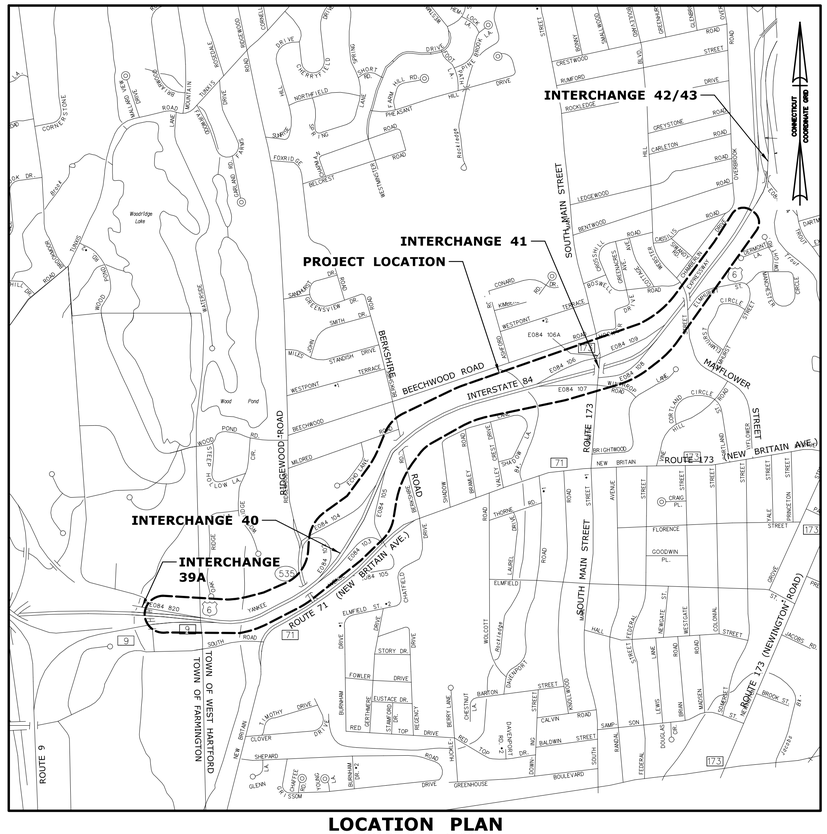
3. FOR A DESCRIPTION OF THE WATERCOURSES, WETLANDS, AND WETLAND SOILS SEE RELEVENT SECTIONS OF THE PERMIT APPLICATION.

4. 400 FOOT GRID BASED ON CONNECTICUT COORIDATE SYSTEM N.A.D. 1983 VERTICAL DATUM BASED ON NGVD OF 1929.

5. ALL CONSTRUCTION ACTIVITIES WILL BE CONDUCTED IN ACCORDANCE WITH THE DEPARTMENTS STANDARD SPECIFICATIONS FOR ROADS, BRIDGES, AND INCIDENTAL CONSTRUCTION, FORM 817, SECTION 1.10 AND WILL ALSO FOLLOW REQUIRED BEST MANAGEMENT PRACTICES (BMPs) AND SEDIMENT AND EROSION CONTROL MEASURES IN ACCORDANCE WITH THE 2002 EROSION & SEDIMENTATION CONTROL GUIDELINES AND THE 2004 STORMWATER QUALITY MANUAL.

LIST OF DRAWINGS

DRAWING NO.	DRAWING TITLE
PMT-01	TITLE SHEET
PMT-02 TO PMT-06	GENERAL SITE PLANS IMPACT AREAS
PMT-07	MISCELLANEOUS DETAIL SHEET
PMT-08	I-84 OVER ROCKLEDGE BR. ELEV. & WALL DETAILS
PMT-809 TO PMT-10	LANDSCAPE PLANS



LOCATION PLAN
SCALE: 1" = 1000'

DESIGNED BY:

BL Companies

BL COMPANIES, INC.
355 RESEARCH PARKWAY
MERIDEN, CT 06450

STATE OF CONNECTICUT
RUSSELL W. BOLLEN
NO. 22758
LICENSED PROFESSIONAL ENGINEER

PERMITTING PLAN SET

PLAN DATE: AUGUST 28, 2019

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK, SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

Plotted Date: 8/29/2019

DESIGNER/DRAFTER: JE
CHECKED BY: MF
SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\HW_MSH_155-171_PMT-01.dgn

SIGNATURE/ BLOCK:

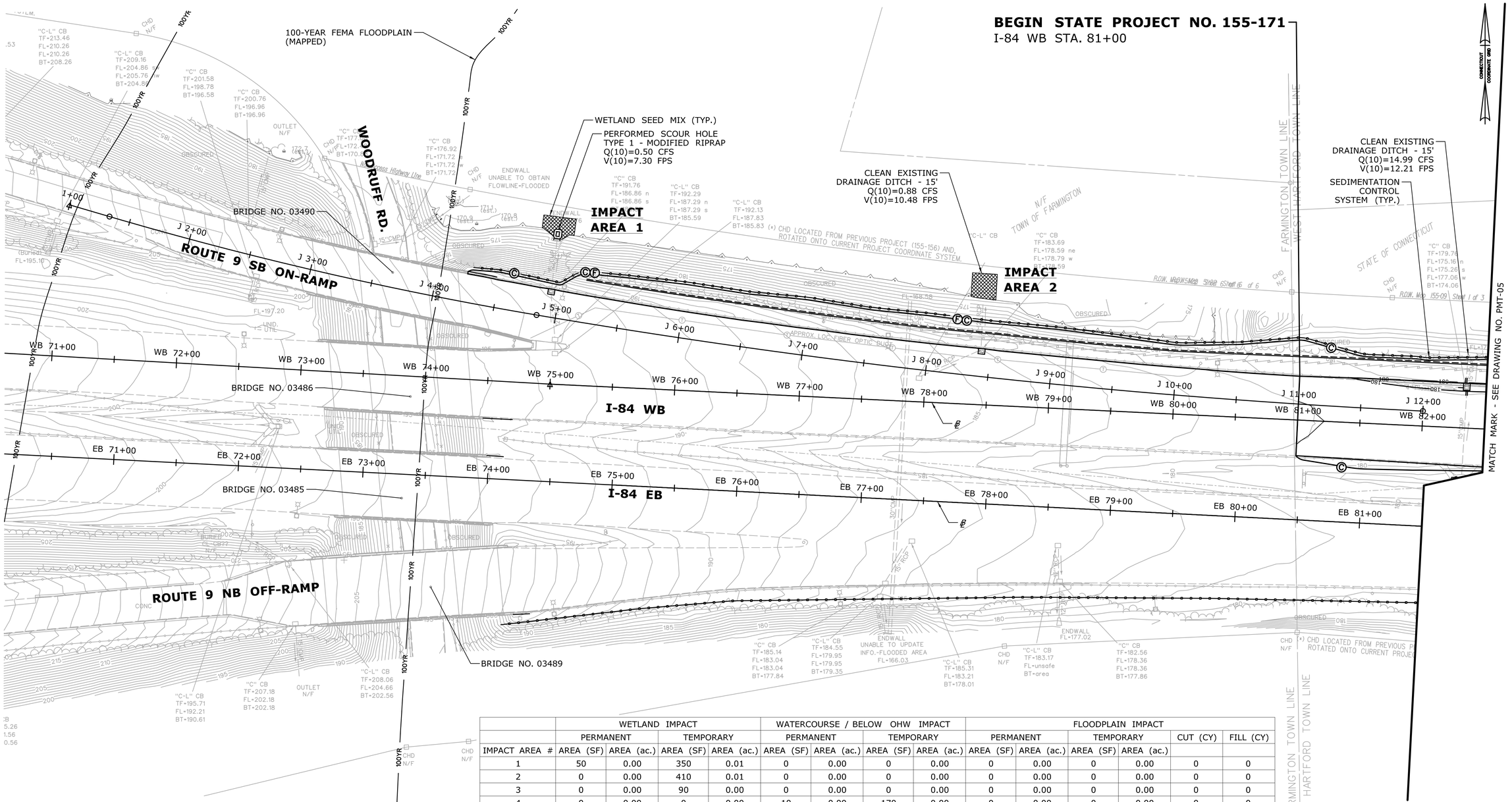
STATE OF CONNECTICUT
RUSSELL W. BOLLEN
NO. 22758
LICENSED PROFESSIONAL ENGINEER

PROJECT TITLE:
SAFETY AND OPERATIONAL IMPROVEMENTS ON I-84

TOWN: **WEST HARTFORD**

DRAWING TITLE: **TITLE SHEET**

PROJECT NO. **155-171**
DRAWING NO. **PMT-01**
SHEET NO. **1**



	WETLAND IMPACT				WATERCOURSE / BELOW OHW IMPACT				FLOODPLAIN IMPACT					
	PERMANENT		TEMPORARY		PERMANENT		TEMPORARY		PERMANENT		TEMPORARY		CUT (CY)	FILL (CY)
IMPACT AREA #	AREA (SF)	AREA (ac.)	AREA (SF)	AREA (ac.)	AREA (SF)	AREA (ac.)	AREA (SF)	AREA (ac.)	AREA (SF)	AREA (ac.)	AREA (SF)	AREA (ac.)		
1	50	0.00	350	0.01	0	0.00	0	0.00	0	0.00	0	0.00	0	0
2	0	0.00	410	0.01	0	0.00	0	0.00	0	0.00	0	0.00	0	0
3	0	0.00	90	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0
4	0	0.00	0	0.00	10	0.00	170	0.00	0	0.00	0	0.00	0	0
5	75	0.00	460	0.01	0	0.00	0	0.00	75	0.00	640	0.01	15	6
6	0	0.00	0	0.00	0	0.00	10	0.00	50	0.00	530	0.01	12	3
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8	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	510	0.01	5	0
9	0	0.00	120	0.00	0	0.00	730	0.02	0	0.00	900	0.02	0	0
10	0	0.00	100	0.00	0	0.00	660	0.02	0	0.00	760	0.02	0	0
11	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	190	0.00	3	0
TOTAL	125	0.00	1530	0.04	10	0.00	1570	0.00	155	0.00	3640	0.08	40	11

LEGEND
- WETLAND LIMITS
- OHW/WATERCOURSE LIMITS
- 100YR – FEMA 100-YEAR FLOOD (MAPPED)
- C – CUT LIMITS
- F – FILL LIMITS
- SEDIMENTATION CONTROL SYSTEM
- WETLAND SEED MIX

PERMITTING PLAN SET

PLAN DATE: AUGUST 28, 2019

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK, SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

Plotted Date: 8/29/2019

DESIGNER/DRAFTER: JE
CHECKED BY: MF
SCALE IN FEET 0 40 80
SCALE 1"=40'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\HW_MSH_155-171_PMT-02.dgn

SIGNATURE/ BLOCK:

STATE OF CONNECTICUT · MICHAEL W. ROSSI · No. 22709 · LICENSED PROFESSIONAL ENGINEER

PROJECT TITLE:
SAFETY AND OPERATIONAL IMPROVEMENTS ON I-84

TOWN: **WEST HARTFORD**

DRAWING TITLE:
GENERAL SITE PLAN IMPACT AREAS

PROJECT NO. **155-171**
DRAWING NO. **PMT-02**
SHEET NO. **2**

LIMIT OF MILL AND OVERLAY

CLEAN EXISTING DRAINAGE DITCH - 15'
Q(10)=0.17 CFS
V(10)=5.04 FPS

CLEAN EXISTING DRAINAGE DITCH - 15'

CLEAN EXISTING DRAINAGE DITCH - 15'

RAMP B

RIDGEWOOD RD

BRIDGE NO. 01743B

MATCH MARK - SEE DRAWING NO. PMT-06

MATCH MARK - SEE DRAWING NO. PMT-07

PREFORMED SCOUR HOLE
TYPE 1 - MODIFIED RIPRAP
Q(10)=1.39 CFS
V(10)=10.16 FPS

TYPE "C" CB

REMOVE DRAINAGE STRUCTURE

CLEAN EXISTING DRAINAGE DITCH - 15'
Q(10)=0.00 CFS
V(10)=0.00 FPS

REMOVE DRAINAGE STRUCTURE

TYPE "C-L" CB

SEDIMENTATION CONTROL SYSTEM (TYP.)

IMPACT AREA 3

WETLAND SEED MIX

PREFORMED SCOUR HOLE
TYPE 1 - MODIFIED RIPRAP
Q(10)=3.39 CFS
V(10)=21.18 FPS

TYPE "C-L" CATCH BASIN TOP

RAMP G

REMOVE DRAINAGE STRUCTURE

TYPE "C" CB

TYPE "C-M" CB

PREFORMED SCOUR HOLE
TYPE 1 - MODIFIED RIPRAP
Q(10)=6.43 CFS
V(10)=12.76 FPS

TYPE "C-L" CB (4' SUMP)

CLEAN EXISTING DRAINAGE DITCH - 15'
Q(10)=0.00 CFS
V(10)=0.00 FPS

TYPE "C-L" CATCH BASIN TOP

I-84 WB

I-84 EB

RAMP H

TYPE "C" CB

TYPE "C-M" CB

TYPE "C-M" CB

TYPE "C" CB

NEW BRITAIN AVE

BEGIN STATE PROJECT NO. 155-171
I-84 EB STA. 100+00

LEGEND
- WETLAND LIMITS
- OHW/WATERCOURSE LIMITS
- 100YR – FEMA 100-YEAR FLOOD (CALCULATED)
- CUT LIMITS
- FILL LIMITS
- SEDIMENTATION CONTROL SYSTEM
- WETLAND SEED MIX

PERMITTING PLAN SET

PLAN DATE: AUGUST 28, 2019

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK, SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

Plotted Date: 8/29/2019

DESIGNER/DRAFTER: JE
CHECKED BY: MF
SCALE IN FEET
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SCALE 1"=40'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\HW_MSH_155-171_PMT-03.dgn

SIGNATURE/ BLOCK:

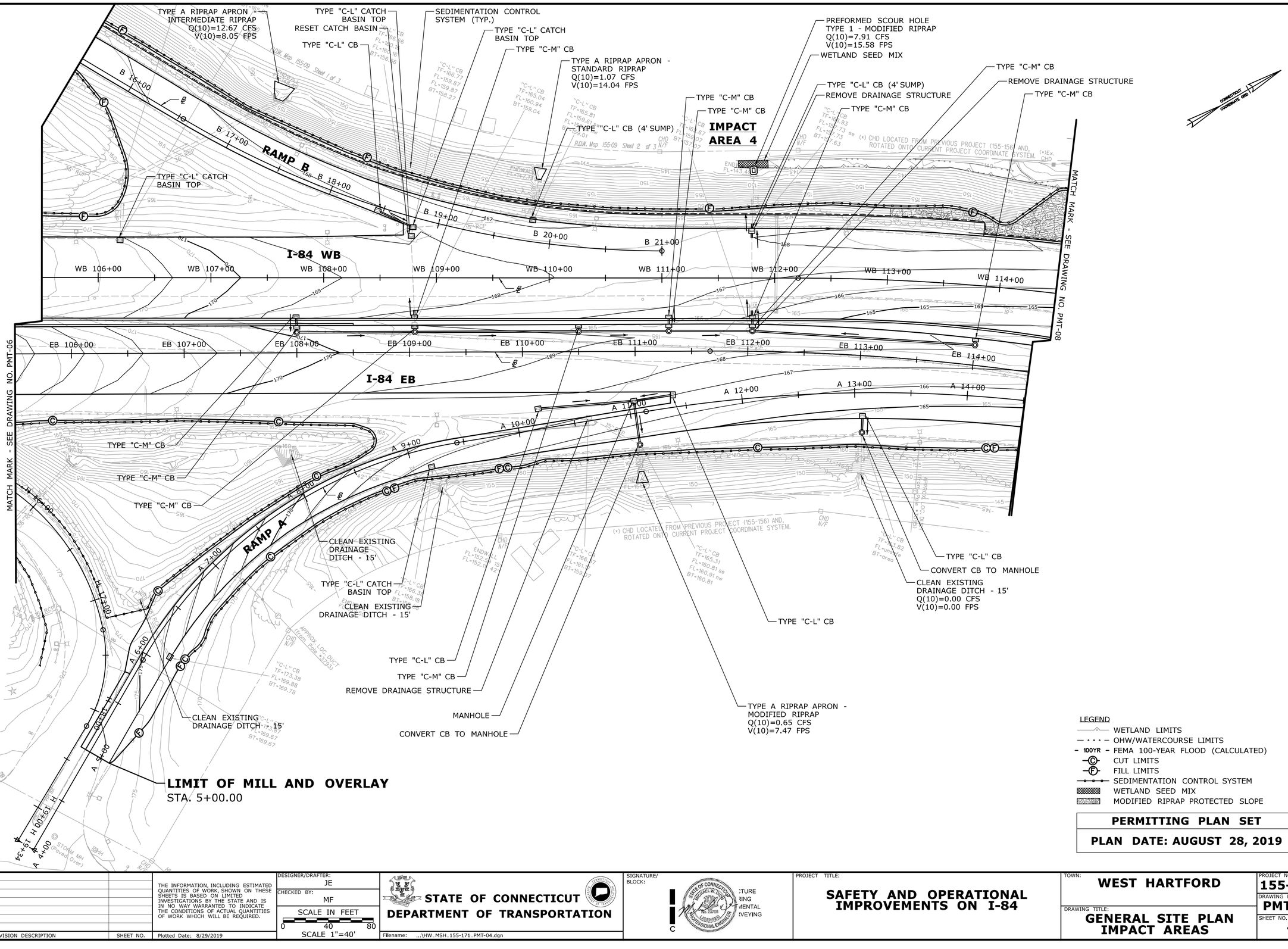
STATE OF CONNECTICUT · SIGURDI W. ROSSI · No. 22826 · LICENSED PROFESSIONAL ENGINEER

PROJECT TITLE:
SAFETY AND OPERATIONAL IMPROVEMENTS ON I-84

TOWN: **WEST HARTFORD**

DRAWING TITLE:
GENERAL SITE PLAN IMPACT AREAS

PROJECT NO. **155-171**
DRAWING NO. **PMT-03**
SHEET NO. **3**



LEGEND

- WETLAND LIMITS
- OHW/WATERCOURSE LIMITS
- 100YR – FEMA 100-YEAR FLOOD (CALCULATED)
- (C) CUT LIMITS
- (F) FILL LIMITS
- SEDIMENTATION CONTROL SYSTEM
- WETLAND SEED MIX
- MODIFIED RIPRAP PROTECTED SLOPE

PERMITTING PLAN SET

PLAN DATE: AUGUST 28, 2019

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK, SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

Plotted Date: 8/29/2019

DESIGNER/DRAFTER: JE

CHECKED BY: MF

SCALE IN FEET 0 40 80

SCALE 1"=40'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\HW_MSH_155-171_PMT-04.dgn

SIGNATURE/ BLOCK:

C :TURE
RING
MENTAL
VEYING

PROJECT TITLE:

SAFETY AND OPERATIONAL IMPROVEMENTS ON I-84

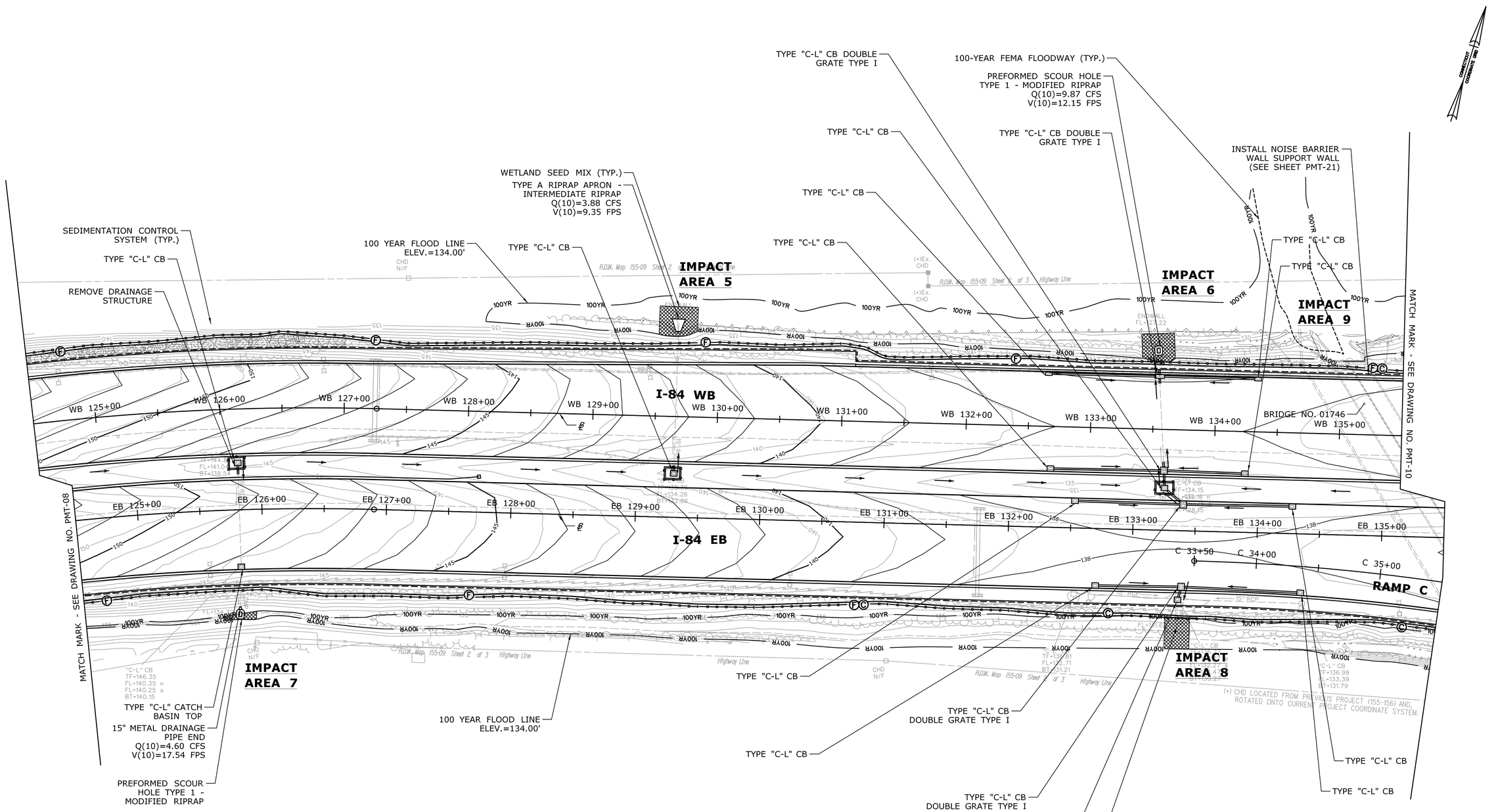
TOWN: **WEST HARTFORD**

DRAWING TITLE: **GENERAL SITE PLAN IMPACT AREAS**

PROJECT NO. **155-171**

DRAWING NO. **PMT-04**

SHEET NO. **4**



LEGEND

- WETLAND LIMITS
- OHW/WATERCOURSE LIMITS
- 100YR - FEMA 100-YEAR FLOOD (CALCULATED)
- FEMA 100-YEAR FLOODWAY
- Ⓒ CUT LIMITS
- Ⓕ FILL LIMITS
- SEDIMENTATION CONTROL SYSTEM
- WETLAND SEED MIX
- MODIFIED RIPRAP PROTECTED SLOPE

PERMITTING PLAN SET

PLAN DATE: AUGUST 28, 2019

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK, SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

Plotted Date: 8/29/2019

DESIGNER/DRAFTER: JE

CHECKED BY: MF

SCALE IN FEET 0 40 80

SCALE 1"=40'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\HW_MSH_155-171_PMT-05.dgn

SIGNATURE/ BLOCK:

STATE OF CONNECTICUT MICHAEL W. WOOD No. 22709 LICENSED PROFESSIONAL ENGINEER

PROJECT TITLE:

SAFETY AND OPERATIONAL IMPROVEMENTS ON I-84

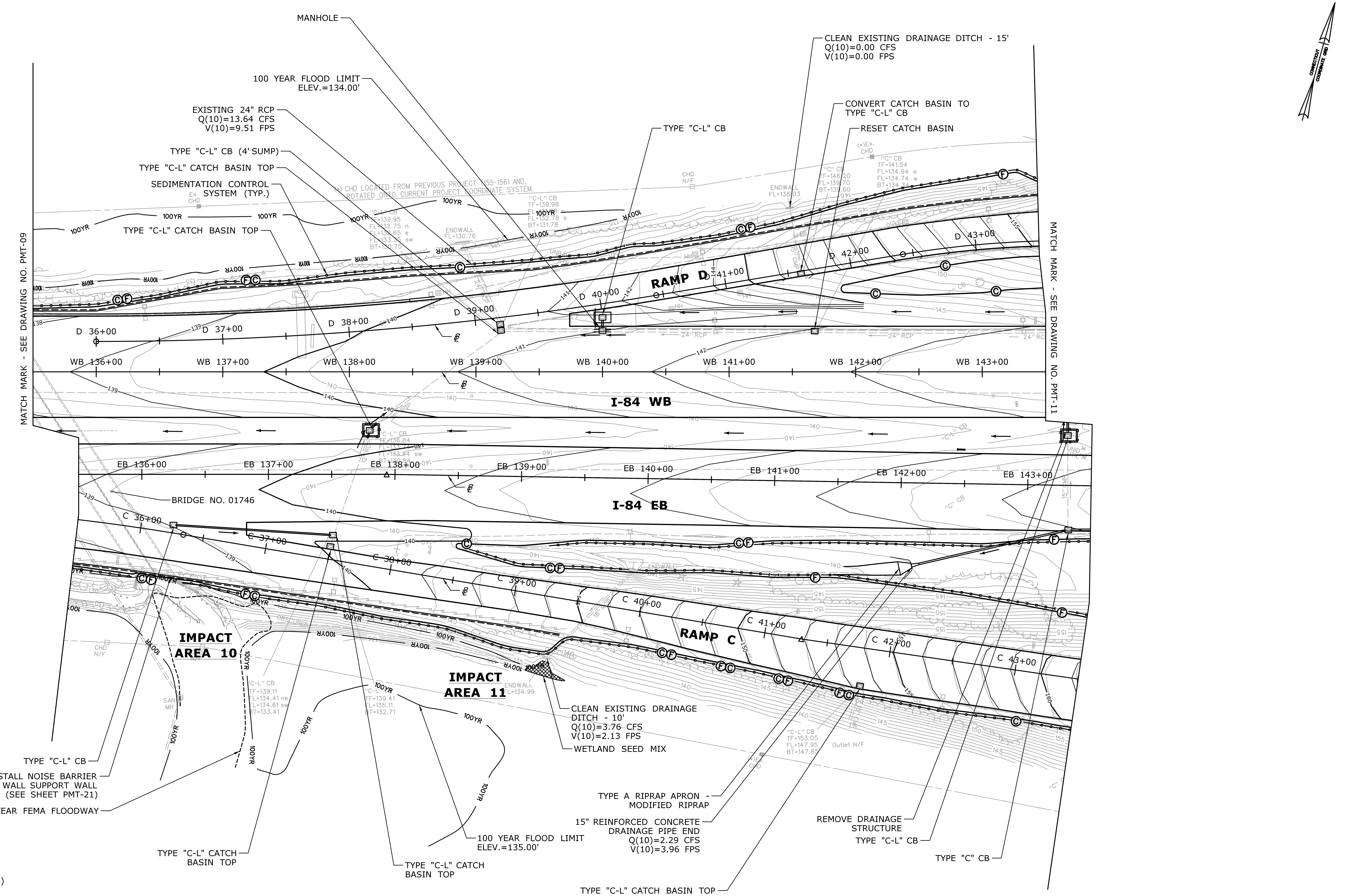
TOWN: **WEST HARTFORD**

DRAWING TITLE: **GENERAL SITE PLAN IMPACT AREAS**

PROJECT NO. **155-171**

DRAWING NO. **PMT-05**

SHEET NO. **5**



LEGEND

- WETLAND LIMITS
- OHW/WATERCOURSE LIMITS
- 100YR FEMA 100-YEAR FLOOD (CALCULATED)
- FEMA 100-YEAR FLOODWAY
- CUT LIMITS
- FILL LIMITS
- SEDIMENTATION CONTROL SYSTEM
- WETLAND SEED MIX

PERMITTING PLAN SET

PLAN DATE: AUGUST 28, 2019

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK, SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

Plotted Date: 8/29/2019

DESIGNER/DRAFTER: JE
CHECKED BY: MF

SCALE IN FEET
0 40 80
SCALE 1"=40'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\HW_MSH_155-171_PMT-06.dgn

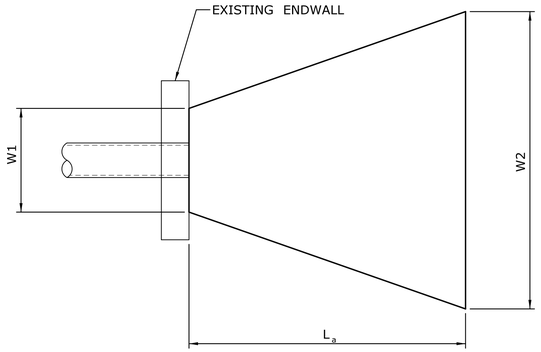
SIGNATURE/BLOCK:

PROJECT TITLE:
SAFETY AND OPERATIONAL IMPROVEMENTS ON I-84

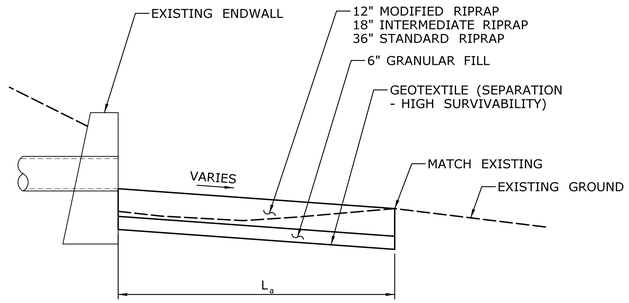
TOWN: WEST HARTFORD

DRAWING TITLE: GENERAL SITE PLAN IMPACT AREAS

PROJECT NO. 155-171
DRAWING NO. PMT-06
SHEET NO. 6



PLAN

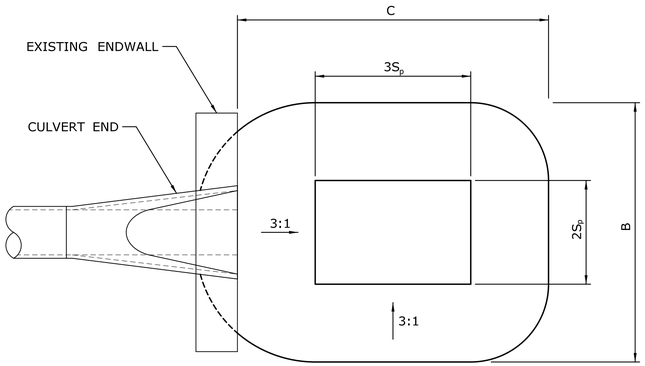


ELEVATION

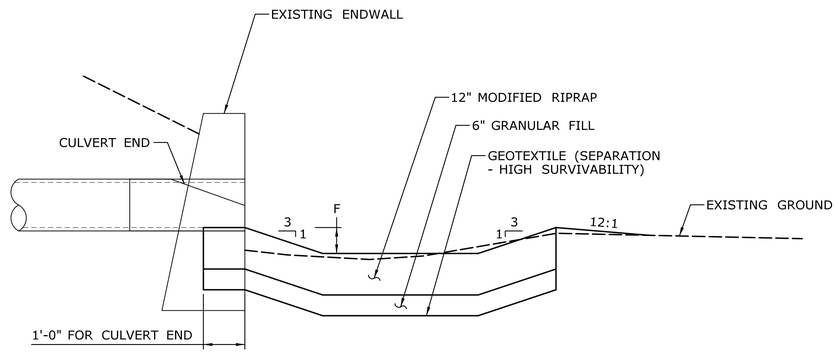
TYPE A RIPRAP APRON TABLE				
OUTLET LOCATION	RIPRAP TYPE	L_a (FT)	W1 (FT)	W2 (FT)
B 17+25 LT	INTERMEDIATE	14	9	18.8
B 19+80 LT	STANDARD	10	3.75	10.75
A 11+00 RT	MODIFIED	10	3.75	10.75
EB 117+50 RT	STANDARD	10	3	10
WB 129+60 LT	INTERMEDIATE	10	3.75	10.75
EB 142+00 RT	MODIFIED	10	3.75	10.75

TYPE A RIPRAP APRON

(N.T.S.)



PLAN



ELEVATION

PREFORMED SCOUR HOLE TYPE 1 TABLE					
PIPE SIZE	C (FT)	B (FT)	$3S_p$ (FT)	$2S_p$ (FT)	F (FT)
15"	7.5	6.25	3.75	2.5	0.625
24"	12	10	6	4	1

PREFORMED SCOUR HOLE TYPE 1

(N.T.S.)

PERMITTING PLAN SET

PLAN DATE: AUGUST 28, 2019

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

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Plotted Date: 8/29/2019

DESIGNER/DRAFTER: JE

CHECKED BY: MF

SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\HW_MSH_155-171_PMT-07.dgn

SIGNATURE/ BLOCK:

STATE OF CONNECTICUT · BRIDGET W. DOWD · NO. 32705 · LICENSED PROFESSIONAL ENGINEER

PROJECT TITLE:
SAFETY AND OPERATIONAL IMPROVEMENTS ON I-84

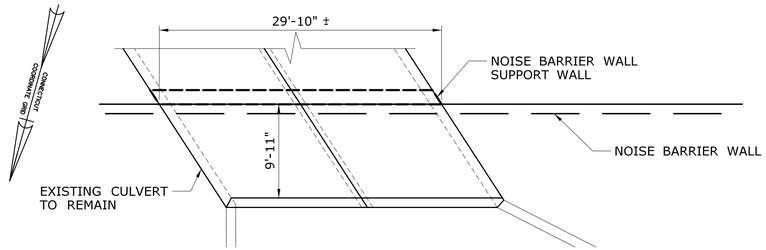
TOWN: **WEST HARTFORD**

DRAWING TITLE: **MISCELLANEOUS DETAIL SHEET**

PROJECT NO. **155-171**

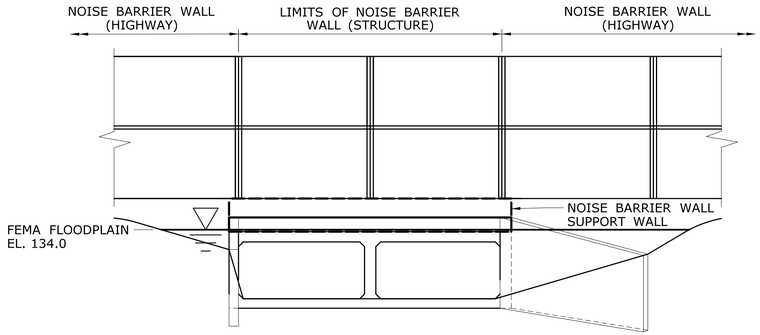
DRAWING NO. **PMT-07**

SHEET NO. **7**



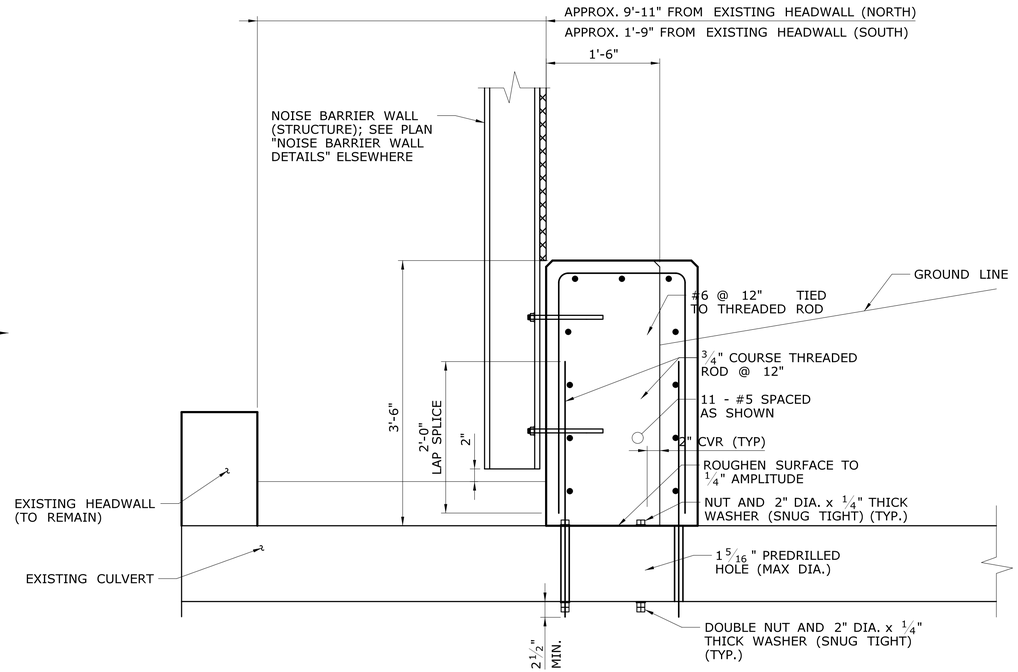
PLAN

SCALE: 1/8" = 1'



NORTH ELEVATION

SCALE: 1/8" = 1'

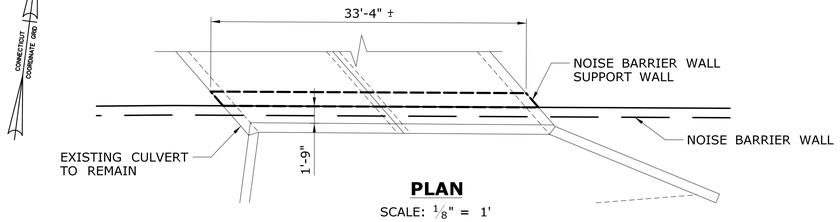


NOISE BARRIER WALL SUPPORT WALL DETAIL

SCALE: 1" = 1'-0"

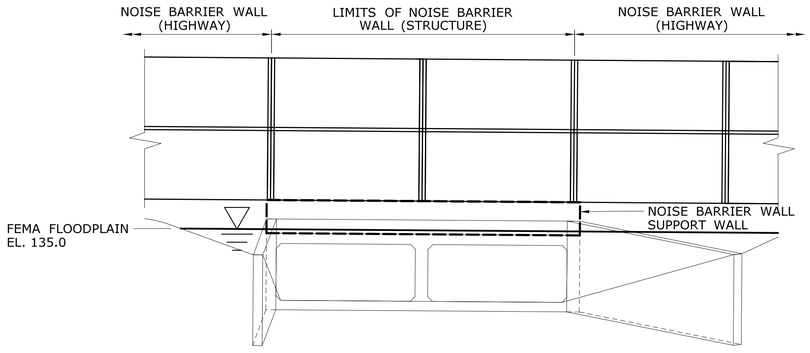
NOTES

1. THREADED RODS SHALL CONFORM TO THE REQUIREMENTS OF ASTM F1554 GRADE 55. ALL COMPONENTS OF THE BOLT ASSEMBLY SHALL BE GALVANIZED IN CONFORMANCE WITH ASTM A153 AND SHALL BE PAID FOR UNDER "DEFORMED STEEL BARS - GALVANIZED".
2. WASHERS SHALL BE GALVANIZED AND CONFORM TO ASTM A572 GRADE 55.
3. NUTS SHALL BE GALVANIZED AND CONFORM TO ASTM A563 DH.
4. DIMENSIONS SHOWN ARE BASED ON ORIGINAL DESIGN DRAWINGS AND ARE TO BE CONSIDERED APPROXIMATE. ALL DIMENSIONS SHALL BE FIELD VERIFIED BY THE CONTRACTOR.
5. COST TO PREDRILL 1 5/16" HOLE TO BE PAID FOR UNDER THE ITEM "DRILLING HOLES AND GROUTING DOWELS".



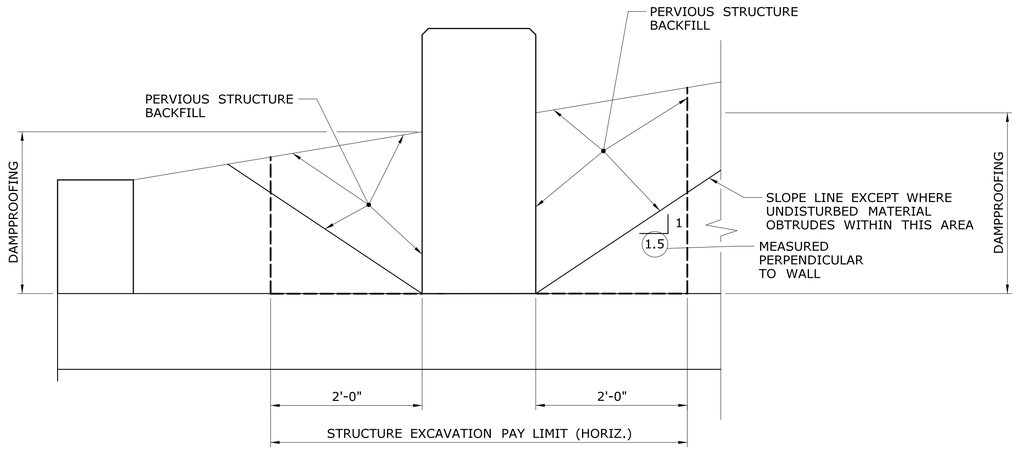
PLAN

SCALE: 1/8" = 1'



SOUTH ELEVATION

SCALE: 1/8" = 1'



NOISE BARRIER WALL SUPPORT WALL PAY LIMITS

SCALE: 1" = 1'-0"

PERMITTING PLAN SET

PLAN DATE: AUGUST 28, 2019

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

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Plotted Date: 8/29/2019

DESIGNER/DRAFTER: MW

CHECKED BY: CP

SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\HW_MSH_155-171_PMT-08.dgn

SIGNATURE/ BLOCK:

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RING
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PROJECT TITLE:
SAFETY AND OPERATIONAL IMPROVEMENTS ON I-84

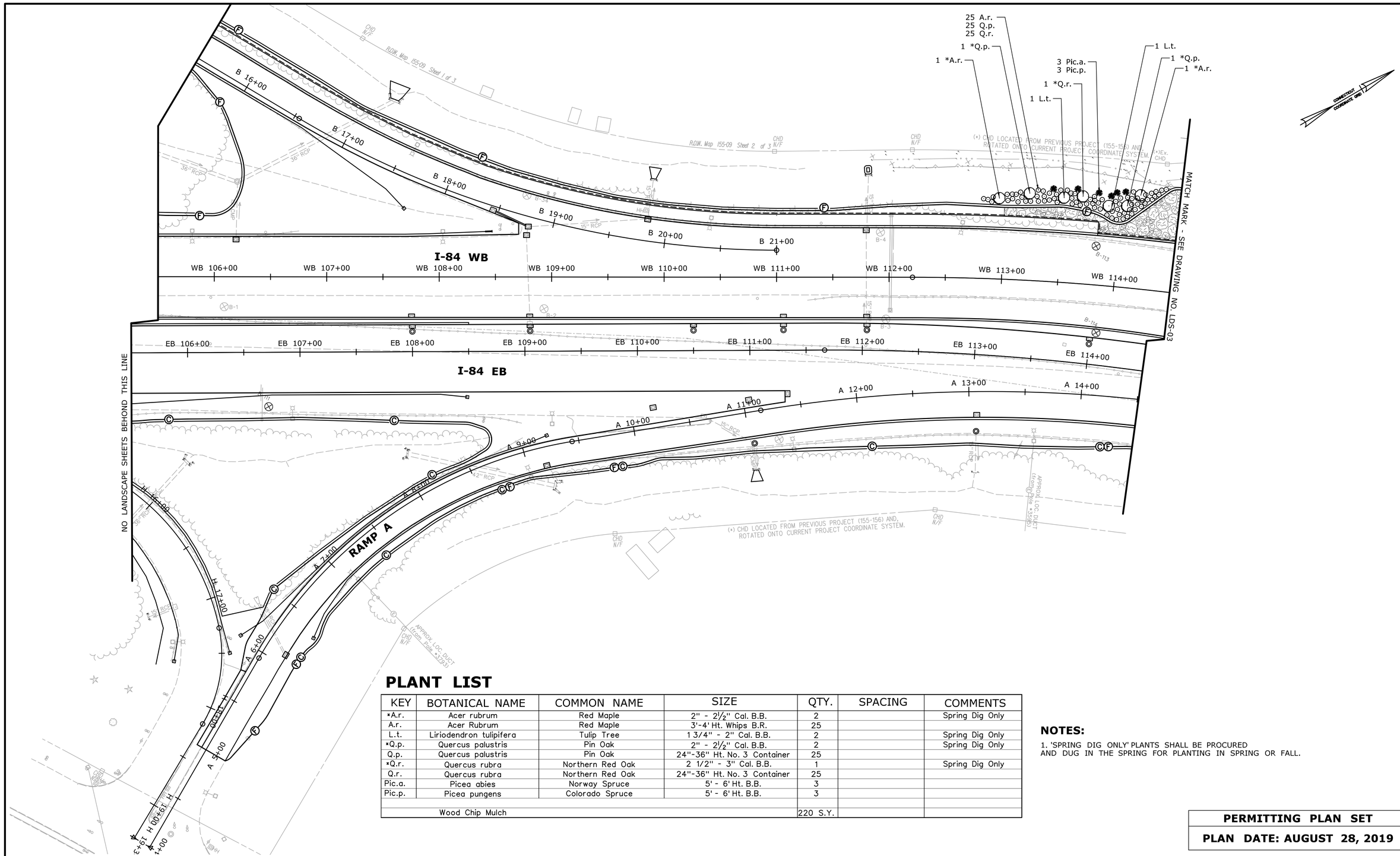
TOWN: **WEST HARTFORD**

DRAWING TITLE:
I-84 OVER ROCKLEDGE BR. ELEV. & WALL DETAILS

PROJECT NO. **155-171**

DRAWING NO. **PMT-08**

SHEET NO. **8**



PLANT LIST

KEY	BOTANICAL NAME	COMMON NAME	SIZE	QTY.	SPACING	COMMENTS
*A.r.	Acer rubrum	Red Maple	2" - 2½" Cal. B.B.	2		Spring Dig Only
A.r.	Acer Rubrum	Red Maple	3'-4' Ht. Whips B.R.	25		
L.t.	Liriodendron tulipifera	Tulip Tree	1 3/4" - 2" Cal. B.B.	2		Spring Dig Only
*Q.p.	Quercus palustris	Pin Oak	2" - 2½" Cal. B.B.	2		Spring Dig Only
Q.p.	Quercus palustris	Pin Oak	24"-36" Ht. No. 3 Container	25		
*Q.r.	Quercus rubra	Northern Red Oak	2 1/2" - 3" Cal. B.B.	1		Spring Dig Only
Q.r.	Quercus rubra	Northern Red Oak	24"-36" Ht. No. 3 Container	25		
Pic.a.	Picea abies	Norway Spruce	5' - 6' Ht. B.B.	3		
Pic.p.	Picea pungens	Colorado Spruce	5' - 6' Ht. B.B.	3		
	Wood Chip Mulch			220 S.Y.		

NOTES:

1. 'SPRING DIG ONLY' PLANTS SHALL BE PROCURED AND DUG IN THE SPRING FOR PLANTING IN SPRING OR FALL.

PERMITTING PLAN SET

PLAN DATE: AUGUST 28, 2019

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK, SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

Plotted Date: 8/29/2019

DESIGNER/DRAFTER: MV

CHECKED BY: SB

SCALE IN FEET
0 40 80
SCALE 1"=40'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\HW_MSH_155-171_PMT-09.dgn

SIGNATURE/ BLOCK:

STATE OF CONNECTICUT · MICHAEL W. ROSSI · NO. 22705 · LICENSED PROFESSIONAL ENGINEER

PROJECT TITLE:
SAFETY AND OPERATIONAL IMPROVEMENTS ON I-84

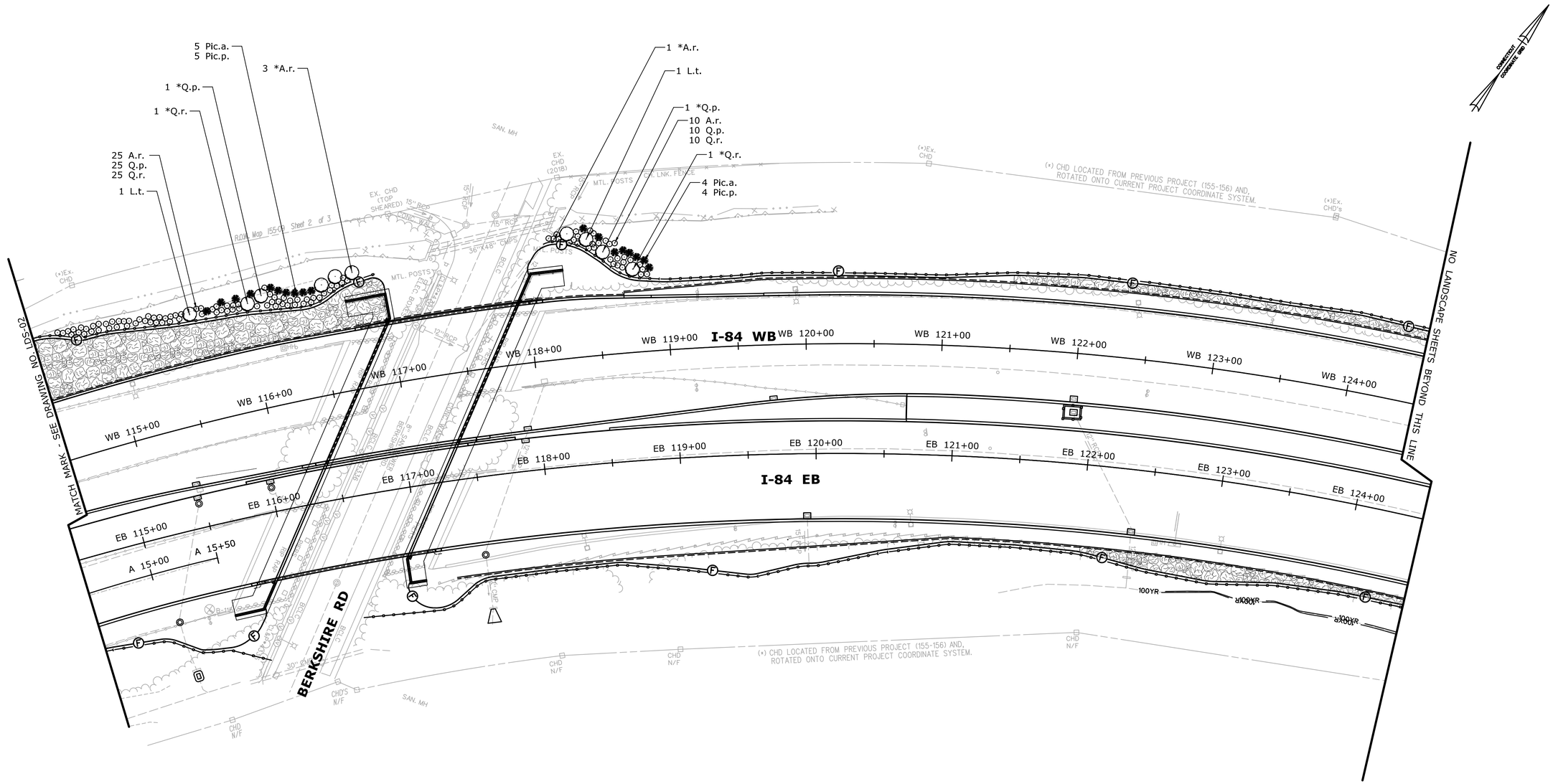
TOWN: **WEST HARTFORD**

DRAWING TITLE: **LANDSCAPE PLAN**

PROJECT NO. **155-171**

DRAWING NO. **PMT-09**

SHEET NO. **9**



PLANT LIST

KEY	BOTANICAL NAME	COMMON NAME	SIZE	QTY.	SPACING	COMMENTS
*A.r.	Acer rubrum	Red Maple	2" - 2½" Cal. B.B.	4		Spring Dig Only
A.r.	Acer Rubrum	Red Maple	3'-4' Ht. Whips B.R.	35		
L.t.	Liriodendron tulipifera	Tulip Tree	1 3/4" - 2" Cal. B.B.	2		Spring Dig Only
*Q.p.	Quercus palustris	Pin Oak	2" - 2½" Cal. B.B.	2		Spring Dig Only
Q.p.	Quercus palustris	Pin Oak	24"-36" Ht. No. 3 Container	35		
*Q.r.	Quercus rubra	Northern Red Oak	2 1/2" - 3" Cal. B.B.	2		Spring Dig Only
Q.r.	Quercus rubra	Northern Red Oak	24"-36" Ht. No. 3 Container	35		
Pic.a.	Picea abies	Norway Spruce	5' - 6' Ht. B.B.	9		
Pic.p.	Picea pungens	Colorado Spruce	5' - 6' Ht. B.B.	9		
	Wood Chip Mulch			330 S.Y.		

NOTES:

1. 'SPRING DIG ONLY' PLANTS SHALL BE PROCURED AND DUG IN THE SPRING FOR PLANTING IN SPRING OR FALL.

PERMITTING PLAN SET

PLAN DATE: AUGUST 28, 2019

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK, SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

Plotted Date: 8/29/2019

DESIGNER/DRAFTER: MV
CHECKED BY: SB
SCALE IN FEET 0 40 80
SCALE 1"=40'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\HW_MSH_155-171_PMT-10.dgn

SIGNATURE/ BLOCK:

PROJECT TITLE:
SAFETY AND OPERATIONAL IMPROVEMENTS ON I-84

TOWN: **WEST HARTFORD**

DRAWING TITLE: **LANDSCAPE PLAN**

PROJECT NO. **155-171**
DRAWING NO. **LDS-03**
SHEET NO. **10**

IWGP
Attachment D: NDDB Map (Dated June 2019)

Applicant: Connecticut Department of Transportation
Project: State Project No. 155-171
Safety and Operational Improvements on I-84
Exit 39A to Exit 41
Town of West Hartford

Natural Diversity Data Base Areas

WEST HARTFORD, CT

June 2019

State and Federal Listed Species

Critical Habitat

Town Boundary

NOTE: This map shows general locations of State and Federal Listed Species and Critical Habitats. Information on listed species is collected and compiled by the Natural Diversity Data Base (NDDB) from a variety of data sources . Exact locations of species have been buffered to produce the generalized locations.

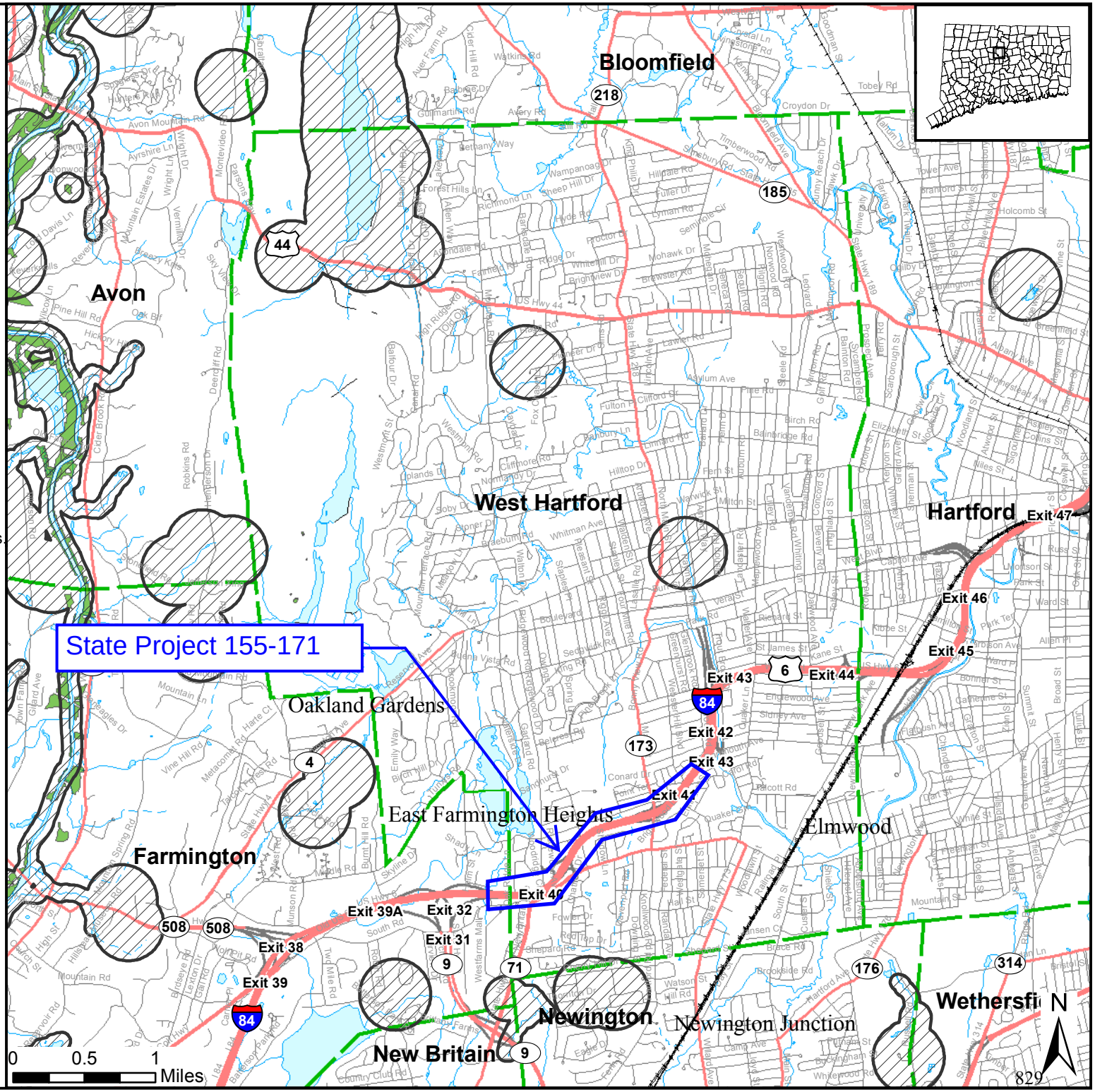
This map is intended for use as a preliminary screening tool for conducting a Natural Diversity Data Base Review Request. To use the map, locate the project boundaries and any additional affected areas. If the project is within a hatched area there may be a potential conflict with a listed species. For more information, complete a Request for Natural Diversity Data Base State Listed Species Review form (DEP-APP-007), and submit it to the NDDB along with the required maps and information. More detailed instructions are provided with the request form on our website.

www.ct.gov/deep/nddbrequest

Use the CTECO Interactive Map Viewers at www.cteco.uconn.edu to more precisely search for and locate a site and to view aerial imagery with NDDB Areas.

QUESTIONS: Department of Energy and Environmental Protection (DEEP)
79 Elm St, Hartford, CT 06106
email: deep.nddbrequest@ct.gov
Phone: (860) 424-3011

Connecticut Department of Energy & Environmental Protection
Bureau of Natural Resources
Wildlife Division



IWGP
Attachment F: ACOE Self-Verification Notification Form

Applicant: Connecticut Department of Transportation
Project: State Project No. 155-171
Safety and Operational Improvements on I-84
Exit 39A to Exit 41
Town of West Hartford

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

2800 BERLIN TURNPIKE, P.O. BOX 317546
NEWINGTON, CONNECTICUT 06131-7546
Phone:

September 3, 2019

Ms. Susan Lee
U.S. Army Corps of Engineers
New England District
696 Virginia Road
Concord, MA 01742-2751

Subject: State Project No. 155-171
I-84 Eastbound and Westbound (Exits 39A to 41)
Town of West Hartford

Dear Ms. Lee:

Enclosed please find one copy of the USACE Self-Verification Form for General Permit 18 Stream, River, and Brook Crossings for your review and approval. A copy has also been submitted to the Connecticut Department of Energy and Environmental Protection.

Any questions pertaining to this application may be directed to Mr. Andrew H. Davis, Transportation Supervising Planner of my staff, at 860-594-2157.

Very truly yours,

Kimberly C. Lesay
Transportation Planning Director
Bureau of Policy and Planning

Attachments
cc: Nathan Margason – USEPA

Ken S. Kittredge/ksk

bcc: Kimberly C. Lesay – Andrew H. Davis – Amanda M. Saul – Chris W. Samorajczyk
Gregory M. Dorosh – Susan M. Labatique – Nilesh Patel – Ahsan Saghir
Donald L. Ward (District 1)
Michael W. Dion (BL Companies)

US Army Corps of Engineers®
New England District

Appendix E: Self-Verification Notification Form

This form is required for all **non-tidal projects in Connecticut**, but **not** required if work is done within boundaries of Mashantucket Pequot or Mohegan Tribal Lands. **Before** work commences, complete **all** fields (write "none" if applicable); attach project plans (not required for projects involving the installation of construction mats only); and any state or local approval(s); and send to:

Permits & Enforcement Branch B
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751
or cenae-r@usace.army.mil

and

CT DEEP
Inland Water Resources Division
79 Elm Street
Hartford, CT 06106-5127

****

State or local Permit Number: _____
Date of State or local Permit: _____
State/local Project Manager: _____

Permittee: Connecticut Department of Transportation; Contact Person: Kimberly Lesay
Address, City, State & Zip: 2800 Berlin Turnpike, Newington, CT 06131
Phone(s) and Email: 860-594-2001; thomas.maziarz@ct.gov

Contractor: TBD by bid process.
Address, City, State & Zip: _____
Phone(s) and Email: _____

Consultant/Engineer/Designer: BL Companies; Contact Person: Michael W. Dion
Address, City, State & Zip: 355 Research Parkway, Meriden, CT 06450
Phone(s) and Email: 860-630-2416; mdion@blcompanies.com

Wetland/Soil Scientist Consultant: Wetlands delineated by ConnDOT
Address, City, State & Zip: _____
Phone(s) and Email: _____

Project Location (provide detailed description & locus map): _____
I-84 Eastbound and Westbound (Exit 39A to Exit 41).
Address, City, State & Zip: Town of West Hartford.
Latitude/Longitude Coordinates: Lat. 41.730900 / Long. -72.754359
Waterway Name: Rockledge Brook
Project Purpose (include all aspects of the project including those not within Corps jurisdiction):
This portion of I-84 is a heavily traveled corridor and the existing expressway does not have the capacity to convey current traffic volumes and needs to be improved to provide adequate traffic flow.
Work Description: This project includes the addition of one travel lane for approximately 9,500 feet along the westbound lanes and approximately 2,800 feet along the eastbound lanes. The shoulders will be brought up to current design standards. Bridges along this corridor will be widened to accommodate these improvements. Drainage improvements will include providing outlet protection and cleaning debris at the outlets.

Work will be done under the following GP(s) (check all that have associated impacts):

_____**GP. 2 - Repair or maintenance of authorized or grandfathered structures/fills**
Area of total wetland impacts: temporary _____SF permanent _____SF
Area of total waterway impacts: temporary _____SF permanent_____SF

_____**GP. 5 - Boat ramps/marine railways**
Area of total wetland impacts: temporary _____SF permanent _____SF
Area of total waterway impacts: temporary _____SF permanent_____SF

_____**GP. 6 - Utility line activities (include calculations for each single & complete crossing – attach additional sheet if necessary)**
Area of total wetland impacts: temporary _____SF permanent _____SF
Area of total waterway impacts: temporary _____SF permanent_____SF

_____**GP. 9 - Shoreline and bank stabilization projects**
Area of total wetland impacts: temporary _____SF permanent _____SF
Area of total waterway impacts: temporary _____SF permanent_____SF

_____**GP. 10 - Aquatic habitat restoration, establishment and enhancement activities**
Area of total wetland impacts: temporary _____SF permanent _____SF
Area of total waterway impacts: temporary _____SF permanent_____SF

_____**GP. 11 - Fish & wildlife harvesting, enhancement and attraction devices and activities**
Area of total wetland impacts: temporary _____SF permanent _____SF
Area of total waterway impacts: temporary _____SF permanent_____SF

_____**GP. 12 - Oil Spill and Hazardous material cleanup**
Area of total wetland impacts: temporary _____SF permanent _____SF
Area of total waterway impacts: temporary _____SF permanent_____SF

_____**GP. 13 - Cleanup of hazardous and toxic waste**
Area of total wetland impacts: temporary _____SF permanent _____SF
Area of total waterway impacts: temporary _____SF permanent_____SF

_____**GP. 14 - Scientific measurements devices**
Area of total wetland impacts: temporary _____SF permanent _____SF
Area of total waterway impacts: temporary _____SF permanent_____SF

_____**GP. 15 - Survey activities**
Area of total wetland impacts: temporary _____SF permanent _____SF
Area of total waterway impacts: temporary _____SF permanent_____SF

_____**GP. 17 - New/expanded developments & recreational facilities**
Area of total wetland impacts: temporary _____SF permanent _____SF
Area of total waterway impacts: temporary _____SF permanent_____SF

__X__ **GP. 18 - Linear transportation projects- wetland crossings only (include calculations for each single & complete crossing - attach additional sheet if necessary)**

Area of total wetland impacts: temporary 1,530 SF permanent 125 SF
Area of total waterway impacts: temporary 1,570 SF permanent 10 SF

_____ **GP. 19 - Stream, river & brook crossings – not including wetland crossings (include calculations for each single & complete crossing – attach additional sheet if necessary)**

Area of total wetland impacts: temporary _____ SF permanent _____ SF
Area of total waterway impacts: temporary _____ SF permanent _____ SF

_____ **GP. 21 - Temporary fill not associated with any other GP activities**

Area of total wetland impacts: temporary _____ SF permanent _____ SF
Area of total waterway impacts: temporary _____ SF permanent _____ SF

Does your project include any secondary effects? Yes _____ No X
(Secondary effects include, but are not limited to non-tidal waters or wetlands drained, flooded, fragmented, or mechanically cleared resulting from a single and complete project. See Appendix F - Definitions.) If YES, describe here: _____

Proposed Work Dates: Start: April 1, 2020 Finish: June 30, 2023

Your name/signature below, as permittee, confirms that your project meets the self-verification criteria and that you accept and agree to comply with the applicable terms and conditions in the Connecticut General Permits.

Thomas J Mazzarz
Signature of Permittee

9-3-2019
Date

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
Phone: (603) 223-2541 Fax: (603) 223-0104
http://www.fws.gov/newengland

In Reply Refer To:
Consultation Code: 05E1NE00-2019-TA-2756
Event Code: 05E1NE00-2019-E-07188
Project Name: CTDOT 155-171

September 03, 2019

Subject: Verification letter for the 'CTDOT 155-171' project under the January 5, 2016, Programmatic Biological Opinion on Final 4(d) Rule for the Northern Long-eared Bat and Activities Excepted from Take Prohibitions.

Dear Christopher Samorajczyk:

The U.S. Fish and Wildlife Service (Service) received on September 03, 2019 your effects determination for the 'CTDOT 155-171' (the Action) using the northern long-eared bat (*Myotis septentrionalis*) key within the Information for Planning and Consultation (IPaC) system. This IPaC key assists users in determining whether a Federal action is consistent with the activities analyzed in the Service's January 5, 2016, Programmatic Biological Opinion (PBO). The PBO addresses activities excepted from "take"[1] prohibitions applicable to the northern long-eared bat under the Endangered Species Act of 1973 (ESA) (87 Stat.884, as amended; 16 U.S.C. 1531 et seq.).

Based upon your IPaC submission, the Action is consistent with activities analyzed in the PBO. The Action may affect the northern long-eared bat; however, any take that may occur as a result of the Action is not prohibited under the ESA Section 4(d) rule adopted for this species at 50 CFR §17.40(o). Unless the Service advises you within 30 days of the date of this letter that your IPaC-assisted determination was incorrect, this letter verifies that the PBO satisfies and concludes your responsibilities for this Action under ESA Section 7(a)(2) with respect to the northern long-eared bat.

Please report to our office any changes to the information about the Action that you submitted in IPaC, the results of any bat surveys conducted in the Action area, and any dead, injured, or sick northern long-eared bats that are found during Action implementation. If the Action is not completed within one year of the date of this letter, you must update and resubmit the information required in the IPaC key.

If the Action may affect other federally listed species besides the northern long-eared bat, a proposed species, and/or designated critical habitat, additional consultation between you and this Service office is required. If the Action may disturb bald or golden eagles, additional coordination with the Service under the Bald and Golden Eagle Protection Act is recommended.

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[1]Take means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct [ESA Section 3(19)].

Action Description
You provided to IPaC the following name and description for the subject Action.

1. Name

CTDOT 155-171

2. Description

The following description was provided for the project 'CTDOT 155-171':

safety and operational improvements along I-84 in West Hartford, CT

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/41.737214704339166N72.74000097737341W

Determination Key Result

This Federal Action may affect the northern long-eared bat in a manner consistent with the description of activities addressed by the Service's PBO dated January 5, 2016. Any taking that may occur incidental to this Action is not prohibited under the final 4(d) rule at 50 CFR §17.40(o). Therefore, the PBO satisfies your responsibilities for this Action under ESA Section 7(a)(2) relative to the northern long-eared bat.

Determination Key Description: Northern Long-eared Bat 4(d) Rule

This key was last updated in IPaC on May 15, 2017. Keys are subject to periodic revision.

This key is intended for actions that may affect the threatened northern long-eared bat.

The purpose of the key for Federal actions is to assist determinations as to whether proposed actions are consistent with those analyzed in the Service's PBO dated January 5, 2016.

Federal actions that may cause prohibited take of northern long-eared bats, affect ESA-listed species other than the northern long-eared bat, or affect any designated critical habitat, require ESA Section 7(a)(2) consultation in addition to the use of this key. Federal actions that may affect species proposed for listing or critical habitat proposed for designation may require a conference under ESA Section 7(a)(4).

Determination Key Result

This project may affect the threatened Northern long-eared bat; therefore, consultation with the Service pursuant to Section 7(a)(2) of the Endangered Species Act of 1973 (87 Stat.884, as amended; 16 U.S.C. 1531 et seq.) is required. However, based on the information you provided, this project may rely on the Service's January 5, 2016, *Programmatic Biological Opinion on Final 4(d) Rule for the Northern Long-Eared Bat and Activities Excepted from Take Prohibitions* to fulfill its Section 7(a)(2) consultation obligation.

Qualification Interview

1. Is the action authorized, funded, or being carried out by a Federal agency?

   Yes

2. Have you determined that the proposed action will have "no effect" on the northern long-eared bat? (If you are unsure select "No")

   No

3. Will your activity purposefully **Take** northern long-eared bats?

   No

4. Is the project action area located wholly outside the White-nose Syndrome Zone?

   Automatically answered
   No

5. Have you contacted the appropriate agency to determine if your project is near a known hibernaculum or maternity roost tree?

   Location information for northern long-eared bat hibernacula is generally kept in state Natural Heritage Inventory databases – the availability of this data varies state-by-state. Many states provide online access to their data, either directly by providing maps or by providing the opportunity to make a data request. In some cases, to protect those resources, access to the information may be limited. A web page with links to state Natural Heritage Inventory databases is available at www.fws.gov/midwest/endangered/mammals/nleb/nhisites.html.

   Yes

6. Will the action affect a cave or mine where northern long-eared bats are known to hibernate (i.e., hibernaculum) or could it alter the entrance or the environment (physical or other alteration) of a hibernaculum?

   No

7. Will the action involve Tree Removal?
   Yes

8. Will the action only remove hazardous trees for the protection of human life or property?
   Yes

Project Questionnaire

If the project includes forest conversion, report the appropriate acreages below. Otherwise, type '0' in questions 1-3.

1. Estimated total acres of forest conversion:

0

2. If known, estimated acres of forest conversion from April 1 to October 31

0

3. If known, estimated acres of forest conversion from June 1 to July 31

0

If the project includes timber harvest, report the appropriate acreages below. Otherwise, type '0' in questions 4-6.

4. Estimated total acres of timber harvest

0

5. If known, estimated acres of timber harvest from April 1 to October 31

0

6. If known, estimated acres of timber harvest from June 1 to July 31

0

If the project includes prescribed fire, report the appropriate acreages below. Otherwise, type '0' in questions 7-9.

7. Estimated total acres of prescribed fire

0

8. If known, estimated acres of prescribed fire from April 1 to October 31

0

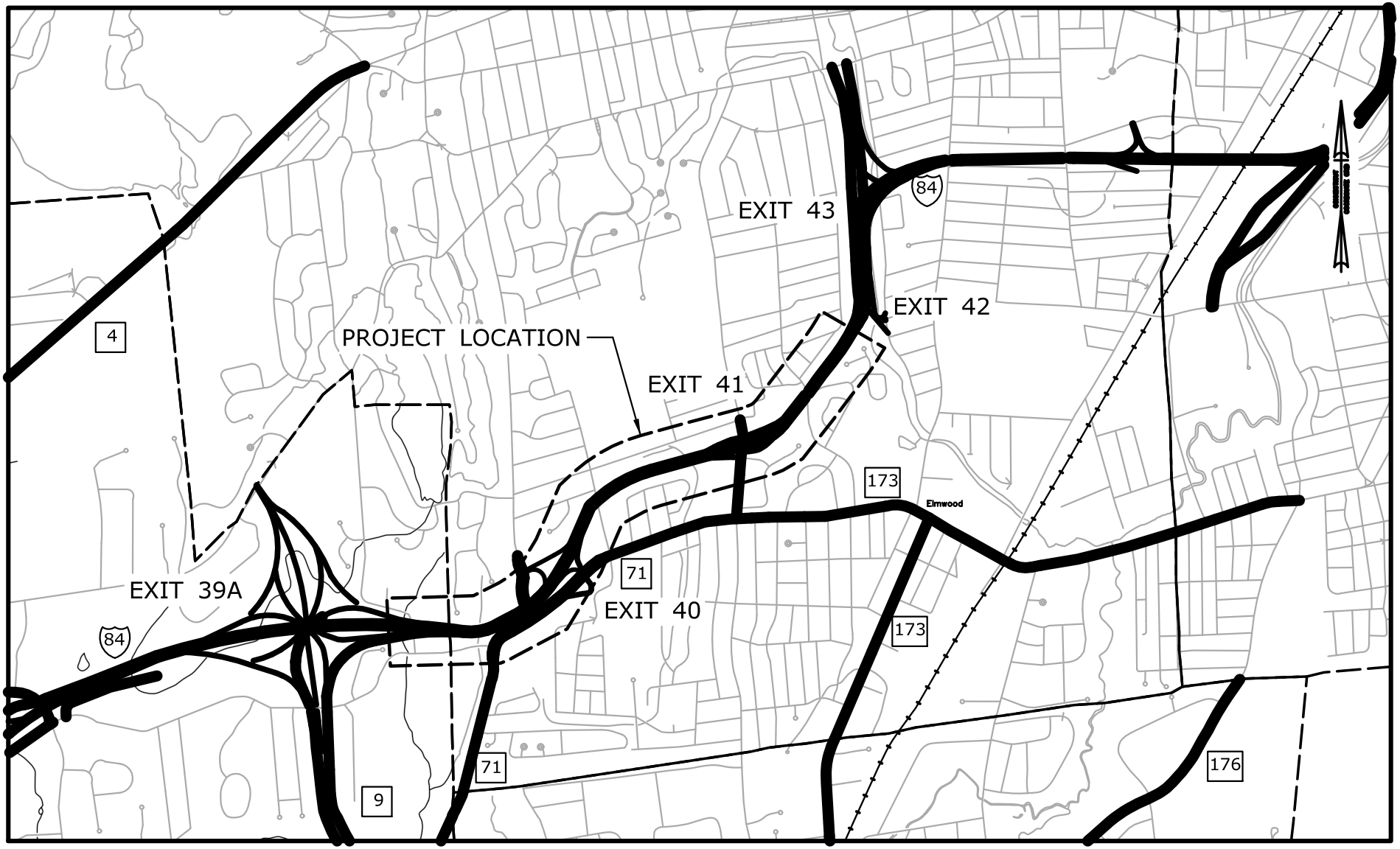
9. If known, estimated acres of prescribed fire from June 1 to July 31

0

If the project includes new wind turbines, report the megawatts of wind capacity below. Otherwise, type '0' in question 10.

10. What is the estimated wind capacity (in megawatts) of the new turbine(s)?

0



STATE PROJECT NO.: 0155-0171 CITY/TOWN: WEST HARTFORD	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION I-84 SAFETY AND OPERATIONAL IMPROVEMENTS	BL Companies ARCHITECTURE ENGINEERING ENVIRONMENTAL LAND SURVEYING	DATE: FEBRUARY 2019 LOC-01

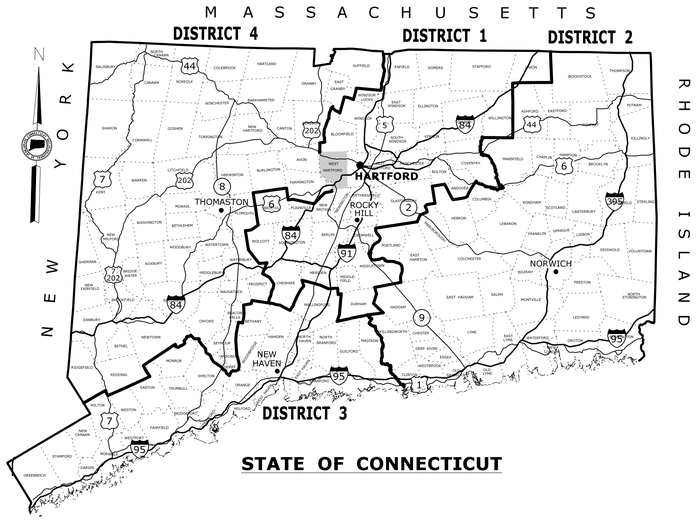
FIGURE 1 - LOCATION MAP

ACOE: Index of Permit Plan Sheets

Applicant: Connecticut Department of Transportation
Project: State Project No. 155-171
Safety and Operational Improvements on I-84
Exit 39A to Exit 41
Town of West Hartford

Drawing No.	Drawing Title
PMT-01	Title Sheet
PMT-02 to PMT-06	General Site Plans Impact Areas
PMT-07	Miscellaneous Details
PMT-08	Elev. & Wall Details
PMT-09 TO PMT-10	Landscape Plans

ENVIRONMENTAL PERMIT PLANS
STATE PROJECT 155-171
SAFETY AND OPERATIONAL IMPROVEMENTS ON I-84



STATE OF CONNECTICUT

GENERAL NOTES:

1. THESE PLANS ARE INTENDED ONLY FOR ENVIRONMENTAL PERMITTING PURPOSES. THESE PLANS HOLD AUTHORITY FOR ALL ACTIVITIES CONCERNING THE REGULATED AREA. FOR DETAILED PLANIMETRIC INFORMATION AND PAYMENT REFER TO THE APPLICABLE CONTRACT DOCUMENTS.

2. THE DEPARTMENT OF TRANSPORTATION WILL ONLY SUBMIT REVISIONS TO DEEP AND USACE FOR CHANGES TO THE DESIGN THAT WILL AFFECT REGULATED AREAS.

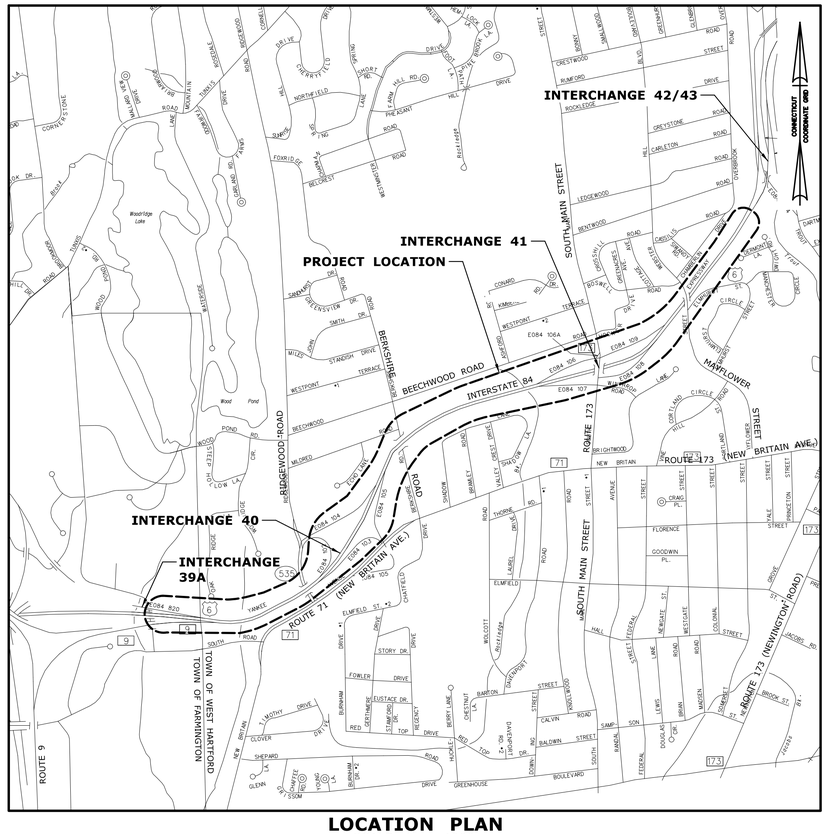
3. FOR A DESCRIPTION OF THE WATERCOURSES, WETLANDS, AND WETLAND SOILS SEE RELEVENT SECTIONS OF THE PERMIT APPLICATION.

4. 400 FOOT GRID BASED ON CONNECTICUT COORIDATE SYSTEM N.A.D. 1983 VERTICAL DATUM BASED ON NGVD OF 1929.

5. ALL CONSTRUCTION ACTIVITIES WILL BE CONDUCTED IN ACCORDANCE WITH THE DEPARTMENTS STANDARD SPECIFICATIONS FOR ROADS, BRIDGES, AND INCIDENTAL CONSTRUCTION, FORM 817, SECTION 1.10 AND WILL ALSO FOLLOW REQUIRED BEST MANAGEMENT PRACTICES (BMPs) AND SEDIMENT AND EROSION CONTROL MEASURES IN ACCORDANCE WITH THE 2002 EROSION & SEDIMENTATION CONTROL GUIDELINES AND THE 2004 STORMWATER QUALITY MANUAL.

LIST OF DRAWINGS

DRAWING NO.	DRAWING TITLE
PMT-01	TITLE SHEET
PMT-02 TO PMT-06	GENERAL SITE PLANS IMPACT AREAS
PMT-07	MISCELLANEOUS DETAIL SHEET
PMT-08	I-84 OVER ROCKLEDGE BR. ELEV. & WALL DETAILS
PMT-809 TO PMT-10	LANDSCAPE PLANS



LOCATION PLAN
SCALE: 1" = 1000'

DESIGNED BY:
BL Companies
BL COMPANIES, INC.
355 RESEARCH PARKWAY
MERIDEN, CT 06450

STATE OF CONNECTICUT · RUSSELL W. BOLLEA · No. 22758 · LICENSED PROFESSIONAL ENGINEER

PERMITTING PLAN SET

PLAN DATE: AUGUST 28, 2019

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK, SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

Plotted Date: 8/29/2019

DESIGNER/DRAFTER: JE
CHECKED BY: MF
SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\HW_MSH_155-171_PMT-01.dgn

SIGNATURE/BLOCK:

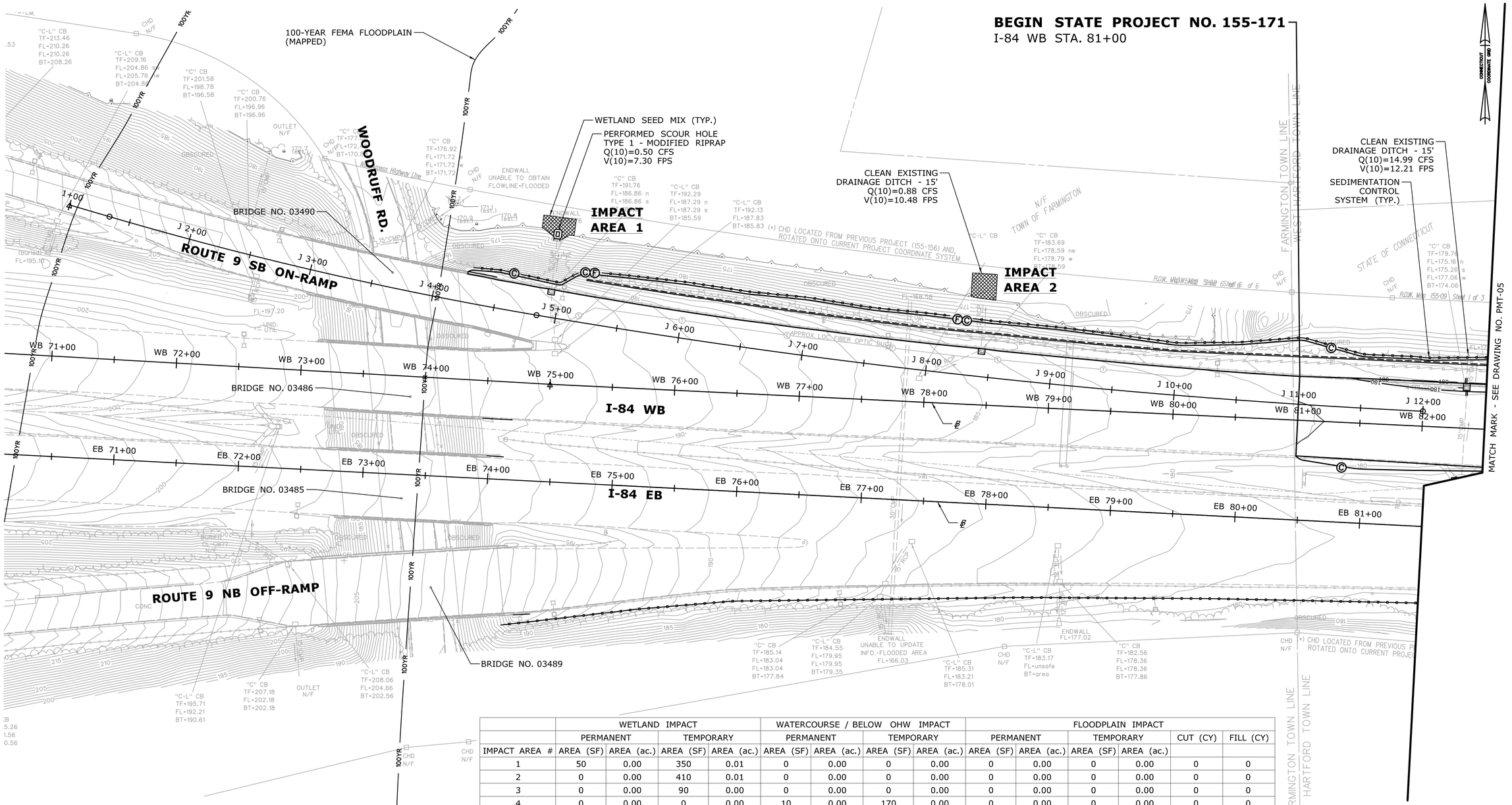
STATE OF CONNECTICUT · RUSSELL W. BOLLEA · No. 22758 · LICENSED PROFESSIONAL ENGINEER

PROJECT TITLE:
SAFETY AND OPERATIONAL IMPROVEMENTS ON I-84

TOWN: **WEST HARTFORD**

DRAWING TITLE: **TITLE SHEET**

PROJECT NO. **155-171**
DRAWING NO. **PMT-01**
SHEET NO. **1**



	WETLAND IMPACT				WATERCOURSE / BELOW OHW IMPACT				FLOODPLAIN IMPACT					
	PERMANENT		TEMPORARY		PERMANENT		TEMPORARY		PERMANENT		TEMPORARY		CUT (CY)	FILL (CY)
IMPACT AREA #	AREA (SF)	AREA (ac.)	AREA (SF)	AREA (ac.)	AREA (SF)	AREA (ac.)	AREA (SF)	AREA (ac.)	AREA (SF)	AREA (ac.)	AREA (SF)	AREA (ac.)		
1	50	0.00	350	0.01	0	0.00	0	0.00	0	0.00	0	0.00	0	0
2	0	0.00	410	0.01	0	0.00	0	0.00	0	0.00	0	0.00	0	0
3	0	0.00	90	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0
4	0	0.00	0	0.00	10	0.00	170	0.00	0	0.00	0	0.00	0	0
5	75	0.00	460	0.01	0	0.00	0	0.00	75	0.00	640	0.01	15	6
6	0	0.00	0	0.00	0	0.00	10	0.00	50	0.00	530	0.01	12	3
7	0	0.00	0	0.00	0	0.00	0	0.00	30	0.00	110	0.00	5	2
8	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	510	0.01	5	0
9	0	0.00	120	0.00	0	0.00	730	0.02	0	0.00	900	0.02	0	0
10	0	0.00	100	0.00	0	0.00	660	0.02	0	0.00	760	0.02	0	0
11	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	190	0.00	3	0
TOTAL	125	0.00	1530	0.04	10	0.00	1570	0.00	155	0.00	3640	0.08	40	11

LEGEND
- WETLAND LIMITS
- OHW/WATERCOURSE LIMITS
- 100YR – FEMA 100-YEAR FLOOD (MAPPED)
- C – CUT LIMITS
- F – FILL LIMITS
- SEDIMENTATION CONTROL SYSTEM
- WETLAND SEED MIX

PERMITTING PLAN SET

PLAN DATE: AUGUST 28, 2019

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

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Plotted Date: 8/29/2019

DESIGNER/DRAFTER: JE
CHECKED BY: MF
SCALE IN FEET 0 40 80
SCALE 1"=40'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\HW_MSH_155-171_PMT-02.dgn

SIGNATURE/ BLOCK:

STATE OF CONNECTICUT · MICHAEL W. ROSSI · No. 22709 · LICENSED PROFESSIONAL ENGINEER

PROJECT TITLE:
SAFETY AND OPERATIONAL IMPROVEMENTS ON I-84

TOWN: **WEST HARTFORD**

DRAWING TITLE:
GENERAL SITE PLAN IMPACT AREAS

PROJECT NO. **155-171**
DRAWING NO. **PMT-02**
SHEET NO. **2**


LIMIT OF MILL AND OVERLAY
CLEAN EXISTING DRAINAGE DITCH - 15'
CLEAN EXISTING DRAINAGE DITCH - 15' Q(10)=0.17 CFS V(10)=5.04 FPS
CLEAN EXISTING DRAINAGE DITCH - 15'
PREFORMED SCOUR HOLE TYPE 1 - MODIFIED RIPRAP Q(10)=1.39 CFS V(10)=10.16 FPS
TYPE "C" CB
REMOVE DRAINAGE STRUCTURE
CLEAN EXISTING DRAINAGE DITCH - 15' Q(10)=0.00 CFS V(10)=0.00 FPS
REMOVE DRAINAGE STRUCTURE
TYPE "C-L" CB
SEDIMENTATION CONTROL SYSTEM (TYP.)
IMPACT AREA 3
WETLAND SEED MIX
PREFORMED SCOUR HOLE TYPE 1 - MODIFIED RIPRAP Q(10)=3.39 CFS V(10)=21.18 FPS
TYPE "C-L" CATCH BASIN TOP
TYPE "C-M" CB
PREFORMED SCOUR HOLE TYPE 1 - MODIFIED RIPRAP Q(10)=6.43 CFS V(10)=12.76 FPS
TYPE "C-L" CB (4' SUMP)
CLEAN EXISTING DRAINAGE DITCH - 15' Q(10)=0.00 CFS V(10)=0.00 FPS
TYPE "C-L" CATCH BASIN TOP
MATCH MARK - SEE DRAWING NO. PMT-07
MATCH MARK - SEE DRAWING NO. PMT-06
BRIDGE NO. 01743B
RIDGEWOOD RD
RAMP B
RAMP G
I-84 WB
I-84 EB
RAMP H
NEW BRITAIN AVE
REMOVE DRAINAGE STRUCTURE
TYPE "C" CB
TYPE "C" CB
TYPE "C-M" CB
TYPE "C-M" CB
TYPE "C" CB
BEGIN STATE PROJECT NO. 155-171
I-84 EB STA. 100+00
LEGEND
WETLAND LIMITS
OHW/WATERCOURSE LIMITS
100YR - FEMA 100-YEAR FLOOD (CALCULATED)
CUT LIMITS
FILL LIMITS
SEDIMENTATION CONTROL SYSTEM
WETLAND SEED MIX

PERMITTING PLAN SET

PLAN DATE: AUGUST 28, 2019

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

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Plotted Date: 8/29/2019

DESIGNER/DRAFTER: JE
CHECKED BY: MF
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SCALE 1"=40'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\HW_MSH_155-171_PMT-03.dgn

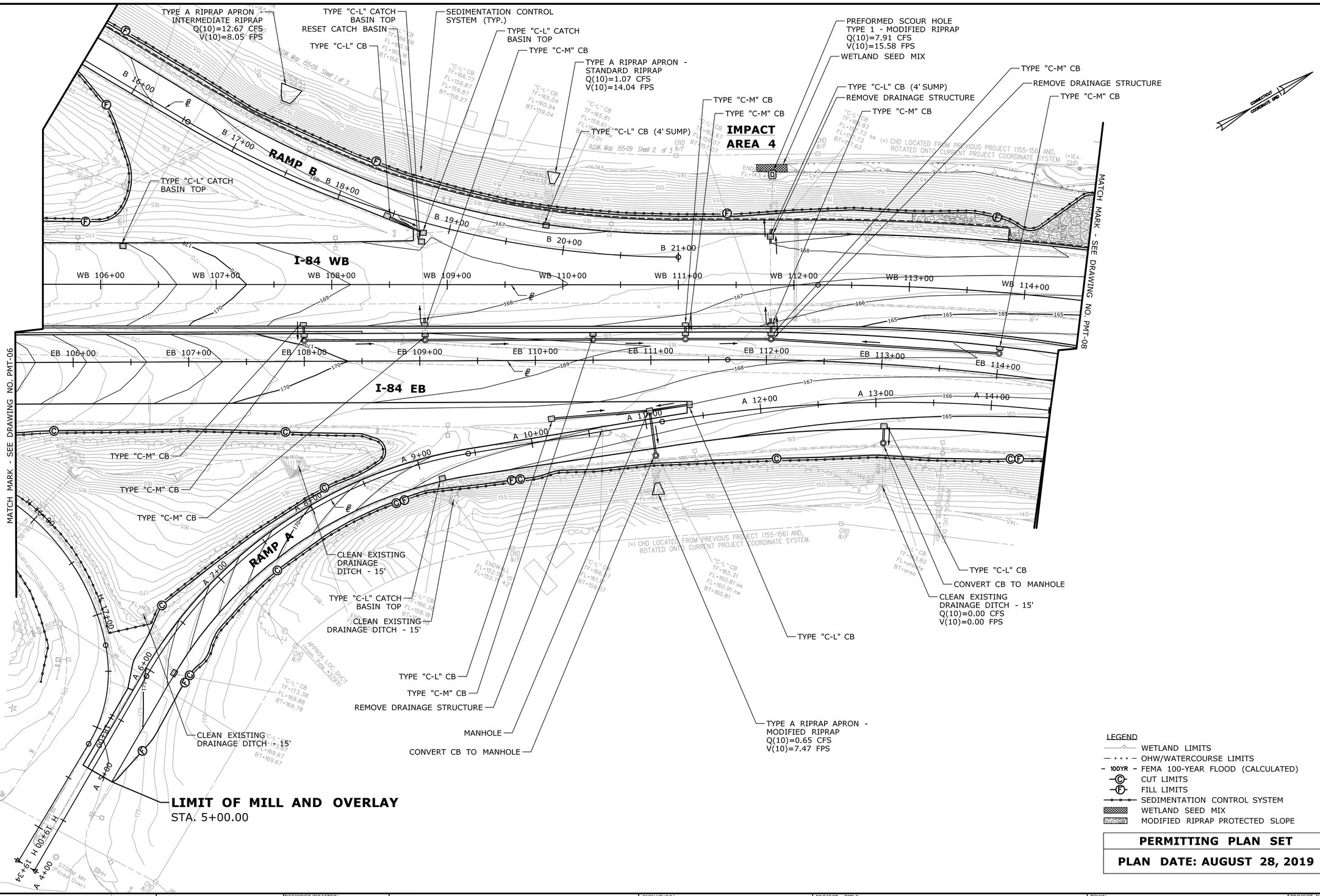
SIGNATURE/BLOCK:

PROJECT TITLE: SAFETY AND OPERATIONAL IMPROVEMENTS ON I-84

TOWN: WEST HARTFORD

DRAWING TITLE: GENERAL SITE PLAN IMPACT AREAS

PROJECT NO. 155-171
DRAWING NO. PMT-03
SHEET NO. 3



LEGEND

- WETLAND LIMITS
- OHW/WATERCOURSE LIMITS
- 100YR – FEMA 100-YEAR FLOOD (CALCULATED)
- (C) CUT LIMITS
- (F) FILL LIMITS
- SEDIMENTATION CONTROL SYSTEM
- WETLAND SEED MIX
- MODIFIED RIPRAP PROTECTED SLOPE

PERMITTING PLAN SET

PLAN DATE: AUGUST 28, 2019

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

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Plotted Date: 8/29/2019

DESIGNER/DRAFTER: JE

CHECKED BY: MF

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SCALE 1"=40'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

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PROJECT TITLE:

SAFETY AND OPERATIONAL IMPROVEMENTS ON I-84

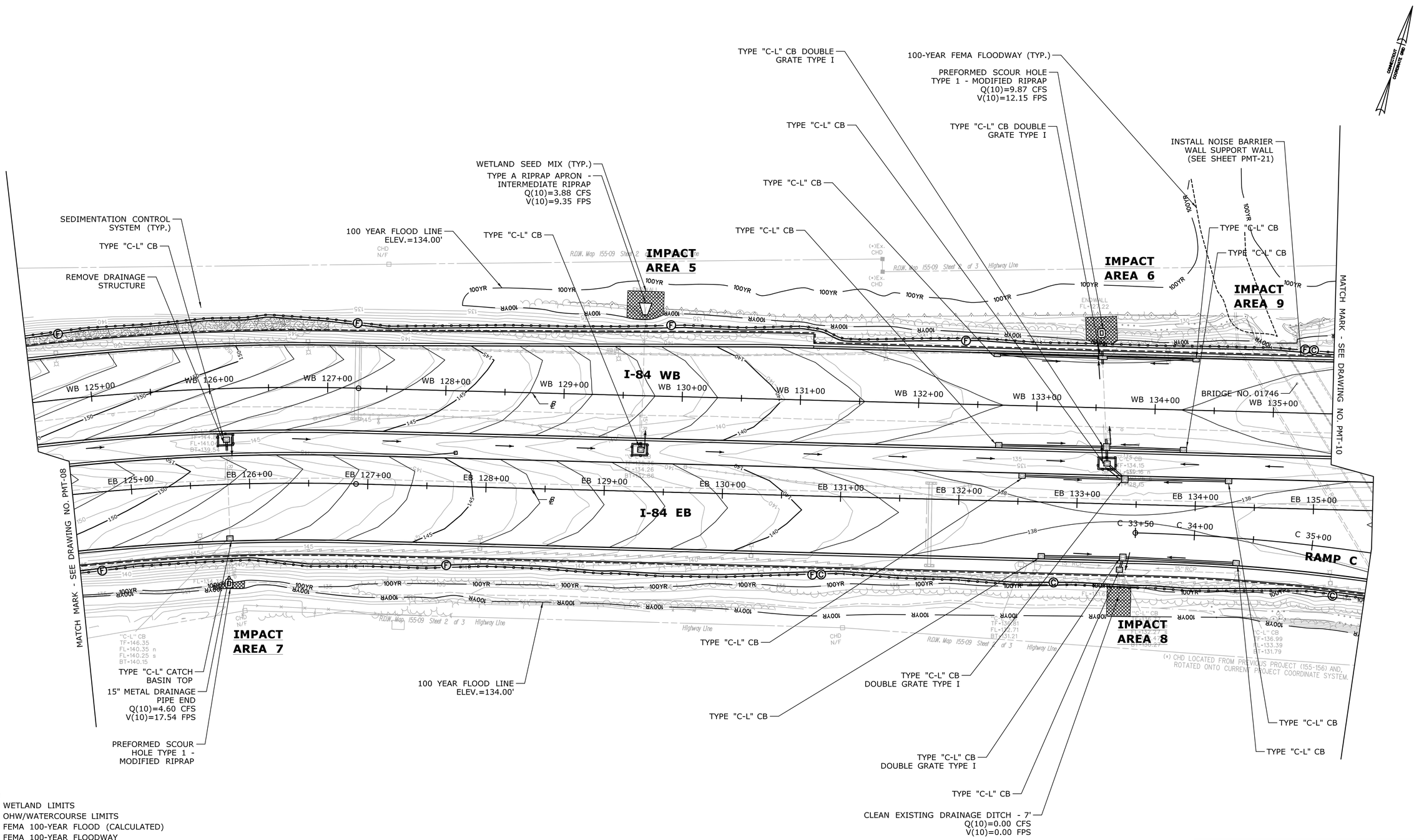
TOWN: **WEST HARTFORD**

DRAWING TITLE: **GENERAL SITE PLAN IMPACT AREAS**

PROJECT NO. **155-171**

DRAWING NO. **PMT-04**

SHEET NO. **4**



LEGEND

- WETLAND LIMITS
- OHW/WATERCOURSE LIMITS
- 100YR - FEMA 100-YEAR FLOOD (CALCULATED)
- FEMA 100-YEAR FLOODWAY
- Ⓒ CUT LIMITS
- Ⓕ FILL LIMITS
- SEDIMENTATION CONTROL SYSTEM
- WETLAND SEED MIX
- MODIFIED RIPRAP PROTECTED SLOPE

PERMITTING PLAN SET

PLAN DATE: AUGUST 28, 2019

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

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Plotted Date: 8/29/2019

DESIGNER/DRAFTER: JE

CHECKED BY: MF

SCALE IN FEET 0 40 80

SCALE 1"=40'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\HW_MSH_155-171_PMT-05.dgn

SIGNATURE/ BLOCK:

STATE OF CONNECTICUT · MICHAEL W. WOOD · No. 22709 · LICENSED PROFESSIONAL ENGINEER

PROJECT TITLE:

SAFETY AND OPERATIONAL IMPROVEMENTS ON I-84

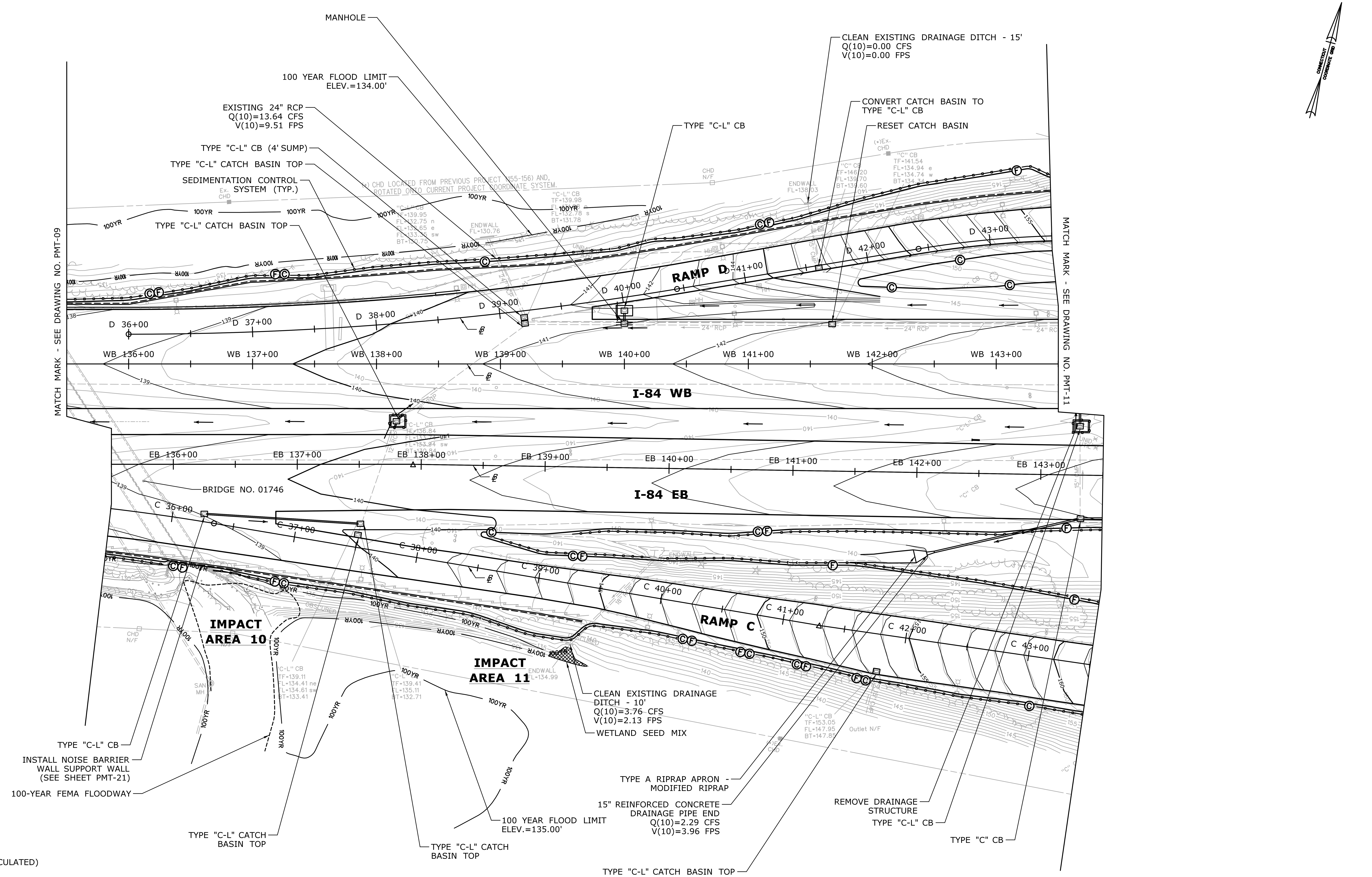
TOWN: **WEST HARTFORD**

DRAWING TITLE: **GENERAL SITE PLAN IMPACT AREAS**

PROJECT NO. **155-171**

DRAWING NO. **PMT-05**

SHEET NO. **5**



LEGEND

- WETLAND LIMITS
- OHW/WATERCOURSE LIMITS
- 100YR FEMA 100-YEAR FLOOD (CALCULATED)
- FEMA 100-YEAR FLOODWAY
- C CUT LIMITS
- F FILL LIMITS
- SEDIMENTATION CONTROL SYSTEM
- WETLAND SEED MIX

PERMITTING PLAN SET

PLAN DATE: AUGUST 28, 2019

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

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Plotted Date: 8/29/2019

DESIGNER/DRAFTER: JE

CHECKED BY: MF

SCALE IN FEET 0 40 80

SCALE 1"=40'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\HW_MSH_155-171_PMT-06.dgn

SIGNATURE/BLOCK:

PROJECT TITLE: **SAFETY AND OPERATIONAL IMPROVEMENTS ON I-84**

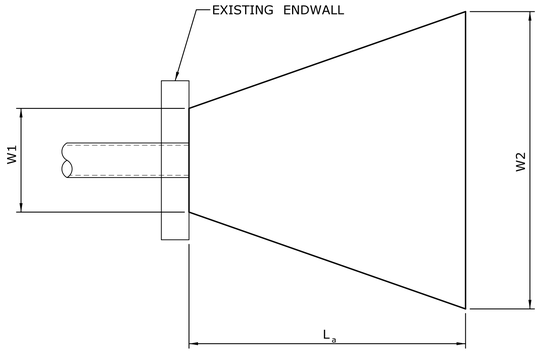
TOWN: **WEST HARTFORD**

DRAWING TITLE: **GENERAL SITE PLAN IMPACT AREAS**

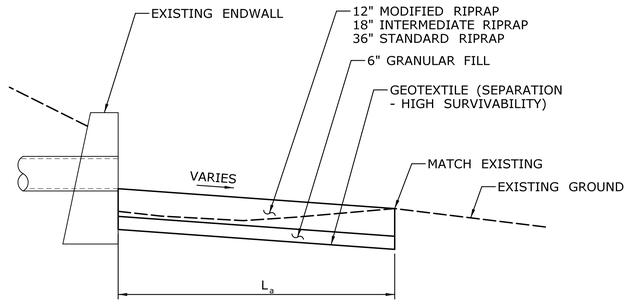
PROJECT NO. **155-171**

DRAWING NO. **PMT-06**

SHEET NO. **6**



PLAN

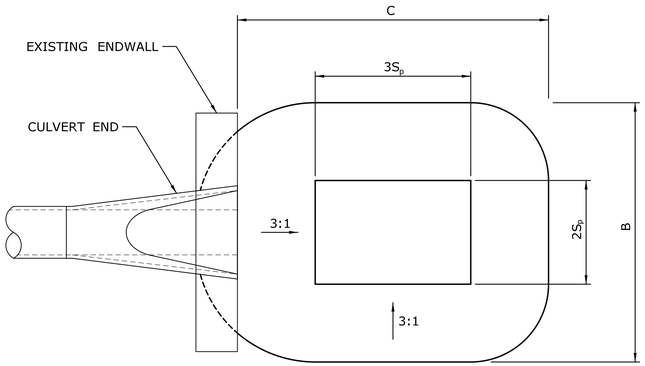


ELEVATION

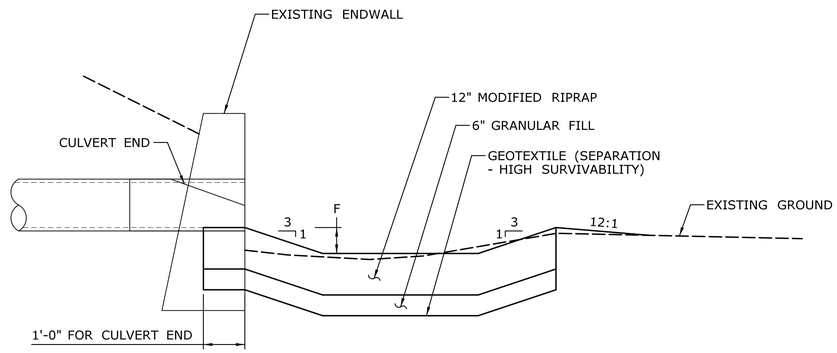
TYPE A RIPRAP APRON TABLE				
OUTLET LOCATION	RIPRAP TYPE	L_a (FT)	W1 (FT)	W2 (FT)
B 17+25 LT	INTERMEDIATE	14	9	18.8
B 19+80 LT	STANDARD	10	3.75	10.75
A 11+00 RT	MODIFIED	10	3.75	10.75
EB 117+50 RT	STANDARD	10	3	10
WB 129+60 LT	INTERMEDIATE	10	3.75	10.75
EB 142+00 RT	MODIFIED	10	3.75	10.75

TYPE A RIPRAP APRON

(N.T.S.)



PLAN



ELEVATION

PREFORMED SCOUR HOLE TYPE 1 TABLE					
PIPE SIZE	C (FT)	B (FT)	$3S_p$ (FT)	$2S_p$ (FT)	F (FT)
15"	7.5	6.25	3.75	2.5	0.625
24"	12	10	6	4	1

PREFORMED SCOUR HOLE TYPE 1

(N.T.S.)

PERMITTING PLAN SET

PLAN DATE: AUGUST 28, 2019

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

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Plotted Date: 8/29/2019

DESIGNER/DRAFTER: JE

CHECKED BY: MF

SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\HW_MSH_155-171_PMT-07.dgn

SIGNATURE/ BLOCK:

STATE OF CONNECTICUT · BRIDGET W. DOOLEY · NO. 32705 · LICENSED PROFESSIONAL ENGINEER

PROJECT TITLE:

SAFETY AND OPERATIONAL IMPROVEMENTS ON I-84

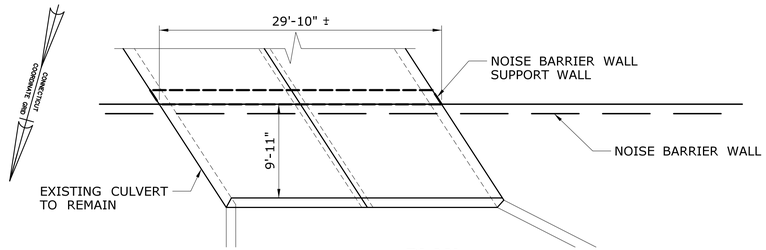
TOWN: **WEST HARTFORD**

DRAWING TITLE: **MISCELLANEOUS DETAIL SHEET**

PROJECT NO. **155-171**

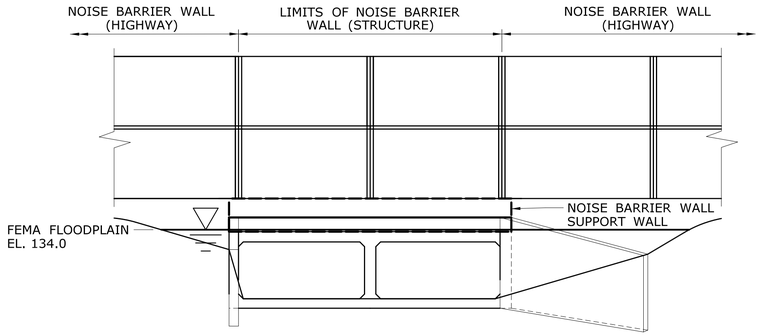
DRAWING NO. **PMT-07**

SHEET NO. **7**



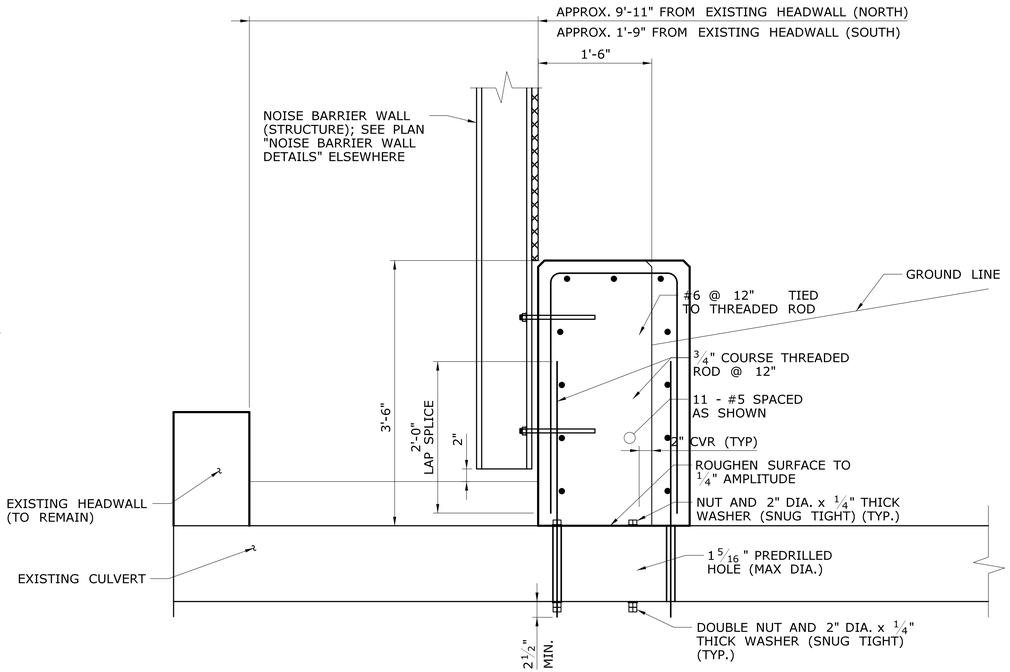
PLAN

SCALE: 1/8" = 1'



NORTH ELEVATION

SCALE: 1/8" = 1'

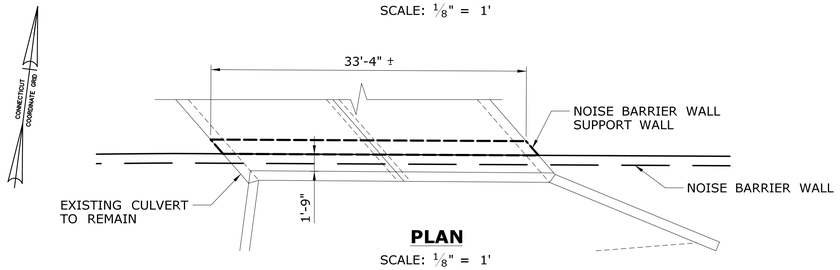


NOISE BARRIER WALL SUPPORT WALL DETAIL

SCALE: 1" = 1'-0"

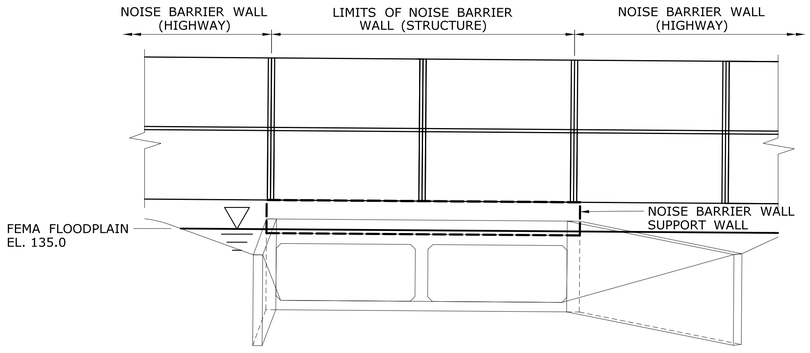
NOTES

1. THREADED RODS SHALL CONFORM TO THE REQUIREMENTS OF ASTM F1554 GRADE 55. ALL COMPONENTS OF THE BOLT ASSEMBLY SHALL BE GALVANIZED IN CONFORMANCE WITH ASTM A153 AND SHALL BE PAID FOR UNDER "DEFORMED STEEL BARS - GALVANIZED".
2. WASHERS SHALL BE GALVANIZED AND CONFORM TO ASTM A572 GRADE 55.
3. NUTS SHALL BE GALVANIZED AND CONFORM TO ASTM A563 DH.
4. DIMENSIONS SHOWN ARE BASED ON ORIGINAL DESIGN DRAWINGS AND ARE TO BE CONSIDERED APPROXIMATE. ALL DIMENSIONS SHALL BE FIELD VERIFIED BY THE CONTRACTOR.
5. COST TO PREDRILL 1 5/16" HOLE TO BE PAID FOR UNDER THE ITEM "DRILLING HOLES AND GROUTING DOWELS".



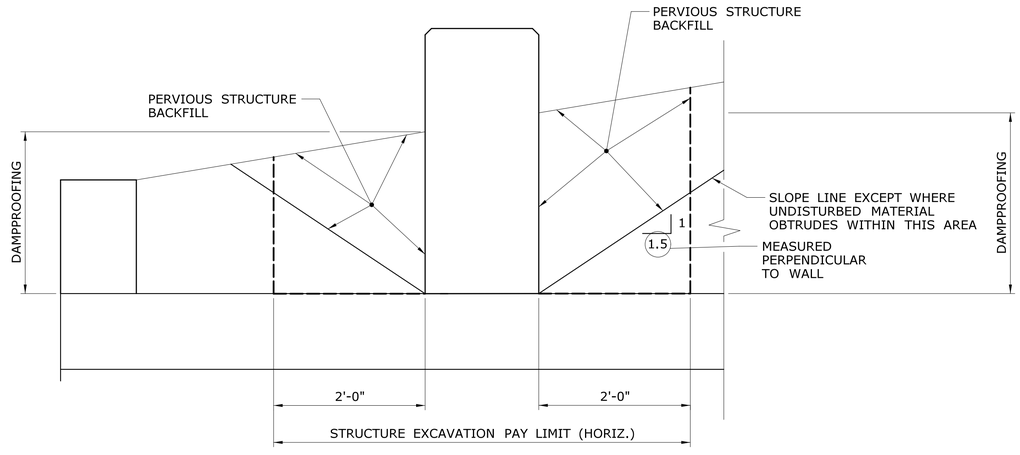
PLAN

SCALE: 1/8" = 1'



SOUTH ELEVATION

SCALE: 1/8" = 1'



NOISE BARRIER WALL SUPPORT WALL PAY LIMITS

SCALE: 1" = 1'-0"

PERMITTING PLAN SET

PLAN DATE: AUGUST 28, 2019

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK, SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

Plotted Date: 8/29/2019

DESIGNER/DRAFTER: MW

CHECKED BY: CP

SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\HW_MSH_155-171_PMT-08.dgn

SIGNATURE/ BLOCK:

-TURE
RING
MENTAL
VEYING

PROJECT TITLE:
SAFETY AND OPERATIONAL IMPROVEMENTS ON I-84

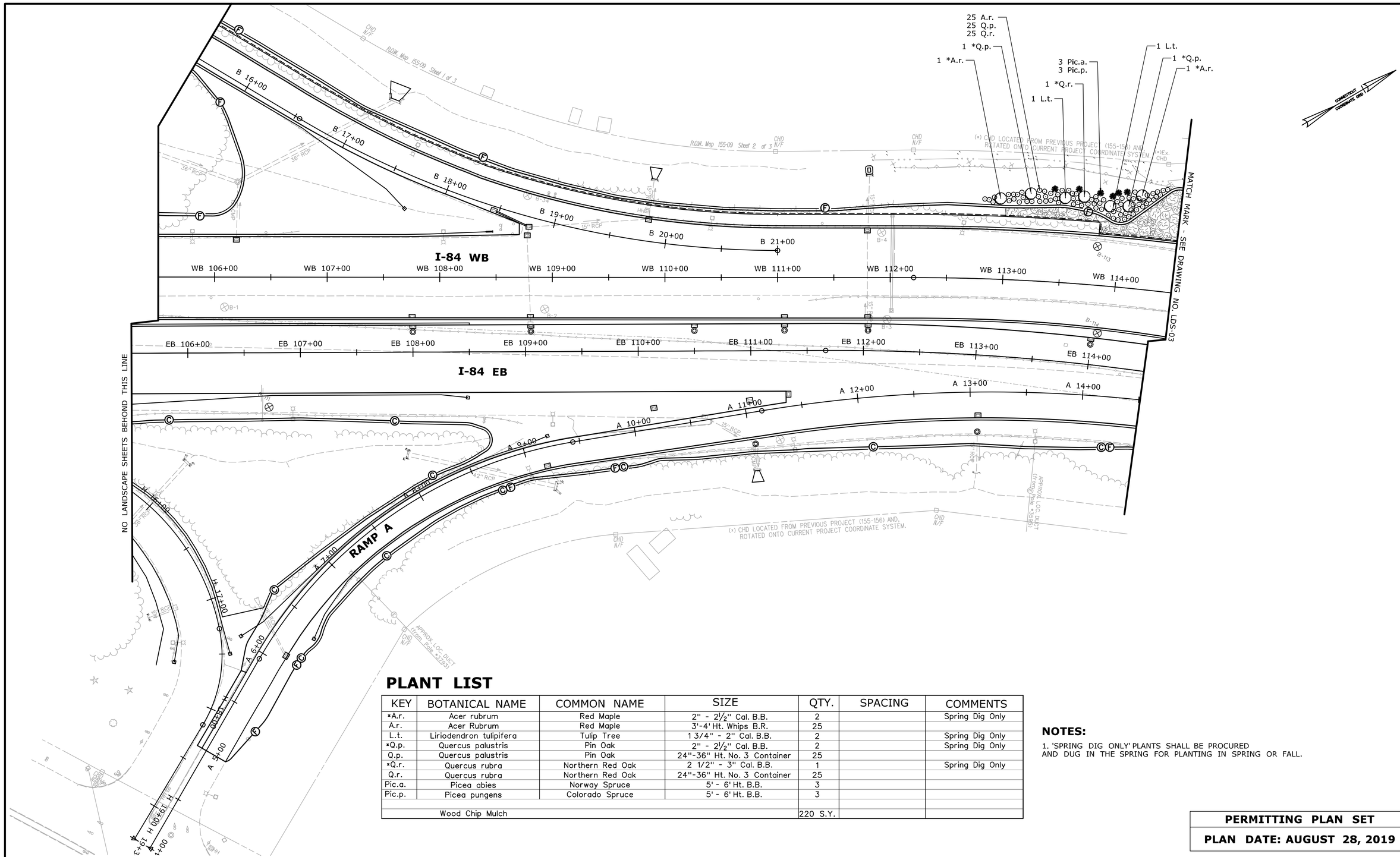
TOWN: WEST HARTFORD

DRAWING TITLE:
I-84 OVER ROCKLEDGE BR. ELEV. & WALL DETAILS

PROJECT NO. 155-171

DRAWING NO. PMT-08

SHEET NO. 8



PLANT LIST

KEY	BOTANICAL NAME	COMMON NAME	SIZE	QTY.	SPACING	COMMENTS
*A.r.	Acer rubrum	Red Maple	2" - 2½" Cal. B.B.	2		Spring Dig Only
A.r.	Acer Rubrum	Red Maple	3'-4' Ht. Whips B.R.	25		
L.t.	Liriodendron tulipifera	Tulip Tree	1 3/4" - 2" Cal. B.B.	2		Spring Dig Only
*Q.p.	Quercus palustris	Pin Oak	2" - 2½" Cal. B.B.	2		Spring Dig Only
Q.p.	Quercus palustris	Pin Oak	24"-36" Ht. No. 3 Container	25		
*Q.r.	Quercus rubra	Northern Red Oak	2 1/2" - 3" Cal. B.B.	1		Spring Dig Only
Q.r.	Quercus rubra	Northern Red Oak	24"-36" Ht. No. 3 Container	25		
Pic.a.	Picea abies	Norway Spruce	5' - 6' Ht. B.B.	3		
Pic.p.	Picea pungens	Colorado Spruce	5' - 6' Ht. B.B.	3		
	Wood Chip Mulch			220 S.Y.		

NOTES:

1. 'SPRING DIG ONLY' PLANTS SHALL BE PROCURED AND DUG IN THE SPRING FOR PLANTING IN SPRING OR FALL.

PERMITTING PLAN SET

PLAN DATE: AUGUST 28, 2019

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK, SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

Plotted Date: 8/29/2019

DESIGNER/DRAFTER: MV

CHECKED BY: SB

SCALE IN FEET 0 40 80

SCALE 1"=40'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\HW_MSH_155-171_PMT-09.dgn

SIGNATURE/ BLOCK:

STATE OF CONNECTICUT MICHAEL W. ROSSI NO. 22705 LICENSED PROFESSIONAL ENGINEER

PROJECT TITLE:

SAFETY AND OPERATIONAL IMPROVEMENTS ON I-84

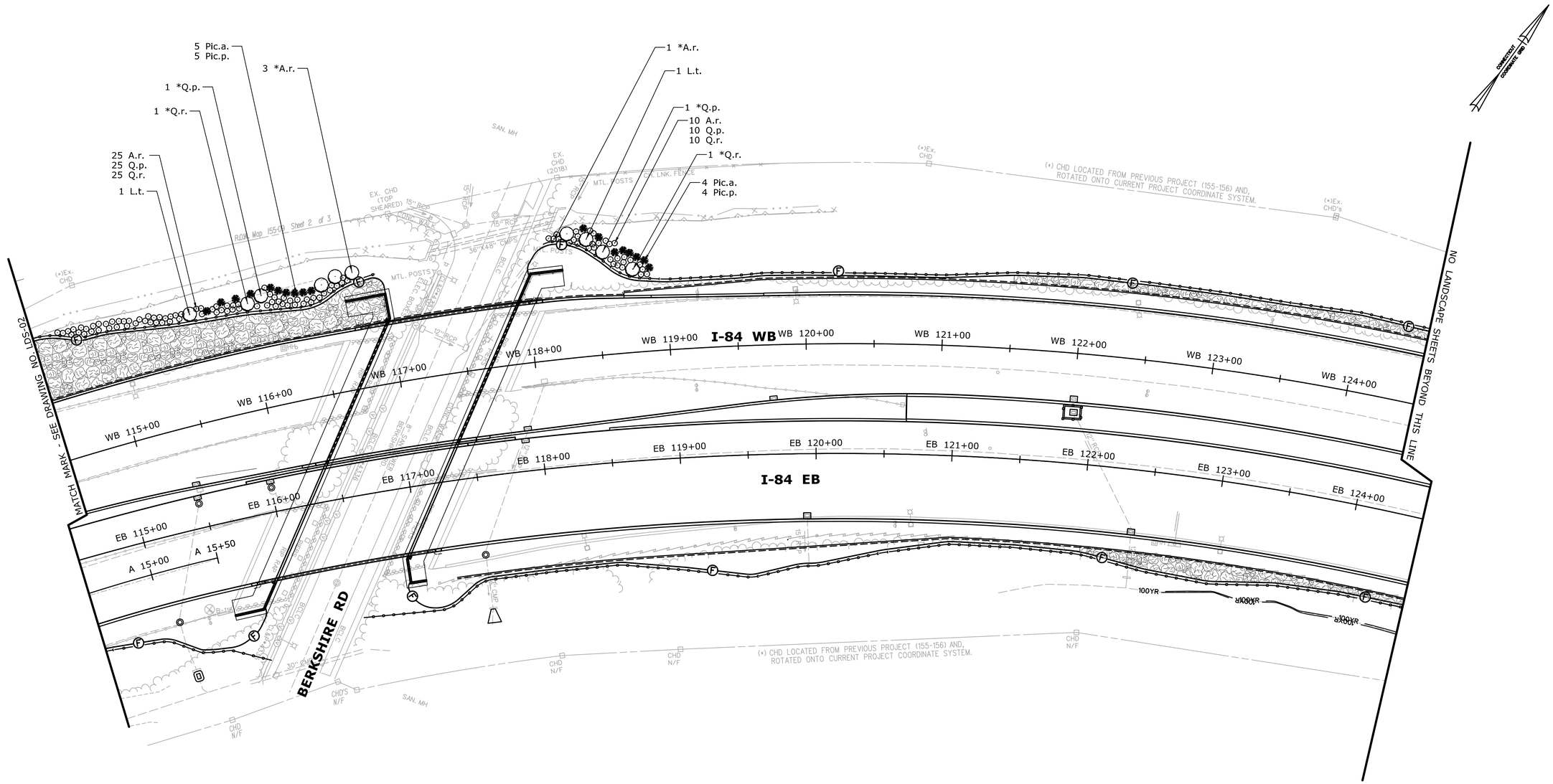
TOWN: **WEST HARTFORD**

DRAWING TITLE: **LANDSCAPE PLAN**

PROJECT NO. **155-171**

DRAWING NO. **PMT-09**

SHEET NO. **9**



PLANT LIST

KEY	BOTANICAL NAME	COMMON NAME	SIZE	QTY.	SPACING	COMMENTS
*A.r.	Acer rubrum	Red Maple	2" - 2½" Cal. B.B.	4		Spring Dig Only
A.r.	Acer Rubrum	Red Maple	3'-4' Ht. Whips B.R.	35		
L.t.	Liriodendron tulipifera	Tulip Tree	1 3/4" - 2" Cal. B.B.	2		Spring Dig Only
*Q.p.	Quercus palustris	Pin Oak	2" - 2½" Cal. B.B.	2		Spring Dig Only
Q.p.	Quercus palustris	Pin Oak	24"-36" Ht. No. 3 Container	35		
*Q.r.	Quercus rubra	Northern Red Oak	2 1/2" - 3" Cal. B.B.	2		Spring Dig Only
Q.r.	Quercus rubra	Northern Red Oak	24"-36" Ht. No. 3 Container	35		
Pic.a.	Picea abies	Norway Spruce	5' - 6' Ht. B.B.	9		
Pic.p.	Picea pungens	Colorado Spruce	5' - 6' Ht. B.B.	9		
	Wood Chip Mulch			330 S.Y.		

NOTES:

1. 'SPRING DIG ONLY' PLANTS SHALL BE PROCURED AND DUG IN THE SPRING FOR PLANTING IN SPRING OR FALL.

PERMITTING PLAN SET

PLAN DATE: AUGUST 28, 2019

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK, SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

Plotted Date: 8/29/2019

DESIGNER/DRAFTER: MV
CHECKED BY: SB
SCALE IN FEET 0 40 80
SCALE 1"=40'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\HW_MSH_155-171_PMT-10.dgn

SIGNATURE/ BLOCK:

PROJECT TITLE:
SAFETY AND OPERATIONAL IMPROVEMENTS ON I-84

TOWN: **WEST HARTFORD**

DRAWING TITLE: **LANDSCAPE PLAN**

PROJECT NO. **155-171**
DRAWING NO. **LDS-03**
SHEET NO. **10**

IWGP
Attachment H: Photographs

Applicant: Connecticut Department of Transportation
Project: State Project No. 155-171
Safety and Operational Improvements on I-84
Exit 39A to Exit 41
Town of West Hartford

Bridge Nos. 03486, 03489 & 03490
I-84 Eastbound over Woodruff Lane (Exit 39A)

I-84 Eastbound (between Exit 39A & Exit 40)

Bridge Nos. 01743A & 01743B
I-84 Eastbound over Ridgewwod Drive (Exit 40)

I-84 Eastbound (between Exit 40 & Exit 41)

Bridge Nos. 01744 and 01745

Bridge No. 01747
South Main Street over I-84 Eastbound (Exit 41)

Impact Area 1 (I-84 WB 75+00 LT)

Impact Area 2 (I-84 WB 78+50 LT)

Impact Area 3 (Ramp G 9+75 LT)

Impact Area 4 (I-84 WB 112+00 LT)

Impact Area 5 (I-84 WB 129+75 LT)

Impact Area 6 (I-84 WB 133+50 LT)

Impact Area 7 (I-84 EB 125+75 RT)

Impact Area 8 (I-84 EB 133+37 RT)

Impact Area 9 (Ramp C 39+25 RT)

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

5 September 2019

Regulatory Division
File Number: NAE-2019-02335

Kimberly Lesay
CT DOT I-84 Eastbound and Westbound
2800 Berlin Turnpike
Newington, CT 06131

Dear Ms. Lesay:

PROPOSED WORK/LOCATION: The Addition of one Travel Lane on I-84 Eastbound and Westbound, West Hartford, CT.

We have reviewed your proposal to perform work within Corps of Engineers jurisdiction. We have assigned this file number **NAE-2019-02335.** Please reference this number in any future correspondence with us.

Since your project may have only minimal individual and cumulative impacts on waters and wetlands of the United States, it is authorized by the Corps of Engineers under the Connecticut General Permits (GPs). This authorization does not obviate the need to obtain other federal, state, or local approvals. You are responsible for ensuring that the work meets the terms and conditions of the CT GPs. We have recorded this project as permittee self-verification of the CT GPs in our database.

Please contact me at (978) 318-8703 if you have any questions.

Sincerely,

Kevin R. Kotelly, P.E.
Chief, Permits & Enforcement Branch
Regulatory Division

cc:
CT DEEP, Chief, Land & Water Resources Division – via email

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

2800 BERLIN TURNPIKE, P.O. BOX 317546
NEWINGTON, CONNECTICUT 06131-7546
Phone:

September 3, 2019

Ms. Susan Lee
U.S. Army Corps of Engineers
New England District
696 Virginia Road
Concord, MA 01742-2751

Subject: State Project No. 155-171
I-84 Eastbound and Westbound (Exits 39A to 41)
Town of West Hartford

Dear Ms. Lee:

Enclosed please find one copy of the USACE Self-Verification Form for General Permit 18 Stream, River, and Brook Crossings for your review and approval. A copy has also been submitted to the Connecticut Department of Energy and Environmental Protection.

Any questions pertaining to this application may be directed to Mr. Andrew H. Davis, Transportation Supervising Planner of my staff, at 860-594-2157.

Very truly yours,

Kimberly C. Lesay
Transportation Planning Director
Bureau of Policy and Planning

Attachments
cc: Nathan Margason – USEPA

Ken S. Kittredge/ksk

bcc: Kimberly C. Lesay – Andrew H. Davis – Amanda M. Saul – Chris W. Samorajczyk
Gregory M. Dorosh – Susan M. Labatique – Nilesh Patel – Ahsan Saghir
Donald L. Ward (District 1)
Michael W. Dion (BL Companies)

US Army Corps of Engineers®
New England District

Appendix E: Self-Verification Notification Form

This form is required for all **non-tidal projects in Connecticut**, but **not** required if work is done within boundaries of Mashantucket Pequot or Mohegan Tribal Lands. **Before** work commences, complete **all** fields (write "none" if applicable); attach project plans (not required for projects involving the installation of construction mats only); and any state or local approval(s); and send to:

Permits & Enforcement Branch B
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751
or cenae-r@usace.army.mil

and

CT DEEP
Inland Water Resources Division
79 Elm Street
Hartford, CT 06106-5127

****

State or local Permit Number: _____
Date of State or local Permit: _____
State/local Project Manager: _____

Permittee: Connecticut Department of Transportation; Contact Person: Kimberly Lesay
Address, City, State & Zip: 2800 Berlin Turnpike, Newington, CT 06131
Phone(s) and Email: 860-594-2001; thomas.maziarz@ct.gov

Contractor: TBD by bid process.
Address, City, State & Zip: _____
Phone(s) and Email: _____

Consultant/Engineer/Designer: BL Companies; Contact Person: Michael W. Dion
Address, City, State & Zip: 355 Research Parkway, Meriden, CT 06450
Phone(s) and Email: 860-630-2416; mdion@blcompanies.com

Wetland/Soil Scientist Consultant: Wetlands delineated by ConnDOT
Address, City, State & Zip: _____
Phone(s) and Email: _____

Project Location (provide detailed description & locus map): _____
I-84 Eastbound and Westbound (Exit 39A to Exit 41).
Address, City, State & Zip: Town of West Hartford.
Latitude/Longitude Coordinates: Lat. 41.730900 / Long. -72.754359
Waterway Name: Rockledge Brook
Project Purpose (include all aspects of the project including those not within Corps jurisdiction):
This portion of I-84 is a heavily traveled corridor and the existing expressway does not have the capacity to convey current traffic volumes and needs to be improved to provide adequate traffic flow.
Work Description: This project includes the addition of one travel lane for approximately 9,500 feet along the westbound lanes and approximately 2,800 feet along the eastbound lanes. The shoulders will be brought up to current design standards. Bridges along this corridor will be widened to accommodate these improvements. Drainage improvements will include providing outlet protection and cleaning debris at the outlets.

Work will be done under the following GP(s) (check all that have associated impacts):

_____**GP. 2 - Repair or maintenance of authorized or grandfathered structures/fills**
Area of total wetland impacts: temporary _____SF permanent _____SF
Area of total waterway impacts: temporary _____SF permanent_____SF

_____**GP. 5 - Boat ramps/marine railways**
Area of total wetland impacts: temporary _____SF permanent _____SF
Area of total waterway impacts: temporary _____SF permanent_____SF

_____**GP. 6 - Utility line activities (include calculations for each single & complete crossing – attach additional sheet if necessary)**
Area of total wetland impacts: temporary _____SF permanent _____SF
Area of total waterway impacts: temporary _____SF permanent_____SF

_____**GP. 9 - Shoreline and bank stabilization projects**
Area of total wetland impacts: temporary _____SF permanent _____SF
Area of total waterway impacts: temporary _____SF permanent_____SF

_____**GP. 10 - Aquatic habitat restoration, establishment and enhancement activities**
Area of total wetland impacts: temporary _____SF permanent _____SF
Area of total waterway impacts: temporary _____SF permanent_____SF

_____**GP. 11 - Fish & wildlife harvesting, enhancement and attraction devices and activities**
Area of total wetland impacts: temporary _____SF permanent _____SF
Area of total waterway impacts: temporary _____SF permanent_____SF

_____**GP. 12 - Oil Spill and Hazardous material cleanup**
Area of total wetland impacts: temporary _____SF permanent _____SF
Area of total waterway impacts: temporary _____SF permanent_____SF

_____**GP. 13 - Cleanup of hazardous and toxic waste**
Area of total wetland impacts: temporary _____SF permanent _____SF
Area of total waterway impacts: temporary _____SF permanent_____SF

_____**GP. 14 - Scientific measurements devices**
Area of total wetland impacts: temporary _____SF permanent _____SF
Area of total waterway impacts: temporary _____SF permanent_____SF

_____**GP. 15 - Survey activities**
Area of total wetland impacts: temporary _____SF permanent _____SF
Area of total waterway impacts: temporary _____SF permanent_____SF

_____**GP. 17 - New/expanded developments & recreational facilities**
Area of total wetland impacts: temporary _____SF permanent _____SF
Area of total waterway impacts: temporary _____SF permanent_____SF

__X__ **GP. 18 - Linear transportation projects- wetland crossings only (include calculations for each single & complete crossing - attach additional sheet if necessary)**

Area of total wetland impacts: temporary 1,530 SF permanent 125 SF
Area of total waterway impacts: temporary 1,570 SF permanent 10 SF

_____ **GP. 19 - Stream, river & brook crossings – not including wetland crossings (include calculations for each single & complete crossing – attach additional sheet if necessary)**

Area of total wetland impacts: temporary _____ SF permanent _____ SF
Area of total waterway impacts: temporary _____ SF permanent _____ SF

_____ **GP. 21 - Temporary fill not associated with any other GP activities**

Area of total wetland impacts: temporary _____ SF permanent _____ SF
Area of total waterway impacts: temporary _____ SF permanent _____ SF

Does your project include any secondary effects? Yes _____ No X
(Secondary effects include, but are not limited to non-tidal waters or wetlands drained, flooded, fragmented, or mechanically cleared resulting from a single and complete project. See Appendix F - Definitions.) If YES, describe here: _____

Proposed Work Dates: Start: April 1, 2020 Finish: June 30, 2023

Your name/signature below, as permittee, confirms that your project meets the self-verification criteria and that you accept and agree to comply with the applicable terms and conditions in the Connecticut General Permits.

Thomas J Mazzarz
Signature of Permittee

9-3-2019
Date

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
Phone: (603) 223-2541 Fax: (603) 223-0104
http://www.fws.gov/newengland

In Reply Refer To:
Consultation Code: 05E1NE00-2019-TA-2756
Event Code: 05E1NE00-2019-E-07188
Project Name: CTDOT 155-171

September 03, 2019

Subject: Verification letter for the 'CTDOT 155-171' project under the January 5, 2016, Programmatic Biological Opinion on Final 4(d) Rule for the Northern Long-eared Bat and Activities Excepted from Take Prohibitions.

Dear Christopher Samorajczyk:

The U.S. Fish and Wildlife Service (Service) received on September 03, 2019 your effects determination for the 'CTDOT 155-171' (the Action) using the northern long-eared bat (*Myotis septentrionalis*) key within the Information for Planning and Consultation (IPaC) system. This IPaC key assists users in determining whether a Federal action is consistent with the activities analyzed in the Service's January 5, 2016, Programmatic Biological Opinion (PBO). The PBO addresses activities excepted from "take"[1] prohibitions applicable to the northern long-eared bat under the Endangered Species Act of 1973 (ESA) (87 Stat.884, as amended; 16 U.S.C. 1531 et seq.).

Based upon your IPaC submission, the Action is consistent with activities analyzed in the PBO. The Action may affect the northern long-eared bat; however, any take that may occur as a result of the Action is not prohibited under the ESA Section 4(d) rule adopted for this species at 50 CFR §17.40(o). Unless the Service advises you within 30 days of the date of this letter that your IPaC-assisted determination was incorrect, this letter verifies that the PBO satisfies and concludes your responsibilities for this Action under ESA Section 7(a)(2) with respect to the northern long-eared bat.

Please report to our office any changes to the information about the Action that you submitted in IPaC, the results of any bat surveys conducted in the Action area, and any dead, injured, or sick northern long-eared bats that are found during Action implementation. If the Action is not completed within one year of the date of this letter, you must update and resubmit the information required in the IPaC key.

If the Action may affect other federally listed species besides the northern long-eared bat, a proposed species, and/or designated critical habitat, additional consultation between you and this Service office is required. If the Action may disturb bald or golden eagles, additional coordination with the Service under the Bald and Golden Eagle Protection Act is recommended.

---

[1]Take means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct [ESA Section 3(19)].

Action Description
You provided to IPaC the following name and description for the subject Action.

1. Name

CTDOT 155-171

2. Description

The following description was provided for the project 'CTDOT 155-171':

safety and operational improvements along I-84 in West Hartford, CT

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/41.737214704339166N72.74000097737341W

Determination Key Result

This Federal Action may affect the northern long-eared bat in a manner consistent with the description of activities addressed by the Service's PBO dated January 5, 2016. Any taking that may occur incidental to this Action is not prohibited under the final 4(d) rule at 50 CFR §17.40(o). Therefore, the PBO satisfies your responsibilities for this Action under ESA Section 7(a)(2) relative to the northern long-eared bat.

Determination Key Description: Northern Long-eared Bat 4(d) Rule

This key was last updated in IPaC on May 15, 2017. Keys are subject to periodic revision.

This key is intended for actions that may affect the threatened northern long-eared bat.

The purpose of the key for Federal actions is to assist determinations as to whether proposed actions are consistent with those analyzed in the Service's PBO dated January 5, 2016.

Federal actions that may cause prohibited take of northern long-eared bats, affect ESA-listed species other than the northern long-eared bat, or affect any designated critical habitat, require ESA Section 7(a)(2) consultation in addition to the use of this key. Federal actions that may affect species proposed for listing or critical habitat proposed for designation may require a conference under ESA Section 7(a)(4).

Determination Key Result

This project may affect the threatened Northern long-eared bat; therefore, consultation with the Service pursuant to Section 7(a)(2) of the Endangered Species Act of 1973 (87 Stat.884, as amended; 16 U.S.C. 1531 et seq.) is required. However, based on the information you provided, this project may rely on the Service's January 5, 2016, *Programmatic Biological Opinion on Final 4(d) Rule for the Northern Long-Eared Bat and Activities Excepted from Take Prohibitions* to fulfill its Section 7(a)(2) consultation obligation.

Qualification Interview

1. Is the action authorized, funded, or being carried out by a Federal agency?

   Yes

2. Have you determined that the proposed action will have "no effect" on the northern long-eared bat? (If you are unsure select "No")

   No

3. Will your activity purposefully **Take** northern long-eared bats?

   No

4. Is the project action area located wholly outside the White-nose Syndrome Zone?

   Automatically answered
   No

5. Have you contacted the appropriate agency to determine if your project is near a known hibernaculum or maternity roost tree?

   Location information for northern long-eared bat hibernacula is generally kept in state Natural Heritage Inventory databases – the availability of this data varies state-by-state. Many states provide online access to their data, either directly by providing maps or by providing the opportunity to make a data request. In some cases, to protect those resources, access to the information may be limited. A web page with links to state Natural Heritage Inventory databases is available at www.fws.gov/midwest/endangered/mammals/nleb/nhisites.html.

   Yes

6. Will the action affect a cave or mine where northern long-eared bats are known to hibernate (i.e., hibernaculum) or could it alter the entrance or the environment (physical or other alteration) of a hibernaculum?

   No

7. Will the action involve Tree Removal?
   Yes

8. Will the action only remove hazardous trees for the protection of human life or property?
   Yes

Project Questionnaire

If the project includes forest conversion, report the appropriate acreages below. Otherwise, type '0' in questions 1-3.

1. Estimated total acres of forest conversion:

0

2. If known, estimated acres of forest conversion from April 1 to October 31

0

3. If known, estimated acres of forest conversion from June 1 to July 31

0

If the project includes timber harvest, report the appropriate acreages below. Otherwise, type '0' in questions 4-6.

4. Estimated total acres of timber harvest

0

5. If known, estimated acres of timber harvest from April 1 to October 31

0

6. If known, estimated acres of timber harvest from June 1 to July 31

0

If the project includes prescribed fire, report the appropriate acreages below. Otherwise, type '0' in questions 7-9.

7. Estimated total acres of prescribed fire

0

8. If known, estimated acres of prescribed fire from April 1 to October 31

0

9. If known, estimated acres of prescribed fire from June 1 to July 31

0

If the project includes new wind turbines, report the megawatts of wind capacity below. Otherwise, type '0' in question 10.

10. What is the estimated wind capacity (in megawatts) of the new turbine(s)?

0

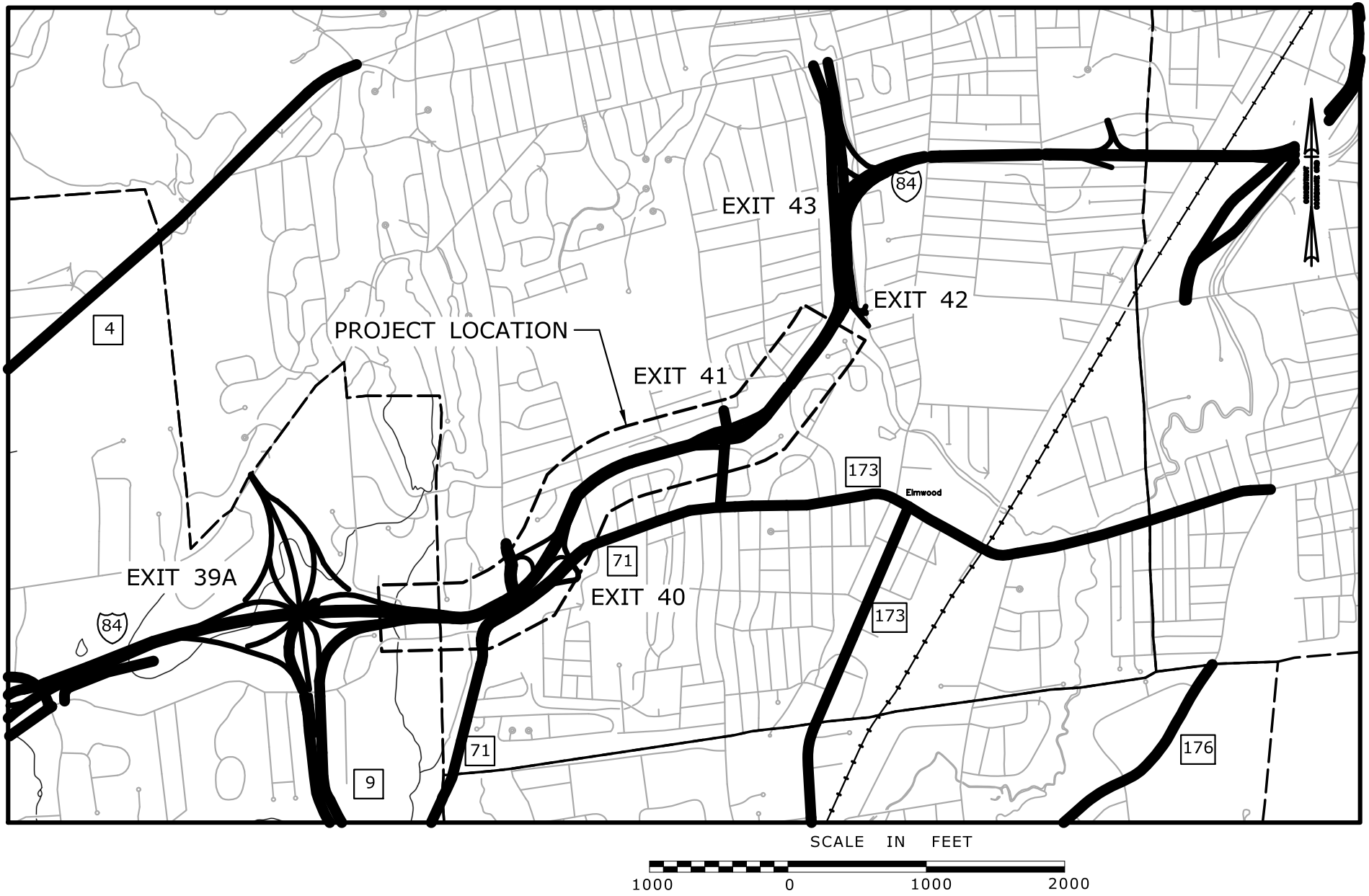


FIGURE 1 - LOCATION MAP

STATE PROJECT NO.:
0155-0171

CITY/TOWN:
WEST HARTFORD

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

I-84 SAFETY AND OPERATIONAL IMPROVEMENTS

BL Companies
ARCHITECTURE
ENGINEERING
ENVIRONMENTAL
LAND SURVEYING

DATE:
FEBRUARY
2019

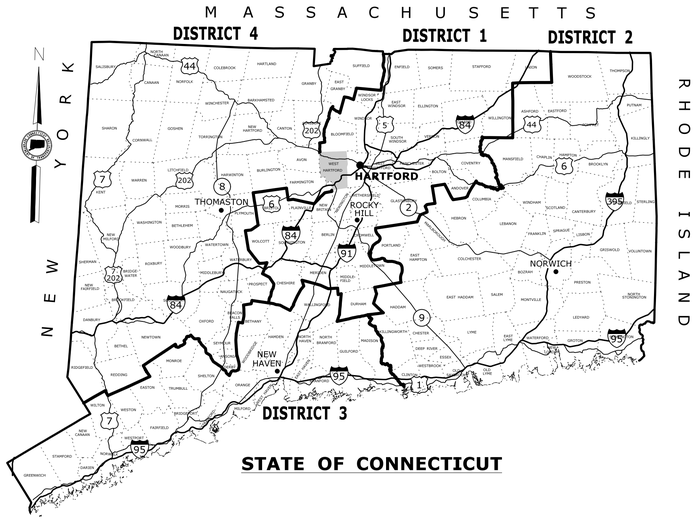
LOC-01

ACOE: Index of Permit Plan Sheets

Applicant: Connecticut Department of Transportation
Project: State Project No. 155-171
Safety and Operational Improvements on I-84
Exit 39A to Exit 41
Town of West Hartford

Drawing No.	Drawing Title
PMT-01	Title Sheet
PMT-02 to PMT-06	General Site Plans Impact Areas
PMT-07	Miscellaneous Details
PMT-08	Elev. & Wall Details
PMT-09 TO PMT-10	Landscape Plans

ENVIRONMENTAL PERMIT PLANS
STATE PROJECT 155-171
SAFETY AND OPERATIONAL IMPROVEMENTS ON I-84



STATE OF CONNECTICUT

GENERAL NOTES:

1. THESE PLANS ARE INTENDED ONLY FOR ENVIRONMENTAL PERMITTING PURPOSES. THESE PLANS HOLD AUTHORITY FOR ALL ACTIVITIES CONCERNING THE REGULATED AREA. FOR DETAILED PLANIMETRIC INFORMATION AND PAYMENT REFER TO THE APPLICABLE CONTRACT DOCUMENTS.

2. THE DEPARTMENT OF TRANSPORTATION WILL ONLY SUBMIT REVISIONS TO DEEP AND USACE FOR CHANGES TO THE DESIGN THAT WILL AFFECT REGULATED AREAS.

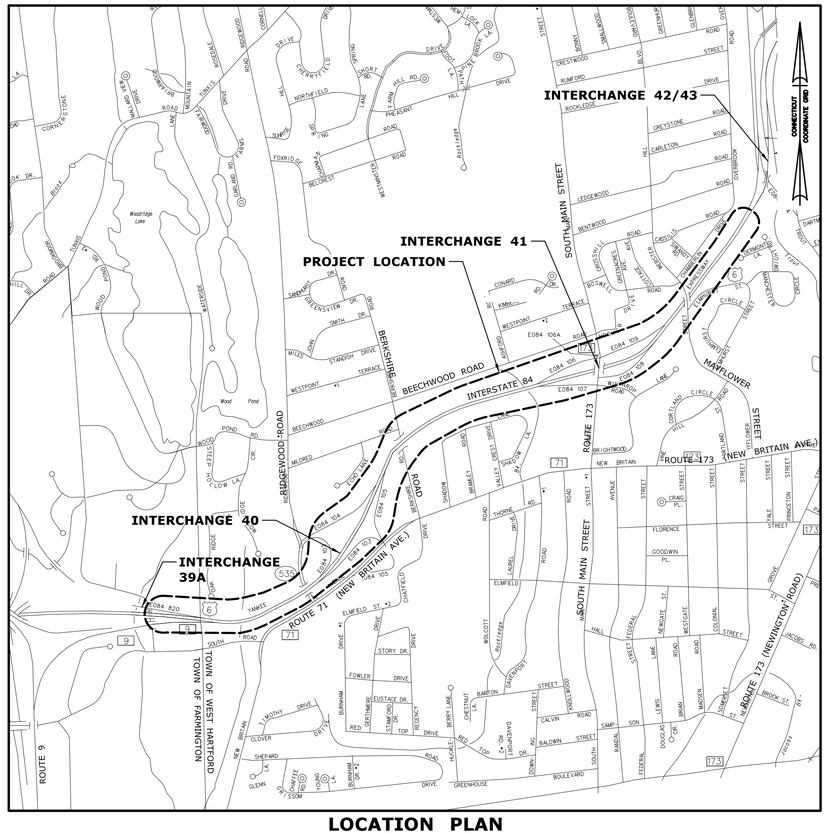
3. FOR A DESCRIPTION OF THE WATERCOURSES, WETLANDS, AND WETLAND SOILS SEE RELEVENT SECTIONS OF THE PERMIT APPLICATION.

4. 400 FOOT GRID BASED ON CONNECTICUT COORIDATE SYSTEM N.A.D. 1983 VERTICAL DATUM BASED ON NGVD OF 1929.

5. ALL CONSTRUCTION ACTIVITIES WILL BE CONDUCTED IN ACCORDANCE WITH THE DEPARTMENTS STANDARD SPECIFICATIONS FOR ROADS, BRIDGES, AND INCIDENTAL CONSTRUCTION, FORM 817, SECTION 1.10 AND WILL ALSO FOLLOW REQUIRED BEST MANAGEMENT PRACTICES (BMPs) AND SEDIMENT AND EROSION CONTROL MEASURES IN ACCORDANCE WITH THE 2002 EROSION & SEDIMENTATION CONTROL GUIDELINES AND THE 2004 STORMWATER QUALITY MANUAL.

LIST OF DRAWINGS

DRAWING NO.	DRAWING TITLE
PMT-01	TITLE SHEET
PMT-02 TO PMT-06	GENERAL SITE PLANS IMPACT AREAS
PMT-07	MISCELLANEOUS DETAIL SHEET
PMT-08	I-84 OVER ROCKLEDGE BR. ELEV. & WALL DETAILS
PMT-809 TO PMT-10	LANDSCAPE PLANS



LOCATION PLAN
SCALE: 1" = 1000'

DESIGNED BY:

BL Companies

BL COMPANIES, INC.
355 RESEARCH PARKWAY
MERIDEN, CT 06450

STATE OF CONNECTICUT
RUSSELL W. BOLLE
No. 22758
LICENSED PROFESSIONAL ENGINEER

PERMITTING PLAN SET

PLAN DATE: AUGUST 28, 2019

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK, SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

Plotted Date: 8/29/2019

DESIGNER/DRAFTER: JE
CHECKED BY: MF
SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\HW_MSH_155-171_PMT-01.dgn

SIGNATURE/ BLOCK:

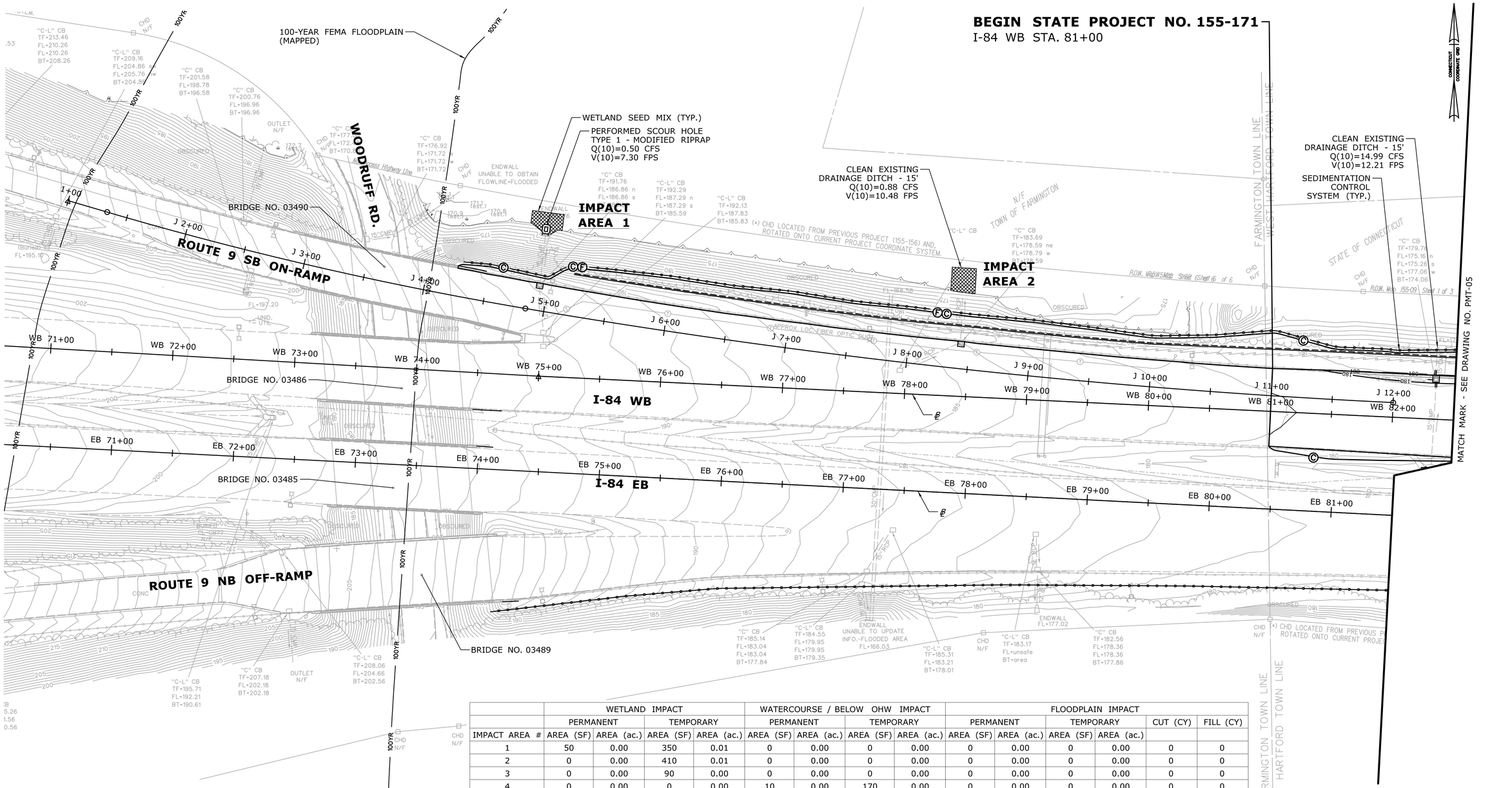
STATE OF CONNECTICUT RUSSELL W. BOLLE No. 22758 LICENSED PROFESSIONAL ENGINEER

PROJECT TITLE:
SAFETY AND OPERATIONAL IMPROVEMENTS ON I-84

TOWN: **WEST HARTFORD**

DRAWING TITLE: **TITLE SHEET**

PROJECT NO. **155-171**
DRAWING NO. **PMT-01**
SHEET NO. **1**



	WETLAND IMPACT				WATERCOURSE / BELOW OHW IMPACT				FLOODPLAIN IMPACT					
	PERMANENT		TEMPORARY		PERMANENT		TEMPORARY		PERMANENT		TEMPORARY		CUT (CY)	FILL (CY)
IMPACT AREA #	AREA (SF)	AREA (ac.)	AREA (SF)	AREA (ac.)	AREA (SF)	AREA (ac.)	AREA (SF)	AREA (ac.)	AREA (SF)	AREA (ac.)	AREA (SF)	AREA (ac.)		
1	50	0.00	350	0.01	0	0.00	0	0.00	0	0.00	0	0.00	0	0
2	0	0.00	410	0.01	0	0.00	0	0.00	0	0.00	0	0.00	0	0
3	0	0.00	90	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0
4	0	0.00	0	0.00	10	0.00	170	0.00	0	0.00	0	0.00	0	0
5	75	0.00	460	0.01	0	0.00	0	0.00	75	0.00	640	0.01	15	6
6	0	0.00	0	0.00	0	0.00	10	0.00	50	0.00	530	0.01	12	3
7	0	0.00	0	0.00	0	0.00	0	0.00	30	0.00	110	0.00	5	2
8	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	510	0.01	5	0
9	0	0.00	120	0.00	0	0.00	730	0.02	0	0.00	900	0.02	0	0
10	0	0.00	100	0.00	0	0.00	660	0.02	0	0.00	760	0.02	0	0
11	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	190	0.00	3	0
TOTAL	125	0.00	1530	0.04	10	0.00	1570	0.00	155	0.00	3640	0.08	40	11

LEGEND
- WETLAND LIMITS
- OHW/WATERCOURSE LIMITS
- 100YR – FEMA 100-YEAR FLOOD (MAPPED)
- CUT LIMITS
- FILL LIMITS
- SEDIMENTATION CONTROL SYSTEM
- WETLAND SEED MIX

PERMITTING PLAN SET

PLAN DATE: AUGUST 28, 2019

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

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Plotted Date: 8/29/2019

DESIGNER/DRAFTER: JE
CHECKED BY: MF
SCALE IN FEET
0 40 80
SCALE 1"=40'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\HW_MSH_155-171_PMT-02.dgn

SIGNATURE/ BLOCK:

STATE OF CONNECTICUT · MICHAEL W. ROSSI · No. 22709 · LICENSED PROFESSIONAL ENGINEER

PROJECT TITLE:
SAFETY AND OPERATIONAL IMPROVEMENTS ON I-84

TOWN: **WEST HARTFORD**

DRAWING TITLE:
GENERAL SITE PLAN IMPACT AREAS

PROJECT NO. **155-171**
DRAWING NO. **PMT-02**
SHEET NO. **2**

LIMIT OF MILL AND OVERLAY
CLEAN EXISTING DRAINAGE DITCH - 15'
CLEAN EXISTING DRAINAGE DITCH - 15' Q(10)=0.17 CFS V(10)=5.04 FPS
PREFORMED SCOUR HOLE TYPE 1 - MODIFIED RIPRAP Q(10)=1.39 CFS V(10)=10.16 FPS
TYPE "C" CB
REMOVE DRAINAGE STRUCTURE
CLEAN EXISTING DRAINAGE DITCH - 15' Q(10)=0.00 CFS V(10)=0.00 FPS
REMOVE DRAINAGE STRUCTURE
TYPE "C-L" CB
SEDIMENTATION CONTROL SYSTEM (TYP.)
BRIDGE NO. 01743B
RIDGEWOOD RD
IMPACT AREA 3
WETLAND SEED MIX
PREFORMED SCOUR HOLE TYPE 1 - MODIFIED RIPRAP Q(10)=3.39 CFS V(10)=21.18 FPS
TYPE "C-L" CATCH BASIN TOP
RAMP G
RAMP B
TYPE "C-M" CB
PREFORMED SCOUR HOLE TYPE 1 - MODIFIED RIPRAP Q(10)=6.43 CFS V(10)=12.76 FPS
TYPE "C-L" CB (4' SUMP)
CLEAN EXISTING DRAINAGE DITCH - 15' Q(10)=0.00 CFS V(10)=0.00 FPS
TYPE "C-L" CATCH BASIN TOP
I-84 WB
I-84 EB
RAMP H
REMOVE DRAINAGE STRUCTURE
TYPE "C" CB
TYPE "C" CB
TYPE "C-M" CB
TYPE "C-M" CB
TYPE "C" CB
MATCH MARK - SEE DRAWING NO. PMT-06
MATCH MARK - SEE DRAWING NO. PMT-07
BEGIN STATE PROJECT NO. 155-171
I-84 EB STA. 100+00
NEW BRITAIN AVE
LEGEND
WETLAND LIMITS
OHW/WATERCOURSE LIMITS
100YR - FEMA 100-YEAR FLOOD (CALCULATED)
CUT LIMITS
FILL LIMITS
SEDIMENTATION CONTROL SYSTEM
WETLAND SEED MIX
PERMITTING PLAN SET
PLAN DATE: AUGUST 28, 2019

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

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Plotted Date: 8/29/2019

DESIGNER/DRAFTER: JE
CHECKED BY: MF
SCALE IN FEET 0 40 80
SCALE 1"=40'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\HW_MSH_155-171_PMT-03.dgn

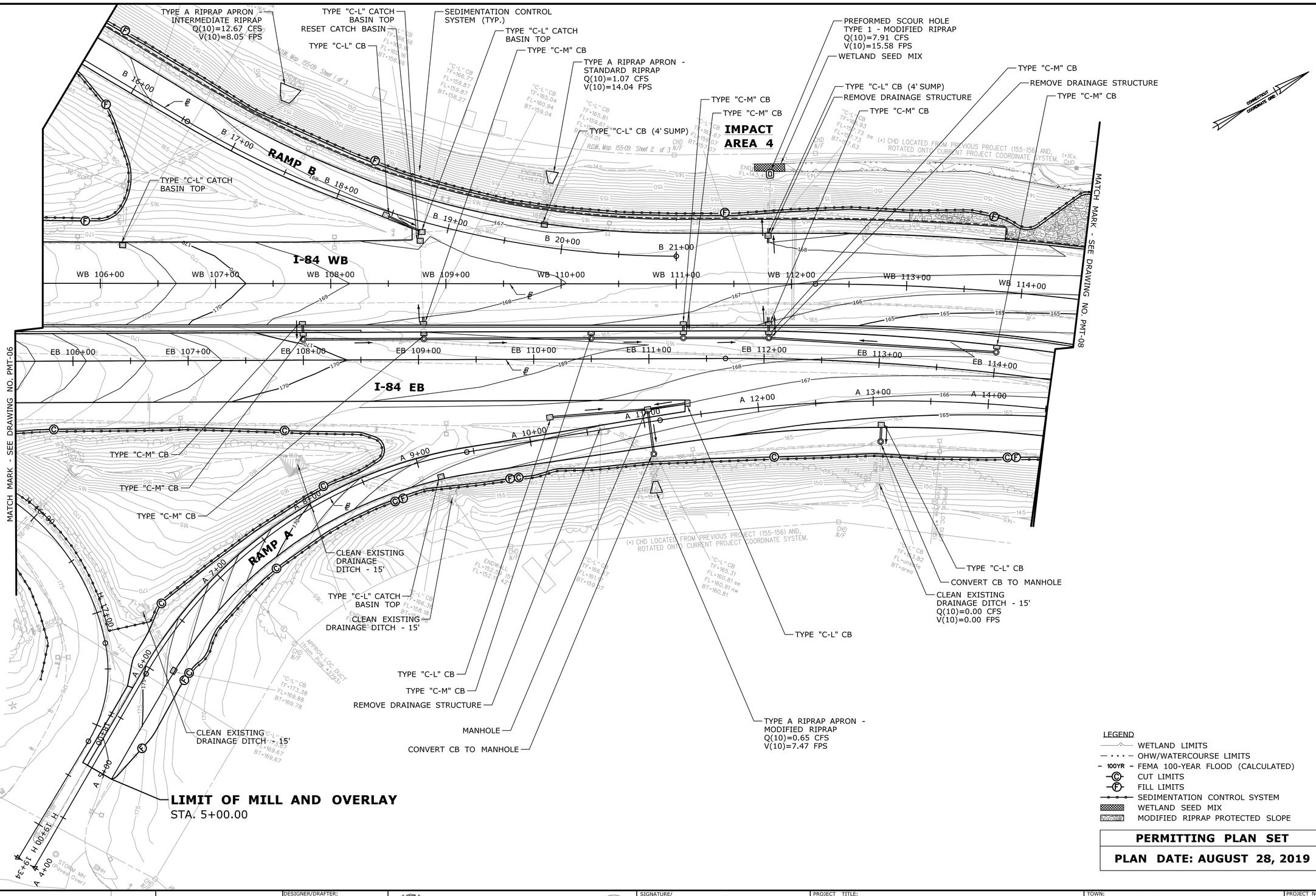
SIGNATURE/BLOCK:

PROJECT TITLE:
SAFETY AND OPERATIONAL IMPROVEMENTS ON I-84

TOWN: WEST HARTFORD

DRAWING TITLE: GENERAL SITE PLAN IMPACT AREAS

PROJECT NO. 155-171
DRAWING NO. PMT-03
SHEET NO. 3



LEGEND

- WETLAND LIMITS
- OHW/WATERCOURSE LIMITS
- 100YR – FEMA 100-YEAR FLOOD (CALCULATED)
- (C) CUT LIMITS
- (F) FILL LIMITS
- SEDIMENTATION CONTROL SYSTEM
- WETLAND SEED MIX
- MODIFIED RIPRAP PROTECTED SLOPE

PERMITTING PLAN SET

PLAN DATE: AUGUST 28, 2019

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

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Plotted Date: 8/29/2019

DESIGNER/DRAFTER: JE

CHECKED BY: MF

SCALE IN FEET 0 40 80

SCALE 1"=40'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\HW_MSH_155-171_PMT-04.dgn

SIGNATURE/ BLOCK:

C :TURE RING MENTAL VEYING

PROJECT TITLE:

SAFETY AND OPERATIONAL IMPROVEMENTS ON I-84

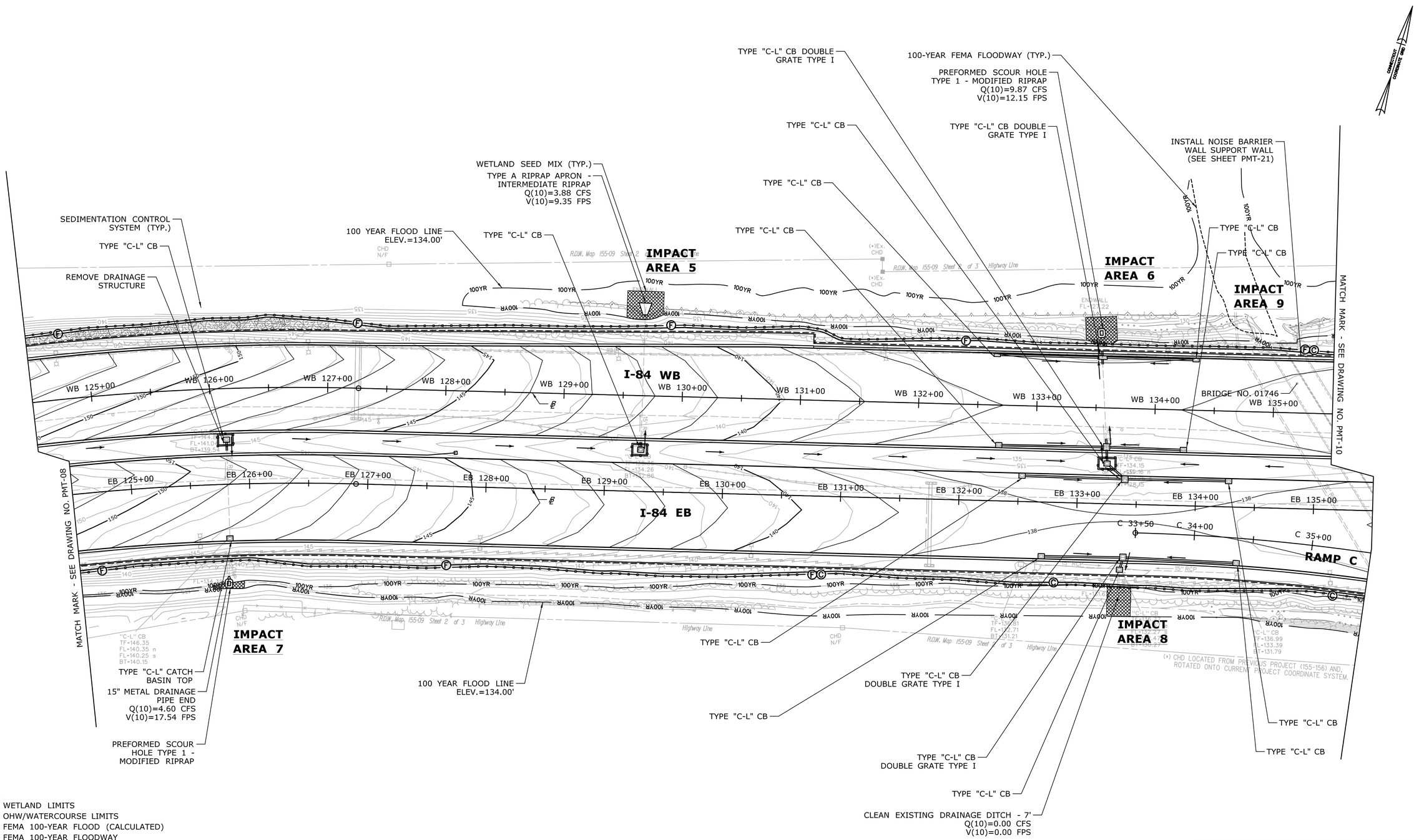
TOWN: **WEST HARTFORD**

DRAWING TITLE: **GENERAL SITE PLAN IMPACT AREAS**

PROJECT NO. **155-171**

DRAWING NO. **PMT-04**

SHEET NO. **4**



LEGEND

- WETLAND LIMITS
- OHW/WATERCOURSE LIMITS
- 100YR - FEMA 100-YEAR FLOOD (CALCULATED)
- FEMA 100-YEAR FLOODWAY
- Ⓒ CUT LIMITS
- Ⓕ FILL LIMITS
- SEDIMENTATION CONTROL SYSTEM
- WETLAND SEED MIX
- MODIFIED RIPRAP PROTECTED SLOPE

PERMITTING PLAN SET

PLAN DATE: AUGUST 28, 2019

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

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Plotted Date: 8/29/2019

DESIGNER/DRAFTER: JE

CHECKED BY: MF

SCALE IN FEET 0 40 80

SCALE 1"=40'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\HW_MSH_155-171_PMT-05.dgn

SIGNATURE/ BLOCK:

STATE OF CONNECTICUT MICHAEL W. WOOD No. 22709 LICENSED PROFESSIONAL ENGINEER

PROJECT TITLE:

SAFETY AND OPERATIONAL IMPROVEMENTS ON I-84

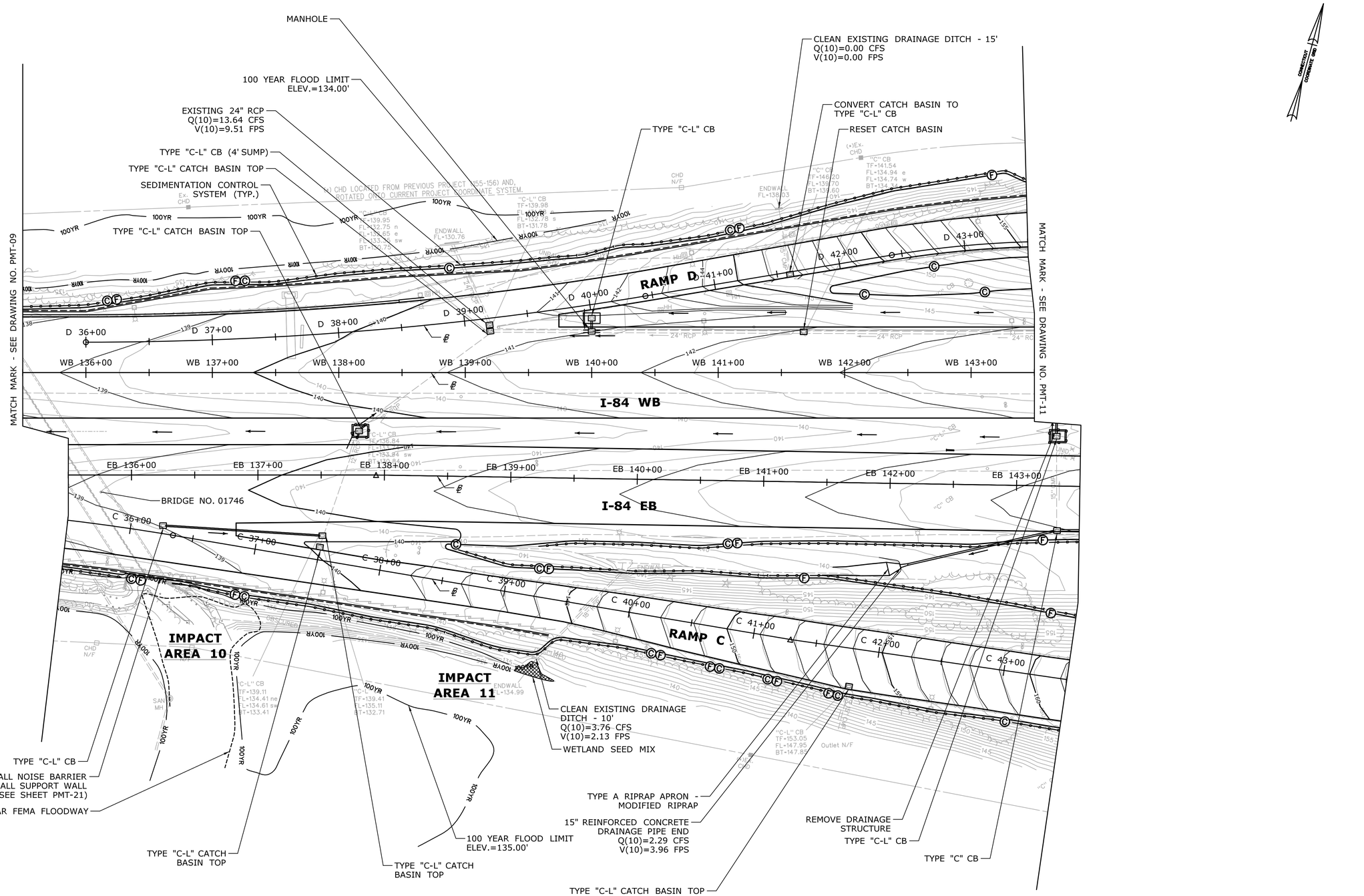
TOWN: **WEST HARTFORD**

DRAWING TITLE: **GENERAL SITE PLAN IMPACT AREAS**

PROJECT NO. **155-171**

DRAWING NO. **PMT-05**

SHEET NO. **5**



LEGEND

- WETLAND LIMITS
- OHW/WATERCOURSE LIMITS
- 100YR – FEMA 100-YEAR FLOOD (CALCULATED)
- FEMA 100-YEAR FLOODWAY
- (C) CUT LIMITS
- (F) FILL LIMITS
- SEDIMENTATION CONTROL SYSTEM
- WETLAND SEED MIX

PERMITTING PLAN SET

PLAN DATE: AUGUST 28, 2019

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

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Plotted Date: 8/29/2019

DESIGNER/DRAFTER: JE

CHECKED BY: MF

SCALE IN FEET 0 40 80

SCALE 1"=40'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\HW_MSH_155-171_PMT-06.dgn

SIGNATURE/ BLOCK:

STATE OF CONNECTICUT · MICHAEL W. FINN · No. 22709 · REGISTERED PROFESSIONAL ENGINEER

PROJECT TITLE:

SAFETY AND OPERATIONAL IMPROVEMENTS ON I-84

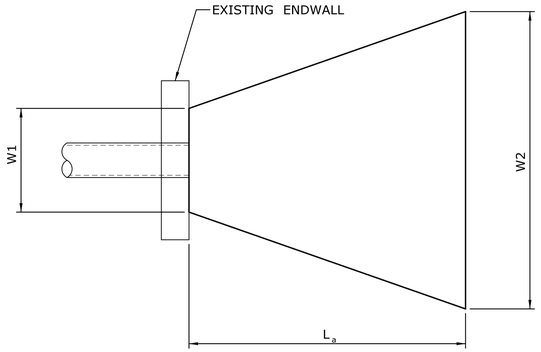
TOWN: **WEST HARTFORD**

DRAWING TITLE: **GENERAL SITE PLAN IMPACT AREAS**

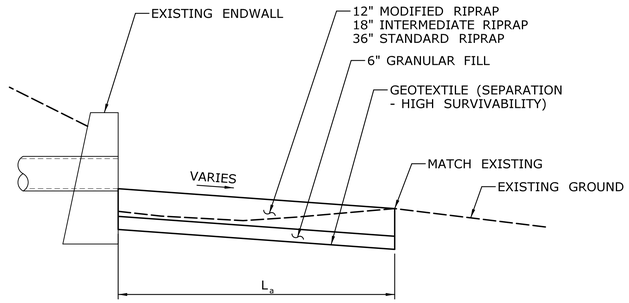
PROJECT NO. **155-171**

DRAWING NO. **PMT-06**

SHEET NO. **6**



PLAN

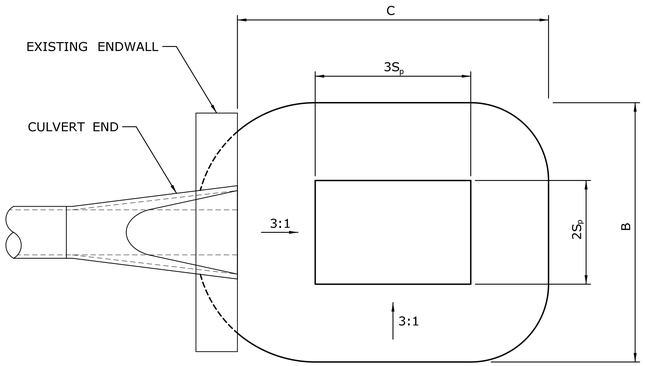


ELEVATION

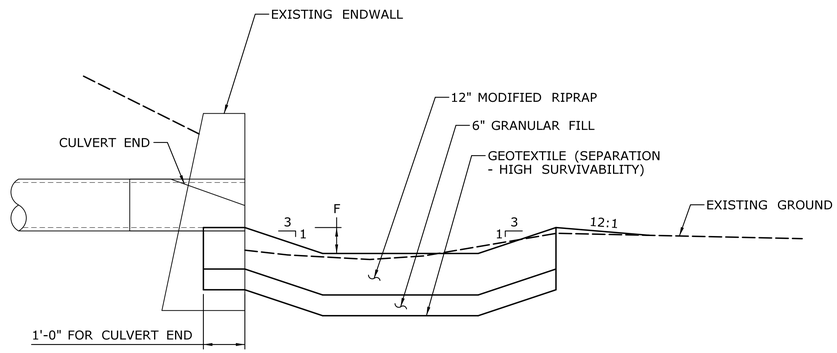
TYPE A RIPRAP APRON TABLE				
OUTLET LOCATION	RIPRAP TYPE	L_a (FT)	W1 (FT)	W2 (FT)
B 17+25 LT	INTERMEDIATE	14	9	18.8
B 19+80 LT	STANDARD	10	3.75	10.75
A 11+00 RT	MODIFIED	10	3.75	10.75
EB 117+50 RT	STANDARD	10	3	10
WB 129+60 LT	INTERMEDIATE	10	3.75	10.75
EB 142+00 RT	MODIFIED	10	3.75	10.75

TYPE A RIPRAP APRON

(N.T.S.)



PLAN



ELEVATION

PREFORMED SCOUR HOLE TYPE 1 TABLE					
PIPE SIZE	C (FT)	B (FT)	$3S_p$ (FT)	$2S_p$ (FT)	F (FT)
15"	7.5	6.25	3.75	2.5	0.625
24"	12	10	6	4	1

PREFORMED SCOUR HOLE TYPE 1

(N.T.S.)

PERMITTING PLAN SET

PLAN DATE: AUGUST 28, 2019

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

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Plotted Date: 8/29/2019

DESIGNER/DRAFTER: JE

CHECKED BY: MF

SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\HW_MSH_155-171_PMT-07.dgn

SIGNATURE/ BLOCK:

STATE OF CONNECTICUT · BRIDGET W. DOWD · NO. 32705 · LICENSED PROFESSIONAL ENGINEER

PROJECT TITLE:
SAFETY AND OPERATIONAL IMPROVEMENTS ON I-84

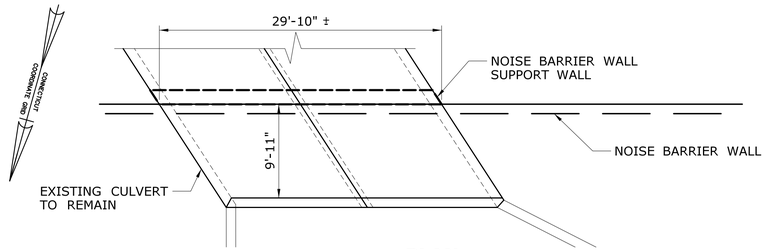
TOWN: **WEST HARTFORD**

DRAWING TITLE: **MISCELLANEOUS DETAIL SHEET**

PROJECT NO. **155-171**

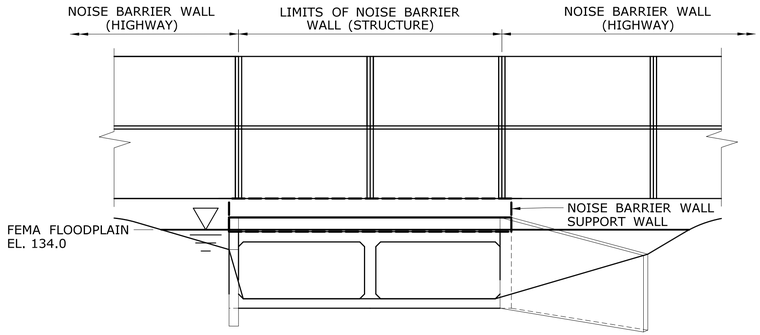
DRAWING NO. **PMT-07**

SHEET NO. **7**



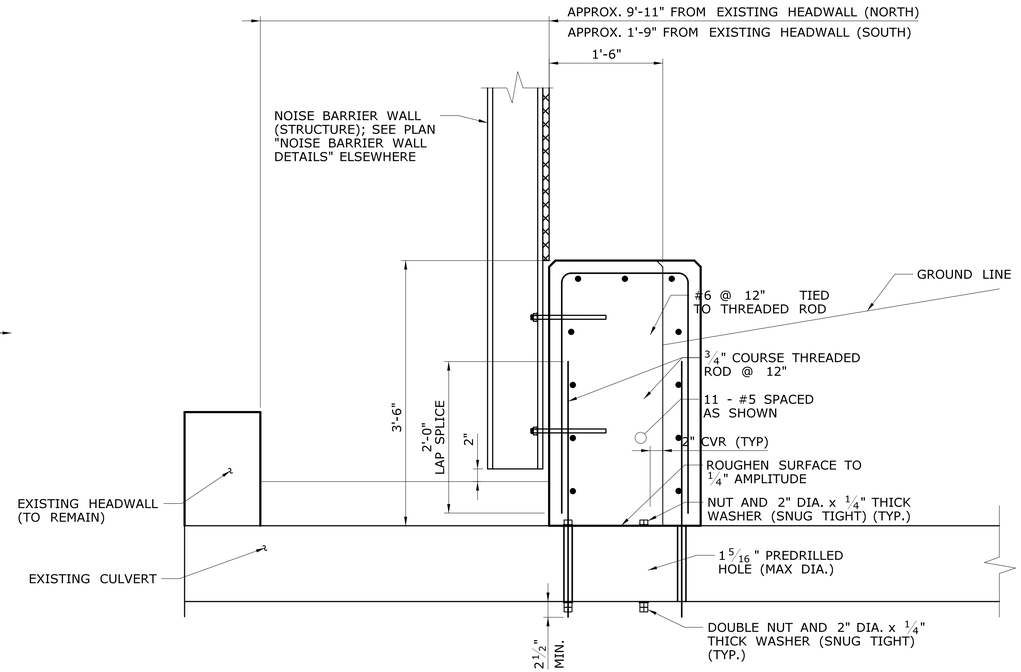
PLAN

SCALE: 1/8" = 1'



NORTH ELEVATION

SCALE: 1/8" = 1'

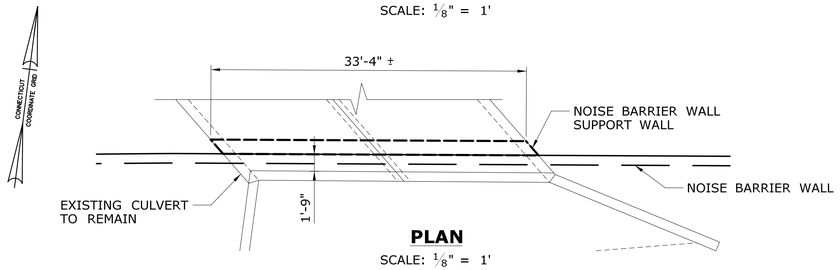


NOISE BARRIER WALL SUPPORT WALL DETAIL

SCALE: 1" = 1'-0"

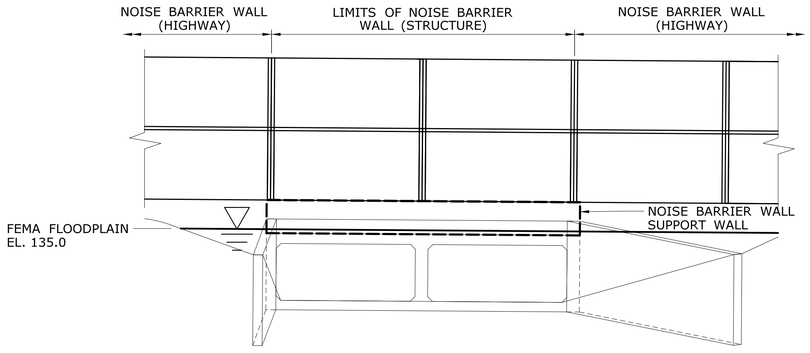
NOTES

1. THREADED RODS SHALL CONFORM TO THE REQUIREMENTS OF ASTM F1554 GRADE 55. ALL COMPONENTS OF THE BOLT ASSEMBLY SHALL BE GALVANIZED IN CONFORMANCE WITH ASTM A153 AND SHALL BE PAID FOR UNDER "DEFORMED STEEL BARS - GALVANIZED".
2. WASHERS SHALL BE GALVANIZED AND CONFORM TO ASTM A572 GRADE 55.
3. NUTS SHALL BE GALVANIZED AND CONFORM TO ASTM A563 DH.
4. DIMENSIONS SHOWN ARE BASED ON ORIGINAL DESIGN DRAWINGS AND ARE TO BE CONSIDERED APPROXIMATE. ALL DIMENSIONS SHALL BE FIELD VERIFIED BY THE CONTRACTOR.
5. COST TO PREDRILL 1 5/16" HOLE TO BE PAID FOR UNDER THE ITEM "DRILLING HOLES AND GROUTING DOWELS".



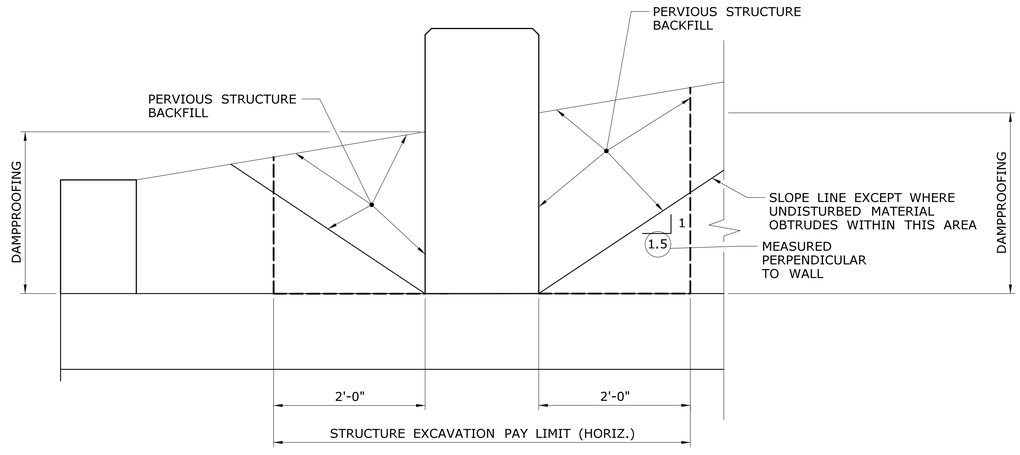
PLAN

SCALE: 1/8" = 1'



SOUTH ELEVATION

SCALE: 1/8" = 1'



NOISE BARRIER WALL SUPPORT WALL PAY LIMITS

SCALE: 1" = 1'-0"

PERMITTING PLAN SET

PLAN DATE: AUGUST 28, 2019

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

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Plotted Date: 8/29/2019

DESIGNER/DRAFTER: MW

CHECKED BY: CP

SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\HW_MSH_155-171_PMT-08.dgn

SIGNATURE/ BLOCK:

-TURE
RING
MENTAL
VEYING

PROJECT TITLE:
SAFETY AND OPERATIONAL IMPROVEMENTS ON I-84

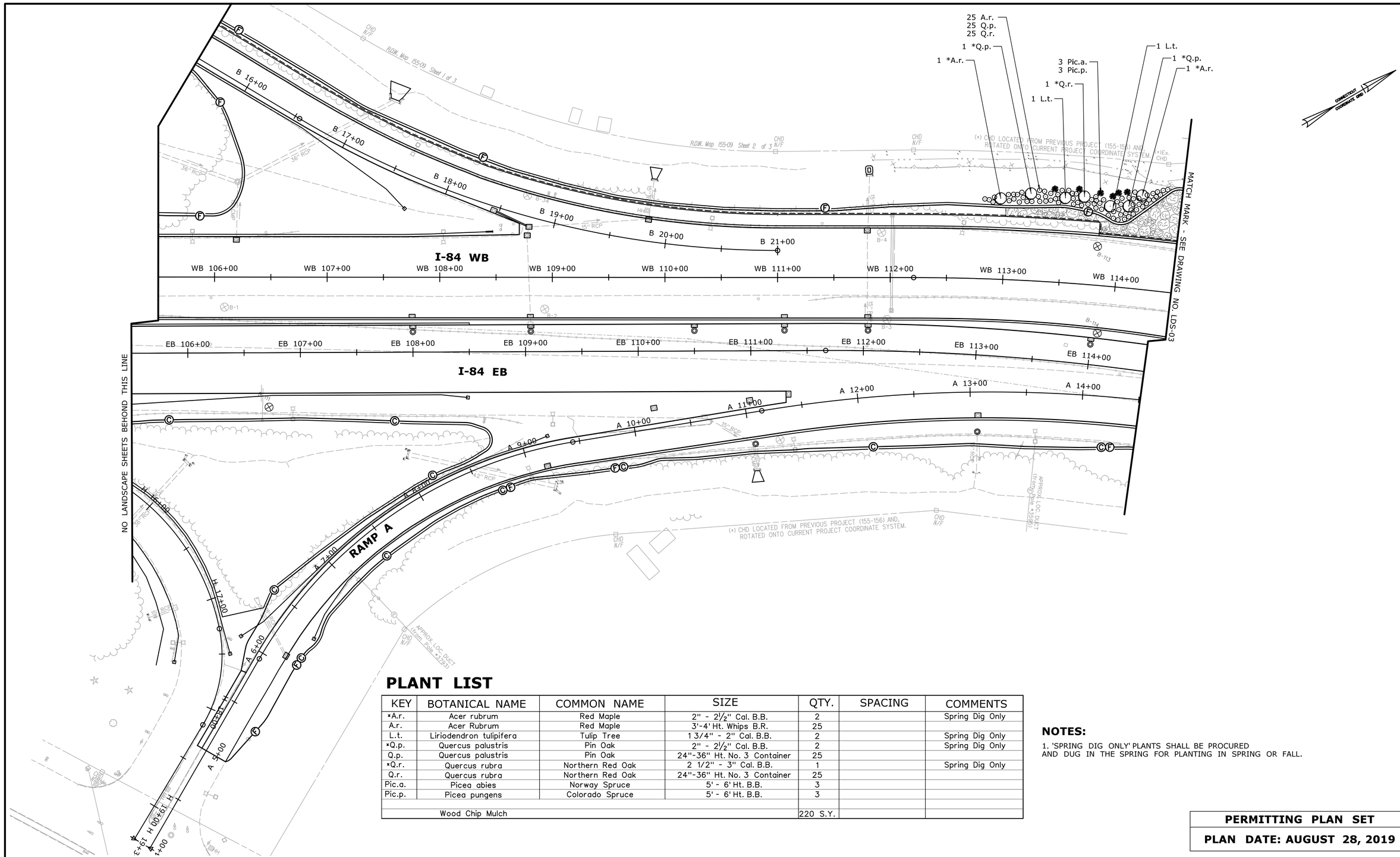
TOWN: **WEST HARTFORD**

DRAWING TITLE:
I-84 OVER ROCKLEDGE BR. ELEV. & WALL DETAILS

PROJECT NO. **155-171**

DRAWING NO. **PMT-08**

SHEET NO. **8**



PLANT LIST

KEY	BOTANICAL NAME	COMMON NAME	SIZE	QTY.	SPACING	COMMENTS
*A.r.	Acer rubrum	Red Maple	2" - 2½" Cal. B.B.	2		Spring Dig Only
A.r.	Acer Rubrum	Red Maple	3'-4' Ht. Whips B.R.	25		
L.t.	Liriodendron tulipifera	Tulip Tree	1 3/4" - 2" Cal. B.B.	2		Spring Dig Only
*Q.p.	Quercus palustris	Pin Oak	2" - 2½" Cal. B.B.	2		Spring Dig Only
Q.p.	Quercus palustris	Pin Oak	24"-36" Ht. No. 3 Container	25		
*Q.r.	Quercus rubra	Northern Red Oak	2 1/2" - 3" Cal. B.B.	1		Spring Dig Only
Q.r.	Quercus rubra	Northern Red Oak	24"-36" Ht. No. 3 Container	25		
Pic.a.	Picea abies	Norway Spruce	5' - 6' Ht. B.B.	3		
Pic.p.	Picea pungens	Colorado Spruce	5' - 6' Ht. B.B.	3		
	Wood Chip Mulch			220 S.Y.		

NOTES:

1. 'SPRING DIG ONLY' PLANTS SHALL BE PROCURED AND DUG IN THE SPRING FOR PLANTING IN SPRING OR FALL.

PERMITTING PLAN SET

PLAN DATE: AUGUST 28, 2019

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

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Plotted Date: 8/29/2019

DESIGNER/DRAFTER: MV

CHECKED BY: SB

SCALE IN FEET
0 40 80
SCALE 1"=40'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\HW_MSH_155-171_PMT-09.dgn

SIGNATURE/ BLOCK:

STATE OF CONNECTICUT · MICHAEL W. ROSSI · NO. 22755 · LICENSED PROFESSIONAL ENGINEER

PROJECT TITLE:
SAFETY AND OPERATIONAL IMPROVEMENTS ON I-84

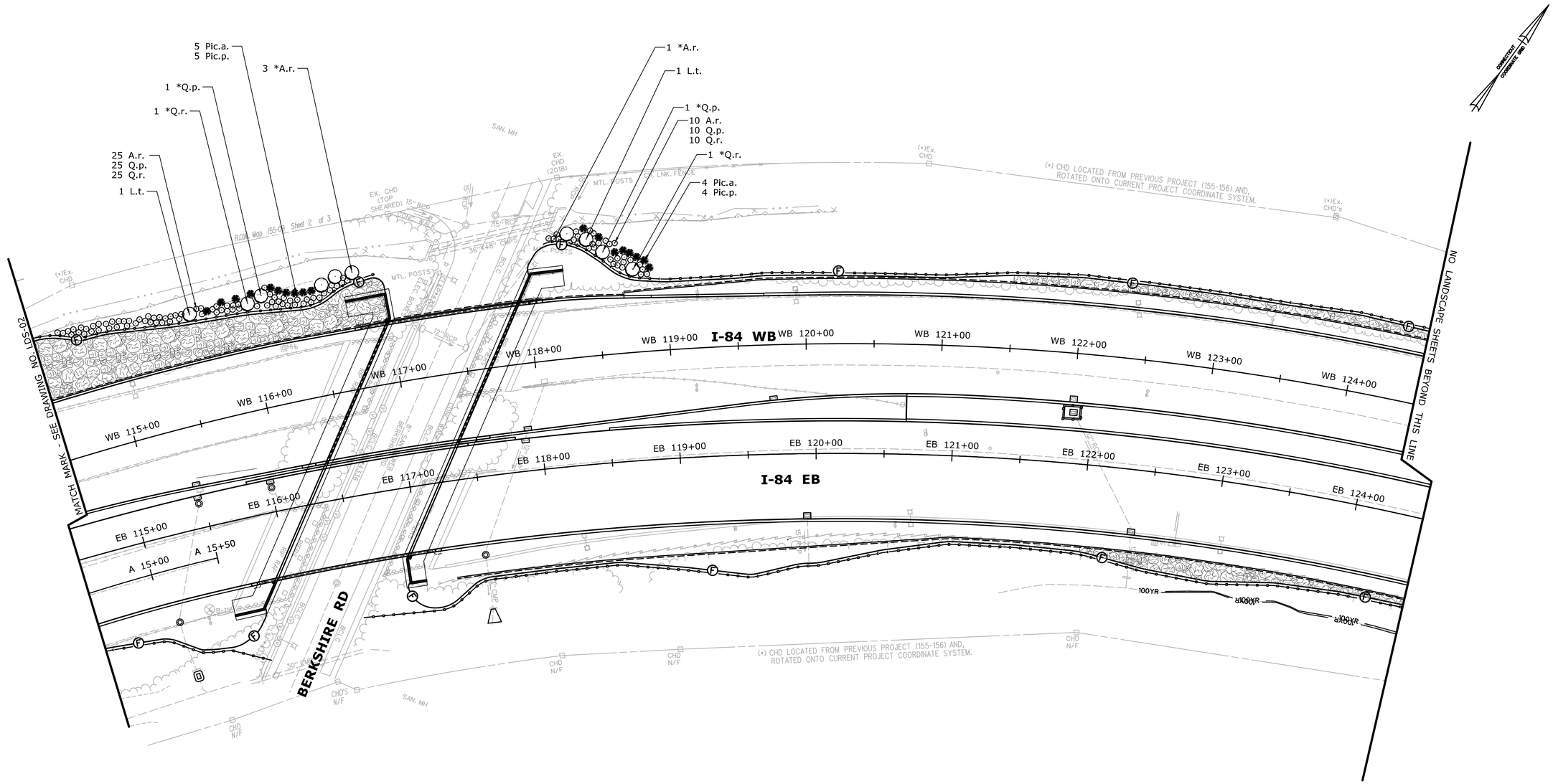
TOWN: **WEST HARTFORD**

DRAWING TITLE: **LANDSCAPE PLAN**

PROJECT NO. **155-171**

DRAWING NO. **PMT-09**

SHEET NO. **9**



PLANT LIST

KEY	BOTANICAL NAME	COMMON NAME	SIZE	QTY.	SPACING	COMMENTS
*A.r.	Acer rubrum	Red Maple	2" - 2½" Cal. B.B.	4		Spring Dig Only
A.r.	Acer Rubrum	Red Maple	3'-4' Ht. Whips B.R.	35		
L.t.	Liriodendron tulipifera	Tulip Tree	1 3/4" - 2" Cal. B.B.	2		Spring Dig Only
*Q.p.	Quercus palustris	Pin Oak	2" - 2½" Cal. B.B.	2		Spring Dig Only
Q.p.	Quercus palustris	Pin Oak	24"-36" Ht. No. 3 Container	35		
*Q.r.	Quercus rubra	Northern Red Oak	2 1/2" - 3" Cal. B.B.	2		Spring Dig Only
Q.r.	Quercus rubra	Northern Red Oak	24"-36" Ht. No. 3 Container	35		
Pic.a.	Picea abies	Norway Spruce	5' - 6' Ht. B.B.	9		
Pic.p.	Picea pungens	Colorado Spruce	5' - 6' Ht. B.B.	9		
	Wood Chip Mulch			330 S.Y.		

NOTES:

1. 'SPRING DIG ONLY' PLANTS SHALL BE PROCURED AND DUG IN THE SPRING FOR PLANTING IN SPRING OR FALL.

PERMITTING PLAN SET

PLAN DATE: AUGUST 28, 2019

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK, SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

Plotted Date: 8/29/2019

DESIGNER/DRAFTER: MV
CHECKED BY: SB
SCALE IN FEET 0 40 80
SCALE 1"=40'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\HW_MSH_155-171_PMT-10.dgn

SIGNATURE/ BLOCK:

PROJECT TITLE:
SAFETY AND OPERATIONAL IMPROVEMENTS ON I-84

TOWN: **WEST HARTFORD**

DRAWING TITLE: **LANDSCAPE PLAN**

PROJECT NO. **155-171**
DRAWING NO. **LDS-03**
SHEET NO. **10**

PERMITS AND REQUIRED PROVISIONS

The following Permits and/or and Required Provisions follow this page are hereby made part of this Contract.

- **PERMITS AND PERMIT APPLICATIONS**

Flood Management General Certification	Issued March 28, 2019
CTDEEP Stormwater Construction General Permit	Acquisition occurs during construction
CTDEEP Inland Wetlands and Watercourses General Permit	Issued September 3, 2019
Army Corps of Engineers Self Verification (SV)	Issued September 5, 2019

- **Construction Contracts - Required Contract Provisions (State Funded Only Contracts)**

Construction Contracts - Required Contract Provisions
(FTA Funded Contracts)

Index

Index of Exhibits

1. Federal Transit Administration Required Contract Clauses

If applicable, the Contractor shall comply with the Federal Transit Administration (FTA) required contract clauses, attached at Exhibit A, as revised, of this section, all of which are hereby made part of this contract.

2. Title VI of the Civil Rights Act of 1964 / Nondiscrimination Requirements

The Contractor shall comply with Title VI of the Civil Rights Act of 1964 as amended (42 U.S.C. 2000 et seq.), all requirements imposed by the regulations of the United States Department of Transportation (49 CFR Part 21) issued in implementation thereof, and the Title VI Contractor Assurances attached hereto at Exhibit B, all of which are hereby made a part of this Contract.

3. Contractor Work Force Utilization (Federal Executive Order 11246) / Equal Employment Opportunity

(a) The Contractor shall comply with the Contractor Work Force Utilization (Federal Executive Order 11246) / Equal Employment Opportunity requirements attached at Exhibit C and hereby made part of this Contract, whenever a contractor or subcontractor at any tier performs construction work in excess of $10,000. These goals shall be included in each contract and subcontract. Goal achievement is calculated for each trade using the hours worked under each trade.

(b) Companies with contracts, agreements or purchase orders valued at $10,000 or more will develop and implement an Affirmative Action Plan utilizing the ConnDOT Affirmative Action Plan Guideline. This Plan shall be designed to further the provision of equal employment opportunity to all persons without regard to their race, color, religion, sex or national origin, and to promote the full realization of equal employment opportunity through a positive continuation program. Plans shall be updated as required by ConnDOT.

4. Requirements of Title 49, Code of Federal Regulations (CFR), Part 26, Participation by DBEs, as may be revised.

Pursuant to 49 CFR 26.13, the following paragraph is part of this Contract and shall be included in each subcontract the Contractor enters into with a subcontractor:

"The Contractor, subrecipient or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The Contractor shall carry out applicable requirements of 49 CFR Part 26, Participation by DBEs, in the award and administration of U.S. DOT-assisted contracts. Failure by the Contractor to carry out these requirements is a material breach of this Contract, which may result in the termination of this contract or such other remedy as ConnDOT (recipient) deems appropriate, which may include, but is not limited to: (1) Withholding monthly progress payments, (2) Assessing sanctions, (3) Liquidated damages; and/or, (4) Disqualifying the contractor from future bidding as non-responsible."

5. Contract Wage Rates

The Contractor shall comply with:

The Federal and State wage rate requirements indicated in Exhibits F and G hereof, as revised, are hereby made part of this Contract. The Federal wage rates (Davis-Bacon Act) applicable to this Contract shall be the Federal wage rates that are current on the US Department of Labor website (http://www.wdol.gov/dba.aspx) as may be revised 10 days prior to bid opening. These applicable Federal wage rates will be physically incorporated in the final contract document executed by both parties. The Department will no longer physically include revised Federal wage rates in the bid documents or as part of addenda documents, prior to the bid opening date. During the bid advertisement period, bidders are responsible for obtaining the appropriate Federal wage rates from the US Department of Labor website.

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

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

Prevailing Wages for Work on State Highways; Annual Adjustments. With respect to contracts for work on state highways and bridges on state highways, the Contractor shall comply with the provisions of Section 31-54 and 31-55a of the Connecticut General Statutes, as revised.

As required by Section 1.05.12 (Payrolls) of the State of Connecticut, Department of Transportation's Standard Specification for Roads, Bridges and Incidental Construction (FORM 816), as may be revised, every Contractor or subcontractor performing project work on a Federal aid project is required to post the relevant prevailing wage rates as determined by the United States Secretary of Labor. The wage rate determinations shall be posted in prominent and easily accessible places at the work site.

6. Americans with Disabilities Act of 1990, as Amended

This provision applies to those Contractors who are or will be responsible for compliance with the terms of the Americans with Disabilities Act of 1990, as amended (42 U.S.C. 12101 et seq.), (Act), during the term of the Contract. The Contractor represents that it is familiar with the terms of this Act and that it is in compliance with the Act. Failure of the Contractor to satisfy this standard as the same applies to performance under this Contract, either now or during the term of the Contract as it may be amended, will render the Contract voidable at the option of the State upon notice to the contractor. The Contractor warrants that it will hold the State harmless and indemnify the State from any liability which may be imposed upon the State as a result of any failure of the Contractor to be in compliance with this Act, as the same applies to performance under this Contract.

7. Connecticut Statutory Labor Requirements

(a) Construction, Alteration or Repair of Public Works Projects; Wage Rates. The Contractor shall comply with Section 31-53 of the Connecticut General Statutes, as revised. The wages paid on an hourly basis to any person performing the work of any mechanic, laborer or worker on the work herein contracted to be done and the amount of payment or contribution paid or payable on behalf of each such person to any employee welfare fund, as defined in subsection (i) of section 31-53 of the Connecticut General Statutes, shall be at a rate equal to the rate customary or prevailing for the same work in the same trade or occupation in the town in which such public works project is being constructed. Any contractor who is not obligated by agreement to make payment or contribution on behalf of such persons to any such employee welfare fund shall pay to

each mechanic, laborer or worker as part of such person's wages the amount of payment or contribution for such person's classification on each pay day.

(b) Debarment List. Limitation on Awarding Contracts. The Contractor shall comply with Section 3l-53a of the Connecticut General Statutes, as revised.

(c) Construction Safety and Health Course. The Contractor shall comply with section 31-53b of the Connecticut General Statutes, as revised. The contractor shall furnish proof to the Labor Commissioner with the weekly certified payroll form for the first week each employee begins work on such project that any person performing the work of a mechanic, laborer or worker pursuant to the classifications of labor under section 31-53 of the Connecticut General Statutes, as revised, on such public works project, pursuant to such contract, has completed a course of at least ten hours in duration in construction safety and health approved by the federal Occupational Safety and Health Administration or, has completed a new miner training program approved by the Federal Mine Safety and Health Administration in accordance with 30 CFR 48 or, in the case of telecommunications employees, has completed at least ten hours of training in accordance with 29 CFR 1910.268.

Any employee required to complete a construction safety and health course as required that has not completed the course, shall have a maximum of fourteen (14) days to complete the course. If the employee has not been brought into compliance, they shall be removed from the project until such time as they have completed the required training.

Any costs associated with this notice shall be included in the general cost of the contract. In addition, there shall be no time granted to the contractor for compliance with this notice. The contractor's compliance with this notice and any associated regulations shall not be grounds for claims as outlined in Section 1.11 – "Claims".

(d) Awarding of Contracts to Occupational Safety and Health Law Violators Prohibited. The Contract is subject to Section 31-57b of the Connecticut General Statutes, as revised.

(e) Residents Preference in Work on Other Public Facilities. NOT APPLICABLE TO FEDERAL AID CONTRACTS. Pursuant to Section 31-52a of the Connecticut General Statutes, as revised, in the employment of mechanics, laborers or workmen to perform the work specified herein, preference shall be given to residents of the state who are, and continuously for at least six months prior to the date hereof have been, residents of this state, and if no such person is available, then to residents of other states

8. Tax Liability - Contractor's Exempt Purchase Certificate (CERT – 141)

The Contractor shall comply with Chapter 219 of the Connecticut General Statutes pertaining to tangible personal property or services rendered that is/are subject to sales tax. The Contractor is responsible for determining its tax liability. If the Contractor purchases materials or supplies pursuant to the Connecticut Department of Revenue Services' "Contractor's Exempt Purchase Certificate (CERT-141)," as may be revised, the Contractor acknowledges and agrees that title to such materials and supplies installed or placed in the project will vest in the State simultaneously with passage of title from the retailers or vendors thereof, and the Contractor will have no property rights in the materials and supplies purchased.

Forms and instructions are available anytime by:

Internet: Visit the DRS website at www.ct.gov/DRS to download and print Connecticut tax forms; or
Telephone: Call 1-800-382-9463 (Connecticut calls outside the Greater Hartford calling area only) and select Option 2 or call 860-297-4753 (from anywhere).

9. Executive Orders

This contract is subject to the provisions of Executive Order No. Three of Governor Thomas J. Meskill, promulgated June 16, 1971, concerning labor employment practices, Executive Order No. Seventeen of Governor Thomas J. Meskill, promulgated February 15, 1973, concerning the listing of employment openings and Executive Order No. Sixteen of Governor John G. Rowland promulgated August 4, 1999, concerning violence in the workplace, all of which are incorporated into and are made a part of the contract as if they had been fully set forth in it. The contract may also be subject to Executive Order No. 14 of Governor M. Jodi Rell, promulgated April 17, 2006, concerning procurement of cleaning products and services and to Executive Order No. 49 of Governor Dannel P. Malloy, promulgated May 22, 2015, mandating disclosure of certain gifts to public employees and contributions to certain candidates for office. If Executive Order No. 14 and/or Executive Order No. 49 are applicable, they are deemed to be incorporated into and are made a part of the contract as if they had been fully set forth in it. At the Contractor's request, the Department shall provide a copy of these orders to the Contractor.

10. Non Discrimination Requirement (pursuant to section 4a-60 and 4a-60a of the Connecticut General Statutes, as revised): References to "minority business enterprises" in this Section are not applicable to Federal-aid projects/contracts. Federal-aid projects/contracts are instead subject to the Federal Disadvantaged Business Enterprise Program.

(a) For purposes of this Section, the following terms are defined as follows:

(1) "Commission" means the Commission on Human Rights and Opportunities;
(2) "Contract" and "contract" include any extension or modification of the Contract or contract;
(3) "Contractor" and "contractor" include any successors or assigns of the Contractor or contractor;
(4) "Gender identity or expression" means a person's gender-related identity, appearance or behavior, whether or not that gender-related identity, appearance or behavior is different from that traditionally associated with the person's physiology or assigned sex at birth, which gender-related identity can be shown by providing evidence including, but not limited to, medical history, care or treatment of the gender-related identity, consistent and uniform assertion of the gender-related identity or any other evidence that the gender-related identity is sincerely held, part of a person's core identity or not being asserted for an improper purpose.
(5) "good faith" means that degree of diligence which a reasonable person would exercise in the performance of legal duties and obligations;
(6) "good faith efforts" shall include, but not be limited to, those reasonable initial efforts necessary to comply with statutory or regulatory requirements and additional or substituted efforts when it is determined that such initial efforts will not be sufficient to comply with such requirements;
(7) "marital status" means being single, married as recognized by the state of Connecticut, widowed, separated or divorced;
(8) "mental disability" means one or more mental disorders, as defined in the most recent edition of the American Psychiatric Association's "Diagnostic and Statistical Manual of Mental Disorders", or a record of or regarding a person as having one or more such disorders;
(9) "minority business enterprise" means any small contractor or supplier of materials fifty-one percent or more of the capital stock, if any, or assets of which is owned by a person or persons:

(1) who are active in the daily affairs of the enterprise, (2) who have the power to direct the management and policies of the enterprise, and (3) who are members of a minority, as such term is defined in subsection (a) of Connecticut General Statutes § 32-9n; and

(10) "public works contract" means any agreement between any individual, firm or corporation and the State or any political subdivision of the State other than a municipality for construction, rehabilitation, conversion, extension, demolition or repair of a public building, highway or other changes or improvements in real property, or which is financed in whole or in part by the State, including, but not limited to, matching expenditures, grants, loans, insurance or guarantees.

For purposes of this Section, the terms "Contract" and "contract" do not include a contract where each contractor is (1) a political subdivision of the State of Connecticut, including, but not limited to municipalities, unless the contract is a municipal public works contract or quasi-public agency project contract, (2) any other state of the United States, including but not limited to, the District of Columbia, Puerto Rico, U.S. territories and possessions, and federally recognized Indian tribal governments, as defined in Connecticut General Statutes § 1-267, (3) the federal government, (4) a foreign government, or (5) an agency of a subdivision, state or government described in subdivision (1), (2), (3), or (4) of this subsection.

(b) (1) The Contractor agrees and warrants that in the performance of the Contract such Contractor will not discriminate or permit discrimination against any person or group of persons on the grounds of race, color, religious creed, age, marital status, national origin, ancestry, sex, gender identity or expression, status as a veteran, intellectual disability, mental disability or physical disability, including, but not limited to, blindness, unless it is shown by such Contractor that such disability prevents performance of the work involved, in any manner prohibited by the laws of the United States or of the State of Connecticut; and the Contractor further agrees to take affirmative action to insure that applicants with job-related qualifications are employed and that employees are treated when employed without regard to their race, color, religious creed, age, marital status, national origin, ancestry, sex, gender identity or expression, status as a veteran, intellectual disability, mental disability or physical disability, including, but not limited to, blindness, unless it is shown by the Contractor that such disability prevents performance of the work involved; (2) the Contractor agrees, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, to state that it is an "affirmative action-equal opportunity employer" in accordance with regulations adopted by the Commission; (3) the Contractor agrees to provide each labor union or representative of workers with which the Contractor has a collective bargaining agreement or other contract or understanding and each vendor with which the Contractor has a contract or understanding, a notice to be provided by the Commission, advising the labor union or workers' representative of the Contractor's commitments under this section and to post copies of the notice in conspicuous places available to employees and applicants for employment; (4) the Contractor agrees to comply with each provision of this Section and Connecticut General Statutes §§ 46a-68e and 46a-68f and with each regulation or relevant order issued by said Commission pursuant to Connecticut General Statutes §§ 46a-56, 46a-68e and 46a-68f; and (5) the Contractor agrees to provide the Commission on Human Rights and Opportunities with such information requested by the Commission, and permit access to pertinent books, records and accounts, concerning the employment practices and procedures of the Contractor as relate to the provisions of this Section and Connecticut General Statutes § 46a-56. If the contract is a public works contract, the Contractor agrees and warrants that he will make good faith efforts to employ minority business enterprises as subcontractors and suppliers of materials on such public works projects.

(c) Determination of the Contractor's good faith efforts shall include, but shall not be limited to, the following factors: The Contractor's employment and subcontracting policies, patterns and

practices; affirmative advertising, recruitment and training; technical assistance activities and such other reasonable activities or efforts as the Commission may prescribe that are designed to ensure the participation of minority business enterprises in public works projects.

(d) The Contractor shall develop and maintain adequate documentation, in a manner prescribed by the Commission, of its good faith efforts.

(e) The Contractor shall include the provisions of subsection (b) of this Section in every subcontract or purchase order entered into in order to fulfill any obligation of a contract with the State and such provisions shall be binding on a subcontractor, vendor or manufacturer unless exempted by regulations or orders of the Commission. The Contractor shall take such action with respect to any such subcontract or purchase order as the Commission may direct as a means of enforcing such provisions including sanctions for noncompliance in accordance with Connecticut General Statutes §46a-56; provided if such Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the Commission, the Contractor may request the State of Connecticut to enter into any such litigation or negotiation prior thereto to protect the interests of the State and the State may so enter.

(f) The Contractor agrees to comply with the regulations referred to in this Section as they exist on the date of this Contract and as they may be adopted or amended from time to time during the term of this Contract and any amendments thereto.

(g) (1) The Contractor agrees and warrants that in the performance of the Contract such Contractor will not discriminate or permit discrimination against any person or group of persons on the grounds of sexual orientation, in any manner prohibited by the laws of the United States or the State of Connecticut, and that employees are treated when employed without regard to their sexual orientation; (2) the Contractor agrees to provide each labor union or representative of workers with which such Contractor has a collective bargaining agreement or other contract or understanding and each vendor with which such Contractor has a contract or understanding, a notice to be provided by the Commission on Human Rights and Opportunities advising the labor union or workers' representative of the Contractor's commitments under this section, and to post copies of the notice in conspicuous places available to employees and applicants for employment; (3) the Contractor agrees to comply with each provision of this section and with each regulation or relevant order issued by said Commission pursuant to Connecticut General Statutes § 46a-56; and (4) the Contractor agrees to provide the Commission on Human Rights and Opportunities with such information requested by the Commission, and permit access to pertinent books, records and accounts, concerning the employment practices and procedures of the Contractor which relate to the provisions of this Section and Connecticut General Statutes § 46a-56.

(h) The Contractor shall include the provisions of the foregoing paragraph in every subcontract or purchase order entered into in order to fulfill any obligation of a contract with the State and such provisions shall be binding on a subcontractor, vendor or manufacturer unless exempted by regulations or orders of the Commission. The Contractor shall take such action with respect to any such subcontract or purchase order as the Commission may direct as a means of enforcing such provisions including sanctions for noncompliance in accordance with Connecticut General Statutes § 46a-56; provided, if such Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the Commission, the Contractor may request the State of Connecticut to enter into any such litigation or negotiation prior thereto to protect the interests of the State and the State may so enter.

Please be aware the Nondiscrimination Certifications can be found at the Office of Policy and Management website:

https://portal.ct.gov/OPM/Fin-PSA/Forms/Nondiscrimination-Certification

11. Whistleblower Provision

The following clause is applicable if the Contract has a value of Five Million Dollars ($5,000,000) or more.

Whistleblowing. This Contract may be subject to the provisions of Section 4-61dd of the Connecticut General Statutes. In accordance with this statute, if an officer, employee or appointing authority of the Contractor takes or threatens to take any personnel action against any employee of the Contractor in retaliation for such employee's disclosure of information to any employee of the contracting state or quasi-public agency or the Auditors of Public Accounts or the Attorney General under the provisions of subsection (a) of such statute, the Contractor shall be liable for a civil penalty of not more than five thousand dollars for each offense, up to a maximum of twenty per cent of the value of this Contract. Each violation shall be a separate and distinct offense and in the case of a continuing violation, each calendar day's continuance of the violation shall be deemed to be a separate and distinct offense. The State may request that the Attorney General bring a civil action in the Superior Court for the Judicial District of Hartford to seek imposition and recovery of such civil penalty. In accordance with subsection (f) of such statute, each large state contractor, as defined in the statute, shall post a notice of the provisions of the statute relating to large state contractors in a conspicuous place which is readily available for viewing by the employees of the Contractor.

12. Connecticut Freedom of Information Act

(a) Disclosure of Records. This Contract may be subject to the provisions of section 1-218 of the Connecticut General Statutes. In accordance with this statute, each contract in excess of two million five hundred thousand dollars between a public agency and a person for the performance of a governmental function shall (a) provide that the public agency is entitled to receive a copy of records and files related to the performance of the governmental function, and (b) indicate that such records and files are subject to FOIA and may be disclosed by the public agency pursuant to FOIA. No request to inspect or copy such records or files shall be valid unless the request is made to the public agency in accordance with FOIA. Any complaint by a person who is denied the right to inspect or copy such records or files shall be brought to the Freedom of Information Commission in accordance with the provisions of sections 1-205 and 1-206 of the Connecticut General Statutes.

(b) Confidential Information. The State will afford due regard to the Contractor's request for the protection of proprietary or confidential information which the State receives from the Contractor. However, all materials associated with the Contract are subject to the terms of the FOIA and all corresponding rules, regulations and interpretations. In making such a request, the Contractor may not merely state generally that the materials are proprietary or confidential in nature and not, therefore, subject to release to third parties. Those particular sentences, paragraphs, pages or sections that the Contractor believes are exempt from disclosure under the FOIA must be specifically identified as such. Convincing explanation and rationale sufficient to justify each exemption consistent with the FOIA must accompany the request. The rationale and explanation must be stated in terms of the prospective harm to the competitive position of the Contractor that would result if the identified material were to be released and the reasons why the materials are legally exempt from release pursuant to the FOIA. To the extent that any other provision or part of the Contract conflicts or is in any way inconsistent with this section, this section controls and shall apply and the conflicting provision or part shall not be given effect. If the Contractor indicates that certain documentation is submitted in confidence, by specifically and clearly marking the documentation as "CONFIDENTIAL," DOT will first review the Contractor's claim for consistency with the FOIA (that is, review that the documentation is actually a trade secret or commercial or financial information and not required by statute), and if

determined to be consistent, will endeavor to keep such information confidential to the extent permitted by law. See, *e.g.*, Conn. Gen. Stat. §1-210(b)(5)(A-B). The State, however, has no obligation to initiate, prosecute or defend any legal proceeding or to seek a protective order or other similar relief to prevent disclosure of any information that is sought pursuant to a FOIA request. Should the State withhold such documentation from a Freedom of Information requester and a complaint be brought to the Freedom of Information Commission, the Contractor shall have the burden of cooperating with DOT in defense of that action and in terms of establishing the availability of any FOIA exemption in any proceeding where it is an issue. In no event shall the State have any liability for the disclosure of any documents or information in its possession which the State believes are required to be disclosed pursuant to the FOIA or other law.

13. Service of Process

The Contractor, if not a resident of the State of Connecticut, or, in the case of a partnership, the partners, if not residents, hereby appoints the Secretary of State of the State of Connecticut, and his successors in office, as agent for service of process for any action arising out of or as a result of this Contract; such appointment to be in effect throughout the life of this Contract and six (6) years thereafter.

14. Substitution of Securities for Retainages on State Contracts and Subcontracts

This Contract is subject to the provisions of Section 3-ll2a of the General Statutes of the State of Connecticut, as revised.

15. Health Insurance Portability and Accountability Act of 1996 (HIPAA)

The Contractor shall comply, if applicable, with the Health Insurance Portability and Accountability Act of 1996 and, pursuant thereto, the provisions attached at Exhibit D, and hereby made part of this Contract.

16. Forum and Choice of Law

Forum and Choice of Law. The parties deem the Contract to have been made in the City of Hartford, State of Connecticut. Both parties agree that it is fair and reasonable for the validity and construction of the Contract to be, and it shall be, governed by the laws and court decisions of the State of Connecticut, without giving effect to its principles of conflicts of laws. To the extent that any immunities provided by Federal law or the laws of the State of Connecticut do not bar an action against the State, and to the extent that these courts are courts of competent jurisdiction, for the purpose of venue, the complaint shall be made returnable to the Judicial District of Hartford only or shall be brought in the United States District Court for the District of Connecticut only, and shall not be transferred to any other court, provided, however, that nothing here constitutes a waiver or compromise of the sovereign immunity of the State of Connecticut. The Contractor waives any objection which it may now have or will have to the laying of venue of any Claims in any forum and further irrevocably submits to such jurisdiction in any suit, action or proceeding.

17. Summary of State Ethics Laws

Pursuant to the requirements of section 1-101qq of the Connecticut General Statutes, the summary of State ethics laws developed by the State Ethics Commission pursuant to section 1-81b of the Connecticut General Statutes is incorporated by reference into and made a part of the Contract as if the summary had been fully set forth in the Contract.

18. Audit and Inspection of Plants, Places of Business and Records

(a) The State and its agents, including, but not limited to, the Connecticut Auditors of Public Accounts, Attorney General and State's Attorney and their respective agents, may, at reasonable hours, inspect and examine all of the parts of the Contractor's and Contractor Parties' plants and places of business which, in any way, are related to, or involved in, the performance of this Contract. For the purposes of this Section, "Contractor Parties" means the Contractor's members, directors, officers, shareholders, partners, managers, principal officers, representatives, agents, servants, consultants, employees or any one of them or any other person or entity with whom the Contractor is in privity of oral or written contract and the Contractor intends for such other person or entity to Perform under the Contract in any capacity.
(b) The Contractor shall maintain, and shall require each of the Contractor Parties to maintain, accurate and complete Records. The Contractor shall make all of its and the Contractor Parties' Records available at all reasonable hours for audit and inspection by the State and its agents.
(c) The State shall make all requests for any audit or inspection in writing and shall provide the Contractor with at least twenty-four (24) hours' notice prior to the requested audit and inspection date. If the State suspects fraud or other abuse, or in the event of an emergency, the State is not obligated to provide any prior notice.
(d) The Contractor shall keep and preserve or cause to be kept and preserved all of its and Contractor Parties' Records until three (3) years after the latter of (i) final payment under this Agreement, or (ii) the expiration or earlier termination of this Agreement, as the same may be modified for any reason. The State may request an audit or inspection at any time during this period. If any Claim or audit is started before the expiration of this period, the Contractor shall retain or cause to be retained all Records until all Claims or audit findings have been resolved.
(e) The Contractor shall cooperate fully with the State and its agents in connection with an audit or inspection. Following any audit or inspection, the State may conduct and the Contractor shall cooperate with an exit conference.
(f) The Contractor shall incorporate this entire Section verbatim into any contract or other agreement that it enters into with any Contractor Party.

19. Campaign Contribution Restriction

For all State contracts, defined in Conn. Gen. Stat. §9-612(f)(1) as having a value in a calendar year of $50,000 or more, or a combination or series of such agreements or contracts having a value of $100,000 or more, the authorized signatory to this contract expressly acknowledges receipt of the State Elections Enforcement Commission's notice advising state contractors of state campaign contribution and solicitation prohibitions, and will inform its principals of the contents of the notice, as set forth in "Notice to Executive Branch State Contractors and Prospective State Contractors of Campaign Contribution and Solicitation Limitations," a copy of which is attached hereto and hereby made a part of this contract, attached as Exhibit E.

20. Tangible Personal Property

(a) The Contractor on its behalf and on behalf of its Affiliates, as defined below, shall comply with the provisions of Conn. Gen. Stat. §12-411b, as follows:

(1) For the term of the Contract, the Contractor and its Affiliates shall collect and remit to the State of Connecticut, Department of Revenue Services, any Connecticut use tax due under the provisions of Chapter 219 of the Connecticut General Statutes for items of tangible personal property sold by the Contractor or by any of its Affiliates in the same manner as if the Contractor and such Affiliates were engaged in the business of selling tangible personal

property for use in Connecticut and had sufficient nexus under the provisions of Chapter 219 to be required to collect Connecticut use tax;

(2) A customer's payment of a use tax to the Contractor or its Affiliates relieves the customer of liability for the use tax;

(3) The Contractor and its Affiliates shall remit all use taxes they collect from customers on or before the due date specified in the Contract, which may not be later than the last day of the month next succeeding the end of a calendar quarter or other tax collection period during which the tax was collected;

(4) The Contractor and its Affiliates are not liable for use tax billed by them but not paid to them by a customer; and

(5) Any Contractor or Affiliate who fails to remit use taxes collected on behalf of its customers by the due date specified in the Contract shall be subject to the interest and penalties provided for persons required to collect sales tax under chapter 219 of the general statutes.

(b) For purposes of this section of the Contract, the word "Affiliate" means any person, as defined in section 12-1 of the general statutes, that controls, is controlled by, or is under common control with another person. A person controls another person if the person owns, directly or indirectly, more than ten per cent of the voting securities of the other person. The word "voting security" means a security that confers upon the holder the right to vote for the election of members of the board of directors or similar governing body of the business, or that is convertible into, or entitles the holder to receive, upon its exercise, a security that confers such a right to vote. "Voting security" includes a general partnership interest.

(c) The Contractor represents and warrants that each of its Affiliates has vested in the Contractor plenary authority to so bind the Affiliates in any agreement with the State of Connecticut. The Contractor on its own behalf and on behalf of its Affiliates shall also provide, no later than 30 days after receiving a request by the State's contracting authority, such information as the State may require to ensure, in the State's sole determination, compliance with the provisions of Chapter 219 of the Connecticut General Statutes, including, but not limited to, §12-411b.

21. Bid Rigging and/or Fraud – Notice to Contractor

The Connecticut Department of Transportation is cooperating with the U.S. Department of Transportation and the Justice Department in their investigation into highway construction contract bid rigging and/or fraud.

A toll-free "HOT LINE" telephone number 800-424-9071 has been established to receive information from contractors, subcontractors, manufacturers, suppliers or anyone with knowledge of bid rigging and/or fraud, either past or current. The "HOT LINE" telephone number will be available during normal working hours (8:00 am – 5:00 pm EST). Information will be treated confidentially and anonymity respected.

22. Consulting Agreement Affidavit

The Contractor shall comply with Connecticut General Statutes Section 4a-81(a) and 4a-81(b), as revised. Pursuant to Public Act 11-229, after the initial submission of the form, if there is a change in the information contained in the form, a contractor shall submit the updated form, as applicable, either (i) not later than thirty (30) days after the effective date of such change or (ii) prior to execution of any new contract, whichever is earlier.
The Affidavit/Form may be submitted in written format or electronic format through the Department of Administrative Services (DAS) website.

23. Cargo Preference Act Requirements (46 CFR 381.7(a)-(b)) – Use of United States Flag Vessels

The Contractor agrees to comply with the following:

(a) ***Agreement Clauses***.

(1) Pursuant to Pub. L. 664 (43 U.S.C. 1241(b)) at least 50 percent of any equipment, materials or commodities procured, contracted for or otherwise obtained with funds granted, guaranteed, loaned, or advanced by the U.S. Government under this agreement, and which may be transported by ocean vessel, shall be transported on privately owned United States-flag commercial vessels, if available.

(2) Within 20 days following the date of loading for shipments originating within the United States or within 30 working days following the date of loading for shipments originating outside the United States, a legible copy of a rated, 'on-board' commercial ocean bill-of-lading in English for each shipment of cargo described in paragraph (a)(1) of this section shall be furnished to both the Contracting Officer (through the prime contractor in the case of subcontractor bills-of-lading) and to the Division of National Cargo, Office of Market Development, Maritime Administration, Washington, DC 20590.

(b) ***Contractor and Subcontractor Clauses.*** The contractor agrees—

(1) To utilize privately owned United States-flag commercial vessels to ship at least 50 percent of the gross tonnage (computed separately for dry bulk carriers, dry cargo liners, and tankers) involved, whenever shipping any equipment, material, or commodities pursuant to this contract, to the extent such vessels are available at fair and reasonable rates for United States-flag commercial vessels.

(2) To furnish within 20 days following the date of loading for shipments originating within the United States or within 30 working days following the date of loading for shipments originating outside the United States, a legible copy of a rated, 'on-board' commercial ocean bill-of-lading in English for each shipment of cargo described in paragraph (b) (1) of this section to both the Contracting Officer (through the prime contractor in the case of subcontractor bills-of-lading) and to the Division of National Cargo, Office of Market Development, Maritime Administration, Washington, DC 20590.

(3) To insert the substance of the provisions of this clause in all subcontracts issued pursuant to this contract.

EXHIBIT A

FEDERAL TRANSIT ADMINISTRATION

Construction Contracts Required Clauses

1. Notification of Federal Participation
2. Fly America Requirements
3. Buy America Requirements (See Certifications - Exhibit A)
4. Cargo Preference Requirements
5. Seismic Safety Requirements
6. Energy Conservation Requirements
7. Clean Water Requirements
8. Lobbying (See Certification - Exhibit B)
9. Access to Records and Reports
10. Federal Changes
11. Bonding Requirements
12. Clean Air
13. Recycled Products
14. Davis-Bacon and Copeland Anti-Kickback Acts
15. Contract Work Hours and Safety Standards Act
16. No Government Obligation to Third Parties
17. Program Fraud and False or Fraudulent Statements and Related Acts
18. Termination
19. Government-wide Debarment and Suspension (Nonprocurement)
20. Civil Rights Requirements
21. Breaches and Dispute Resolution
22. Transit Employee Protective Agreements
23. Disadvantaged Business Enterprises (DBE)
24. Incorporation of Federal Transit Administration (FTA) Terms
25. Access for Individuals with Disabilities
26. National Intelligent Transportation Systems Architecture and Standards
27. Assignability Clause

1. NOTIFICATION OF FEDERAL PARTICIPATION

To the extent required by law, the State agrees that any request for proposals, solicitation, award notice, press release, or other publication involving the distribution of FTA assistance for the Program or the Project having an aggregate value of $500,000 or more, shall indicate that FTA is the Federal agency that is providing the Federal assistance, the Catalog of Federal Domestic Assistance Number of the program from which the Federal assistance is authorized, as may be applicable, and the amount of Federal assistance FTA provided.

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2. FLY AMERICA REQUIREMENTS
49 U.S.C. § 40118
41 CFR Part 301-10

Applicability to Contracts

The Fly America requirements apply to the transportation of persons or property, by air, between a place in the U.S. and a place outside the U.S., or between places outside the U.S., when the FTA will participate in the costs of such air transportation. Transportation on a foreign air carrier is permissible when provided by a foreign air carrier under a code share agreement when the ticket identifies the U.S. air carrier's designator code and flight number. Transportation by a foreign air carrier is also permissible if there is a bilateral or multilateral air transportation agreement to which the U.S. Government and a foreign government are parties and which the Federal DOT has determined meets the requirements of the Fly America Act.

Flow Down Requirements

The Fly America requirements flow down from FTA recipients and subrecipients to first tier contractors, who are responsible for ensuring that lower tier contractors and subcontractors are in compliance.

Fly America Requirements

The Contractor agrees to comply with 49 U.S.C. 40118 (the "Fly America" Act) in accordance with the General Services Administration's regulations at 41 CFR Part 301-10, which provide that recipients and subrecipients of Federal funds and their contractors are required to use U.S. Flag air carriers for U.S Government-financed international air travel and transportation of their personal effects or property, to the extent such service is available, unless travel by foreign air carrier is a matter of necessity, as defined by the Fly America Act. The Contractor shall submit, if a foreign air carrier was used, an appropriate certification or memorandum adequately explaining why service by a U.S. flag air carrier was not available or why it was necessary to use a foreign air carrier and shall, in any event, provide a certificate of compliance with the Fly America requirements. The Contractor agrees to include the requirements of this section in all subcontracts that may involve international air transportation.

3. BUY AMERICA REQUIREMENTS
49 U.S.C. 5323(j)
49 CFR Part 661

Applicability to Contracts
The Buy America requirements apply to the following types of contracts: Construction Contracts and Acquisition of Goods or Rolling Stock (valued at more than $100,000).

Flow Down
The Buy America requirements flow down from FTA recipients and subrecipients to first tier contractors, who are responsible for ensuring that lower tier contractors and subcontractors are in compliance. The $100,000 threshold applies only to the grantee contract, subcontracts under that amount are subject to Buy America.

Buy America - The contractor agrees to comply with 49 U.S.C. 5323(j) and 49 C.F.R. Part 661, which provide that Federal funds may not be obligated unless steel, iron, and manufactured products used in FTA-funded projects are produced in the United States, unless a waiver has been granted by FTA or the product is subject to a general waiver. General waivers are listed in 49 C.F.R. 661.7, and include final assembly in the United States for 15 passenger vans and 15 passenger wagons produced by Chrysler Corporation, and microcomputer equipment and software. Separate requirements for rolling stock are set out at 49 U.S.C. 5323(j)(2)(C) and 49 C.F.R. 661.11. Rolling stock must be assembled in the United States and have a 60 percent domestic content.

A bidder or offeror must submit to the FTA recipient the appropriate Buy America certifications (See Exhibit A of these FTA required clauses) with all bids or offers on FTA-funded contracts, except those subject to a general waiver. Bids or offers that are not accompanied by a completed Buy America certification must be rejected as nonresponsive. This requirement does not apply to lower tier subcontractors.

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4. CARGO PREFERENCE REQUIREMENTS
46 U.S.C. 1241
46 CFR Part 381

Applicability to Contracts
The Cargo Preference requirements apply to all contracts involving equipment, materials, or commodities which may be transported by ocean vessels.

Flow Down
The Cargo Preference requirements apply to all subcontracts when the subcontract may be involved with the transport of equipment, material, or commodities by ocean vessel.
Cargo Preference - Use of United States-Flag Vessels - The contractor agrees: a. to use privately owned United States-Flag commercial vessels to ship at least 50 percent of the gross tonnage (computed separately for dry bulk carriers, dry cargo liners, and tankers) involved, whenever shipping any equipment, material, or commodities pursuant to the underlying contract to the extent such vessels are available at fair and reasonable rates for United States-Flag commercial vessels; b. to furnish within 20 working days following the date of loading for shipments originating within the United States or within 30 working days following the date of leading for shipments originating outside the United States, a legible copy of a rated, "on-board" commercial ocean bill-of -lading in English for

each shipment of cargo described in the preceding paragraph to the Division of National Cargo, Office of Market Development, Maritime Administration, Washington, DC 20590 and to the FTA recipient (through the contractor in the case of a subcontractor's bill-of-lading.) c. to include these requirements in all subcontracts issued pursuant to this contract when the subcontract may involve the transport of equipment, material, or commodities by ocean vessel.

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5. SEISMIC SAFETY REQUIREMENTS
42 U.S.C. 7701 et seq. 49
CFR Part 41

Applicability to Contracts
The Seismic Safety requirements apply only to contracts for the construction of new buildings or additions to existing buildings.

Flow Down
The Seismic Safety requirements flow down from FTA recipients and subrecipients to first tier contractors to assure compliance, with the applicable building standards for Seismic Safety, including the work performed by all subcontractors.

Seismic Safety - The contractor agrees that any new building or addition to an existing building will be designed and constructed in accordance with the standards for Seismic Safety required in Department of Transportation Seismic Safety Regulations 49 CFR Part 41 and will certify to compliance to the extent required by the regulation. The contractor also agrees to ensure that all work performed under this contract including work performed by a subcontractor is in compliance with the standards required by the Seismic Safety Regulations and the certification of compliance issued on the project.

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6. ENERGY CONSERVATION REQUIREMENTS
42 U.S.C. 6321 et seq.
49 CFR Part 18

Applicability to Contracts
The Energy Conservation requirements are applicable to all contracts.

Flow Down
The Energy Conservation requirements extend to all third party contractors and their contracts at every tier and subrecipients and their subagreements at every tier.

Energy Conservation - The contractor agrees to comply with mandatory standards and policies relating to energy efficiency which are contained in the state energy conservation plan issued in compliance with the Energy Policy and Conservation Act.

7. CLEAN WATER REQUIREMENTS
33 U.S.C. 1251

Applicability to Contracts
The Clean Water requirements apply to each contract and subcontract which exceeds $100,000.

Flow Down
The Clean Water requirements flow down to FTA recipients and subrecipients at every tier.

Clean Water - (1) The Contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Federal Water Pollution Control Act, as amended, 33 U.S.C. 1251 et seq. The Contractor agrees to report each violation to the Purchaser and understands and agrees that the Purchaser will, in turn, report each violation as required to assure notification to FTA and the appropriate EPA Regional Office.

(2) The Contractor also agrees to include these requirements in each subcontract exceeding $100,000 financed in whole or in part with Federal assistance provided by FTA.

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8. LOBBYING
31 U.S.C. 1352
49 CFR Part 19
49 CFR Part 20

Applicability to Contracts
The Lobbying requirements apply to Construction/Architectural and Engineering/Acquisition of Rolling Stock/Professional Service Contract/Operational Service Contract/Turnkey contracts.

Flow Down
The Lobbying requirements mandate the maximum flow down, pursuant to Byrd Anti-Lobbying Amendment, 31 U.S.C. § 1352(b)(5) and 49 C.F.R. Part 19, Appendix A, Section 7.

Byrd Anti-Lobbying Amendment, 31 U.S.C. 1352, as amended by the Lobbying Disclosure Act of 1995, P.L. 104-65 [to be codified at 2 U.S.C. § 1601, et seq.] - Contractors who apply or bid for an award of $100,000 or more **shall file the certification required (See Exhibit B of these FTA required clauses)** by 49 CFR part 20, "New Restrictions on Lobbying." Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, officer or employee of Congress, or an employee of a member of Congress in connection with obtaining any Federal contract, grant or any other award covered by 31 U.S.C. 1352. Each tier shall also disclose the name of any registrant under the Lobbying Disclosure Act of 1995 who has made lobbying contacts on its behalf with non-Federal funds with respect to that Federal contract, grant or award covered by 31 U.S.C. 1352. Such disclosures are forwarded from tier to tier up to the recipient.

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9. ACCESS TO RECORDS AND REPORTS
49 U.S.C. 5325
18 CFR 18.36 (i)
49 CFR 633.17

Applicability to Contracts
Reference Chart "Requirements for Access to Records and Reports by Type of Contracts"

Flow Down
FTA does not require the inclusion of these requirements in subcontracts.

Access to Records - The following access to records requirements apply to this Contract:

1. Where the Purchaser is not a State but a local government and is the FTA Recipient or a subgrantee of the FTA Recipient in accordance with 49 C.F.R. 18.36(i), the Contractor agrees to provide the Purchaser, the FTA Administrator, the Comptroller General of the United States or any of their authorized representatives access to any books, documents, papers and records of the Contractor which are directly pertinent to this contract for the purposes of making audits, examinations, excerpts and transcriptions. Contractor also agrees, pursuant to 49 C.F.R. 633.17 to provide the FTA Administrator or his authorized representatives including any PMO Contractor access to Contractor's records and construction sites pertaining to a major capital project, defined at 49 U.S.C. 5302(a)1, which is receiving federal financial assistance through the programs described at 49 U.S.C. 5307, 5309 or 5311.

2. Where the Purchaser is a State and is the FTA Recipient or a subgrantee of the FTA Recipient in accordance with 49 C.F.R. 633.17, Contractor agrees to provide the Purchaser, the FTA Administrator or his authorized representatives, including any PMO Contractor, access to the Contractor's records and construction sites pertaining to a major capital project, defined at 49 U.S.C. 5302(a)1, which is receiving federal financial assistance through the programs described at 49 U.S.C. 5307, 5309 or 5311. By definition, a major capital project excludes contracts of less than the simplified acquisition threshold currently set at $100,000.

3. Where the Purchaser enters into a negotiated contract for other than a small purchase or under the simplified acquisition threshold and is an institution of higher education, a hospital or other non-profit organization and is the FTA Recipient or a subgrantee of the FTA Recipient in accordance with 49 C.F.R. 19.48, Contractor agrees to provide the Purchaser, FTA Administrator, the Comptroller General of the United States or any of their duly authorized representatives with access to any books, documents, papers and record of the Contractor which are directly pertinent to this contract for the purposes of making audits, examinations, excerpts and transcriptions.

4. Where any Purchaser which is the FTA Recipient or a subgrantee of the FTA Recipient in accordance with 49 U.S.C. 5325(a) enters into a contract for a capital project or improvement (defined at 49 U.S.C. 5302(a)1) through other than competitive bidding, the Contractor shall make available records related to the contract to the Purchaser, the Secretary of Transportation and the Comptroller General or any authorized officer or employee of any of them for the purposes of conducting an audit and inspection.

5. The Contractor agrees to permit any of the foregoing parties to reproduce by any means whatsoever or to copy excerpts and transcriptions as reasonably needed.

6. The Contractor agrees to maintain all books, records, accounts and reports required under this contract for a period of not less than three years after the date of termination or expiration of this contract, except in the event of litigation or settlement of claims arising from the performance of this contract, in which case Contractor agrees to maintain same until the Purchaser, the FTA Administrator, the Comptroller General, or any of their duly authorized representatives, have disposed of all such litigation, appeals, claims or exceptions related thereto. Reference 49 CFR 18.39(i)(11).

7. FTA does not require the inclusion of these requirements in subcontracts.

Requirements for Access to Records and Reports by Types of Contract

Contract Characteristics		Operational Service Contract	Turnkey	Construction	Architectural Engineering	Acquisition of Rolling Stock	Professional Services
I State Grantees a. Contracts below SAT ($100,000) b. Contracts above $100,000/Capital Projects		None None unless[1] non-competitive award	Those imposed on state pass thru to Contractor	None Yes, if non-competitive award or if funded thru[2] 5307/5309/5311	None None unless non-competitive award	None None unless non-competitive award	None None unless non-competitive award
II Non State Grantees a. Contracts below SAT ($100,000) b. Contracts above $100,000/Capital Projects		Yes[3] Yes[3]	Those imposed on non-state Grantee pass thru to Contractor	Yes Yes	Yes Yes	Yes Yes	Yes Yes

Sources of Authority:
[1] 49 USC 5325 (a)
[2] 49 CFR 633.17
[3] 18 CFR 18.36 (i)

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10. FEDERAL CHANGES
49 CFR Part 18

Applicability to Contracts
The Federal Changes requirement applies to all contracts.

Flow Down
The Federal Changes requirement flows down appropriately to each applicable changed requirement.

Federal Changes - Contractor shall at all times comply with all applicable FTA regulations, policies, procedures and directives, including without limitation those listed directly or by reference in the Master Agreement between Purchaser and FTA, as they may be amended or promulgated from time to time during the term of this contract. Contractor's failure to so comply shall constitute a material breach of this contract.

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11. BONDING REQUIREMENTS

Refer to the Standard Specifications for Roads, Bridges and Incidental Construction, FORM 816, Section 1.02.01 – "Contract Bidding and Award" - Bonding requirements are addressed in the Connecticut Department of Transportation's Construction Contract Bidding and Award Manual.

12. CLEAN AIR
42 U.S.C. 7401 et seq
40 CFR 15.61
49 CFR Part 18

Applicability to Contracts
The Clean Air requirements apply to all contracts exceeding $100,000, including indefinite quantities where the amount is expected to exceed $100,000 in any year.

Flow Down
The Clean Air requirements flow down to all subcontracts which exceed $100,000.

Clean Air - (1) The Contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act, as amended, 42 U.S.C. §§ 7401 et seq. The Contractor agrees to report each violation to the Purchaser and understands and agrees that the Purchaser will, in turn, report each violation as required to assure notification to FTA and the appropriate EPA Regional Office.

(2) The Contractor also agrees to include these requirements in each subcontract exceeding $100,000 financed in whole or in part with Federal assistance provided by FTA.

13. RECYCLED PRODUCTS
42 U.S.C. 6962
40 CFR Part 247
Executive Order 12873

Applicability to Contracts
The Recycled Products requirements apply to all contracts for items designated by the EPA, when the purchaser or contractor procures $10,000 or more of one of these items during the fiscal year, or has procured $10,000 or more of such items in the previous fiscal year, using Federal funds. New requirements for "recovered materials" will become effective May 1, 1996. These new regulations apply to all procurement actions involving items designated by the EPA, where the procuring agency purchases $10,000 or more of one of these items in a fiscal year, or when the cost of such items purchased during the previous fiscal year was $10,000.

Flow Down
These requirements flow down to all contractor and subcontractor tiers.

Recovered Materials - The contractor agrees to comply with all the requirements of Section 6002 of the Resource Conservation and Recovery Act (RCRA), as amended (42 U.S.C. 6962), including but not limited to the regulatory provisions of 40 CFR Part 247, and Executive Order 12873, as they apply to the procurement of the items designated in Subpart B of 40 CFR Part 247.

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14. DAVIS-BACON AND COPELAND ANTI-KICKBACK ACTS

Background and Application

The Davis-Bacon and Copeland Acts are codified at 40 USC 3141, *et seq.* and 18 USC 874. The Acts apply to grantee construction contracts and subcontracts that "at least partly are financed by a loan or grant from the Federal Government." 40 USC 3145(a), 29 CFR 5.2(h), 49 CFR 18.36(i)(5). The Acts apply to any construction contract over $2,000. 40 USC 3142(a), 29 CFR 5.5(a). 'Construction,' for purposes of the Acts, includes "actual construction, alteration and/or repair, including painting and decorating." 29 CFR 5.5(a). The requirements of both Acts are incorporated into a single clause (*see* 29 CFR 3.11) enumerated at 29 CFR 5.5(a) and reproduced below.

The clause language is drawn directly from 29 CFR 5.5(a) and any deviation from the model clause below should be coordinated with counsel to ensure the Acts' requirements are satisfied.

Davis-Bacon and Copeland Anti-Kickback Acts

(1) **Minimum wages** - (i) All laborers and mechanics employed or working upon the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR Part 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classifications and wage rates conformed under paragraph (1)(ii) of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

(ii)(A) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(1) Except with respect to helpers as defined as 29 CFR 5.2(n)(4), the work to be performed by the classification requested is not performed by a classification in the wage determination; and

(2) The classification is utilized in the area by the construction industry; and

(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination; and

(4) With respect to helpers as defined in 29 CFR 5.2(n)(4), such a classification prevails in the area in which the work is performed.

(B) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(C) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(1)(ii) (B) or (C) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

(v)(A) The contracting officer shall require that any class of laborers or mechanics which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefor only when the following criteria have been met:

(1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(2) The classification is utilized in the area by the construction industry; and

(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(B) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(C) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination with 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(1)(v) (B) or (C) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(2) **Withholding** - The State shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), all or part of the wages required by the contract, the State may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

(3) **Payrolls and basic records** - (i) Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work (or under the United States Housing Act of 1937, or under the Housing Act of 1949, in the construction or development of the project). Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain

records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(ii)(A) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the State for transmission to the Federal Transit Administration. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under section 5.5(a)(3)(i) of Regulations, 29 CFR part 5. This information may be submitted in any form desired. Optional Form WH-347 is available for this purpose and may be purchased from the Superintendent of Documents (Federal Stock Number 029-005-00014-1), U.S. Government Printing Office, Washington, DC 20402. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors.

(B) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be maintained under section 5.5(a)(3)(i) of Regulations, 29 CFR part 5 and that such information is correct and complete;

(2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;

(3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(C) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (a)(3)(ii)(B) of this section.

(D) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

(iii) The contractor or subcontractor shall make the records required under paragraph (a)(3)(i) of this section available for inspection, copying, or transcription by authorized representatives of the Federal Transit Administration or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the Federal agency may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

(4) **Apprentices and trainees** - (i) Apprentices - Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Bureau of Apprenticeship and Training, or with a State Apprenticeship Agency recognized by the Bureau, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Bureau of Apprenticeship and Training or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator of the Wage and Hour Division of the U.S. Department of Labor determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Bureau of Apprenticeship and Training, or a State Apprenticeship Agency recognized by the Bureau, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) Trainees - Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed.

In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) Equal employment opportunity - The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

(5) **Compliance with Copeland Act requirements** - The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.

(6) **Subcontracts** - The contractor or subcontractor shall insert in any subcontracts the clauses contained in 29 CFR 5.5(a)(1) through (10) and such other clauses as the Federal Transit Administration may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

(7) **Contract termination: debarment** - A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

(8) **Compliance with Davis-Bacon and Related Act requirements** - All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.

(9) **Disputes concerning labor standards** - Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

(10) **Certification of eligibility** - (i) By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

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15. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

Background and Application

The Contract Work Hours and Safety Standards Act is codified at 40 USC 3701, *et seq.* The Act applies to grantee contracts and subcontracts "financed at least in part by loans or grants from … the

[Federal] Government." 40 USC 3701(b)(1)(B)(iii) and (b)(2), 29 CFR 5.2(h), 49 CFR 18.36(i)(6). Although the original Act required its application in any construction contract over $2,000 or non-construction contract to which the Act applied over $2,500 (and language to that effect is still found in 49 CFR 18.36(i)(6)), the Act no longer applies to any "contract in an amount that is not greater than $100,000." 40 USC 3701(b)(3) (A)(iii).

The Act applies to construction contracts and, in very limited circumstances, non-construction projects that employ "laborers or mechanics on a public work." These non-construction applications do not generally apply to transit procurements because transit procurements (to include rail cars and buses) are deemed "commercial items." 40 USC 3707, 41 USC 403 (12). A grantee that contemplates entering into a contract to procure a developmental or unique item should consult counsel to determine if the Act applies to that procurement and that additional language required by 29 CFR 5.5(c) must be added to the basic clause below.

Contract Work Hours and Safety Standards

(1) **Overtime requirements** - No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

(2) **Violation; liability for unpaid wages; liquidated damages** - In the event of any violation of the clause set forth in paragraph (1) of this section the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1) of this section, in the sum of $10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (1) of this section.

(3) **Withholding for unpaid wages and liquidated damages** - The (***write in the name of the grantee***) shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (2) of this section.

(4) **Subcontracts** - The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraphs (1) through (4) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (1) through (4) of this section

16. NO GOVERNMENT OBLIGATION TO THIRD PARTIES

Applicability to Contracts
Applicable to all contracts.

Flow Down
Not required by statute or regulation for either primary contractors or subcontractors, this concept should flow down to all levels to clarify, to all parties to the contract, that the Federal Government does not have contractual liability to third parties, absent specific written consent.

No Obligation by the Federal Government.

(1) The Purchaser and Contractor acknowledge and agree that, notwithstanding any concurrence by the Federal Government in or approval of the solicitation or award of the underlying contract, absent the express written consent by the Federal Government, the Federal Government is not a party to this contract and shall not be subject to any obligations or liabilities to the Purchaser, Contractor, or any other party (whether or not a party to that contract) pertaining to any matter resulting from the underlying contract.

(2) The Contractor agrees to include the above clause in each subcontract financed in whole or in part with Federal assistance provided by FTA. It is further agreed that the clause shall not be modified, except to identify the subcontractor who will be subject to its provisions.

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17. PROGRAM FRAUD AND FALSE OR FRAUDULENT STATEMENTS AND RELATED ACTS

31 U.S.C. 3801 et seq.
49 CFR Part 31 18 U.S.C. 1001
49 U.S.C. 5307

Applicability to Contracts
These requirements are applicable to all contracts.

Flow Down
These requirements flow down to contractors and subcontractors who make, present, or submit covered claims and statements.

Program Fraud and False or Fraudulent Statements or Related Acts.

(1) The Contractor acknowledges that the provisions of the Program Fraud Civil Remedies Act of 1986, as amended, 31 U.S.C. § 3801 et seq. and U.S. DOT regulations, "Program Fraud Civil Remedies," 49 C.F.R. Part 31, apply to its actions pertaining to this Project. Upon execution of the underlying contract, the Contractor certifies or affirms the truthfulness and accuracy of any statement it has made, it makes, it may make, or causes to be made, pertaining to the underlying contract or the FTA assisted project for which this contract work is being performed. In addition to other penalties that may be applicable, the Contractor further acknowledges that if it makes, or causes to be made, a false, fictitious, or fraudulent claim, statement, submission, or certification, the Federal Government reserves the right to impose the penalties of the Program Fraud Civil
Remedies Act of 1986 on the Contractor to the extent the Federal Government deems appropriate.

(2) The Contractor also acknowledges that if it makes, or causes to be made, a false, fictitious, or fraudulent claim, statement, submission, or certification to the Federal Government under a contract connected with a project that is financed in whole or in part with Federal assistance originally awarded by FTA under the authority of 49 U.S.C. § 5307, the Government reserves the right to impose the penalties of 18 U.S.C. § 1001 and 49 U.S.C. § 5307(n)(1) on the Contractor, to the extent the Federal Government deems appropriate.

(3) The Contractor agrees to include the above two clauses in each subcontract financed in whole or in part with Federal assistance provided by FTA. It is further agreed that the clauses shall not be modified, except to identify the subcontractor who will be subject to the provisions.

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18. TERMINATION

Refer to the Standard Specifications for Roads, Bridges and Incidental Construction FORM 816 Section 1.05.14

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19. GOVERNMENT-WIDE DEBARMENT AND SUSPENSION (NONPROCUREMENT)

Background and Applicability

In conjunction with the Office of Management and Budget and other affected Federal agencies, DOT published an update to 49 CFR Part 29 on November 26, 2003. This government-wide regulation implements Executive Order 12549, *Debarment and Suspension*, Executive Order 12689, *Debarment and Suspension*, and 31 U.S.C. 6101 note (Section 2455, Public Law 103-355, 108 Stat. 3327).

The provisions of Part 29 apply to all grantee contracts and subcontracts at any level expected to equal or exceed $25,000 as well as any contract or subcontract (at any level) for Federally required auditing services. 49 CFR 29.220(b). This represents a change from prior practice in that the dollar threshold for application of these rules has been lowered from $100,000 to $25,000. These are contracts and subcontracts referred to in the regulation as "covered transactions."

Grantees, contractors, and subcontractors (at any level) that enter into covered transactions are required to verify that the entity (as well as its principals and affiliates) they propose to contract or subcontract with is not excluded or disqualified. They do this by (a) Checking the Excluded Parties List System, (b) Collecting a certification from that person, or (c) Adding a clause or condition to the contract or subcontract. This represents a change from prior practice in that certification is still acceptable but is no longer required. 49 CFR 29.300.

Grantees, contractors, and subcontractors who enter into covered transactions also must require the entities they contract with to comply with 49 CFR 29, subpart C and include this requirement in their own subsequent covered transactions (i.e., the requirement flows down to subcontracts at all levels).

Suspension and Debarment

This contract is a covered transaction for purposes of 49 CFR Part 29. As such, the contractor is required to verify that none of the contractor, its principals, as defined at 49 CFR 29.995, or affiliates, as defined at 49 CFR 29.905, are excluded or disqualified as defined at 49 CFR 29.940 and 29.945.

The contractor is required to comply with 49 CFR 29, Subpart C and must include the requirement to comply with 49 CFR 29, Subpart C in any lower tier covered transaction it enters into.
By signing and submitting its bid or proposal, the bidder or proposer certifies as follows:

The certification in this clause is a material representation of fact relied upon by Connecticut Department of Transportation. If it is later determined that the bidder or proposer knowingly rendered an erroneous certification, in addition to remedies available to Connecticut Department of Transportation., the Federal Government may pursue available remedies, including but not limited to suspension and/or debarment. The bidder or proposer agrees to comply with the requirements of 49 CFR 29, Subpart C while this offer is valid and throughout the period of any contract that may arise from this offer. The bidder or proposer further agrees to include a provision requiring such compliance in its lower tier covered transactions.

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20. CIVIL RIGHTS REQUIREMENTS
29 U.S.C. § 623, 42 U.S.C. § 2000
42 U.S.C. § 6102, 42 U.S.C. § 12112
42 U.S.C. § 12132, 49 U.S.C. § 5332
29 CFR Part 1630, 41 CFR Parts 60 et seq.

Applicability to Contracts
The Civil Rights Requirements apply to all contracts.

Flow Down
The Civil Rights requirements flow down to all third party contractors and their contracts at every tier.

Model Clause/Language
The following clause was predicated on language contained at 49 CFR Part 19, Appendix A, but FTA has shortened the lengthy text.

Civil Rights - The following requirements apply to the underlying contract:

(1) Nondiscrimination - In accordance with Title VI of the Civil Rights Act, as amended, 42 U.S.C. § 2000d, section 303 of the Age Discrimination Act of 1975, as amended, 42 U.S.C. § 6102, section 202 of the Americans with Disabilities Act of 1990, 42 U.S.C. § 12132, and Federal transit law at 49 U.S.C. § 5332, the Contractor agrees that it will not discriminate against any employee or applicant for employment because of race, color, creed, national origin, sex, age, or disability. In addition, the Contractor agrees to comply with applicable Federal implementing regulations and other implementing requirements FTA may issue.

(2) Equal Employment Opportunity - The following equal employment opportunity requirements apply to the underlying contract:
(a) Race, Color, Creed, National Origin, Sex - In accordance with Title VII of the Civil Rights Act, as amended, 42 U.S.C. § 2000e, and Federal transit laws at 49 U.S.C. § 5332, the Contractor agrees to comply with all applicable equal employment opportunity requirements of U.S. Department of Labor (U.S. DOL) regulations, "Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor," 41 C.F.R. Parts 60 et seq., (which implement Executive Order No. 11246, "Equal Employment Opportunity," as amended by Executive Order No. 11375, "Amending Executive Order 11246 Relating to Equal Employment Opportunity," 42 U.S.C. § 2000e note), and with any applicable Federal statutes, executive orders, regulations, and Federal policies that may in the future affect construction activities undertaken in the course of the Project. The Contractor agrees to

take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, creed, national origin, sex, or age. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. In addition, the Contractor agrees to comply with any implementing requirements FTA may issue.

(b) Age - In accordance with section 4 of the Age Discrimination in Employment Act of 1967, as amended, 29 U.S.C. § § 623 and Federal transit law at 49 U.S.C. § 5332, the Contractor agrees to refrain from discrimination against present and prospective employees for reason of age. In addition, the Contractor agrees to comply with any implementing requirements FTA may issue.

(c) Disabilities - In accordance with section 102 of the Americans with Disabilities Act, as amended, 42 U.S.C. § 12112, the Contractor agrees that it will comply with the requirements of U.S. Equal Employment Opportunity Commission, "Regulations to Implement the Equal Employment Provisions of the Americans with Disabilities Act," 29 C.F.R. Part 1630, pertaining to employment of persons with disabilities. In addition, the Contractor agrees to comply with any implementing requirements FTA may issue.

(3) The Contractor also agrees to include these requirements in each subcontract financed in whole or in part with Federal assistance provided by FTA, modified only if necessary to identify the affected parties.

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21. BREACHES AND DISPUTE RESOLUTION

Refer to the Standard Specifications for Roads, Bridges and Incidental Construction, FORM 816, Sections 1.05.01 and 1.08.01 and Connecticut General Statue 4-61(as amended)

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22. TRANSIT EMPLOYEE PROTECTIVE AGREEMENTS
49 U.S.C. § 5310, § 5311, and § 5333
29 CFR Part 215

Applicability to Contracts
The Transit Employee Protective Provisions apply to each contract for transit operations performed by employees of a Contractor recognized by FTA to be a transit operator. (Because transit operations involve many activities apart from directly driving or operating transit vehicles, FTA determines which activities constitute transit "operations" for purposes of this clause.)

Flow Down
These provisions are applicable to all contracts and subcontracts at every tier.

Transit Employee Protective Provisions. (1) The Contractor agrees to the comply with applicable transit employee protective requirements as follows:

(a) General Transit Employee Protective Requirements - To the extent that FTA determines that transit operations are involved, the Contractor agrees to carry out the transit operations work on the underlying contract in compliance with terms and conditions determined by the U.S. Secretary of Labor to be fair and equitable to protect the interests of employees employed under this contract and to meet the employee protective requirements of 49 U.S.C. A 5333(b), and U.S. DOL guidelines at 29

C.F.R. Part 215, and any amendments thereto. These terms and conditions are identified in the letter of certification from the U.S. DOL to FTA applicable to the FTA Recipient's project from which Federal assistance is provided to support work on the underlying contract. The Contractor agrees to carry out that work in compliance with the conditions stated in that U.S. DOL letter. The requirements of this subsection (1), however, do not apply to any contract financed with Federal assistance provided by FTA either for projects for elderly individuals and individuals with disabilities authorized by 49 U.S.C. § 5310(a)(2), or for projects for nonurbanized areas authorized by 49 U.S.C. § 5311. Alternate provisions for those projects are set forth in subsections (b) and (c) of this clause.

(b) Transit Employee Protective Requirements for Projects Authorized by 49 U.S.C. § 5310(a)(2) for Elderly Individuals and Individuals with Disabilities - If the contract involves transit operations financed in whole or in part with Federal assistance authorized by 49 U.S.C. § 5310(a)(2), and if the U.S. Secretary of Transportation has determined or determines in the future that the employee protective requirements of 49 U.S.C. § 5333(b) are necessary or appropriate for the state and the public body subrecipient for which work is performed on the underlying contract, the Contractor agrees to carry out the Project in compliance with the terms and conditions determined by the U.S. Secretary of Labor to meet the requirements of 49 U.S.C. § 5333(b), U.S. DOL guidelines at 29 C.F.R. Part 215, and any amendments thereto. These terms and conditions are identified in the U.S. DOL's letter of certification to FTA, the date of which is set forth Grant Agreement or Cooperative Agreement with the state. The Contractor agrees to perform transit operations in connection with the underlying contract in compliance with the conditions stated in that U.S. DOL letter.

(c) Transit Employee Protective Requirements for Projects Authorized by 49 U.S.C. § 5311 in Nonurbanized Areas - If the contract involves transit operations financed in whole or in part with Federal assistance authorized by 49 U.S.C. § 5311, the Contractor agrees to comply with the terms and conditions of the Special Warranty for the Nonurbanized Area Program agreed to by the U.S. Secretaries of Transportation and Labor, dated May 31, 1979, and the procedures implemented by U.S. DOL or any revision thereto.

(2) The Contractor also agrees to include the any applicable requirements in each subcontract involving transit operations financed in whole or in part with Federal assistance provided by FTA.

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23. DISADVANTAGED BUSINESS ENTERPRISE (DBE)

Refer to the Special Provision section titled D.B.E. Subcontractors and Material Suppliers or Manufacturers

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24. INCORPORATION OF FEDERAL TRANSIT ADMINISTRATION (FTA) TERMS
FTA Circular 4220.1F

Applicability to Contracts
The incorporation of FTA terms applies to all contracts.

Flow Down
The incorporation of FTA terms has unlimited flow down.

Incorporation of Federal Transit Administration (FTA) Terms - The preceding provisions include, in part, certain Standard Terms and Conditions required by DOT, whether or not expressly set forth in

the preceding contract provisions. All contractual provisions required by DOT, as set forth in FTA Circular 4220.1F, are hereby incorporated by reference. Anything to the contrary herein notwithstanding, all FTA mandated terms shall be deemed to control in the event of a conflict with other provisions contained in this Agreement. The Contractor shall not perform any act, fail to perform any act, or refuse to comply with any (name of grantee) requests which would cause (name of grantee) to be in violation of the FTA terms and conditions.

25. ACCESS FOR INDIVIDUALS WITH DISABILITY

The Contactor agrees to comply with 49 U.S.C. § 5301(d), which states the Federal policy that elderly individuals and individuals with disabilities have the same right as other individuals to use public transportation services and facilities, and that special efforts shall be made in planning and designing those services and facilities to implement transportation accessibility rights for elderly individuals and individuals with disabilities. The Contractor also agrees to comply with all applicable provisions of section 504 of the Rehabilitation Act of 1973, as amended, 29 U.S.C. § 794, which prohibits discrimination on the basis of disability in the administration of programs or activities receiving.

26. NATIONAL INTELLIGENT TRANSPORTATION SYSTEMS ARCHITECURE AND STANDARDS

To the extent applicable, the Contractor agrees to conform to the National Intelligent Transportation Systems (ITS) Architecture and Standards as required by SAFETEA-LU § 5307(c), 23 U.S.C. § 512 note, and follow the provisions of FTA Notice, "FTA National ITS Architecture Policy on Transit Projects," 66 *Fed. Reg.* 1455 *et seq*., January 8, 2001, and any other implementing directives FTA may issue at a later date, except to the extent FTA determines otherwise in writing.

27. ASSIGNABILITY CLAUSE

The State agrees to comply with applicable third party procurement requirements of 49 U.S.C. chapter 53, and ensure that for piggybacking purchases made with FTA-assistance, that contract utilized contains assignability clause that authorizes such piggybacking purchases.

Certification requirement for procurement of steel, iron, or manufactured products.

Certificate of Compliance with 49 U.S.C. 5323(j)(1)

The bidder or offeror hereby certifies that it will meet the requirements of 49 U.S.C. 5323(j)(1) and the applicable regulations in 49 C.F.R. Part 661.5.

Date _____

Signature _____

Company _____

Name _____

Title _____

Certificate of Non-Compliance with 49 U.S.C. 5323(j)(1)

The bidder or offeror hereby certifies that it cannot comply with the requirements of 49 U.S.C. 5323(j)(1) and 49 C.F.R. 661.5, but it may qualify for an exception pursuant to 49 U.S.C. 5323(j)(2)(A), 5323(j)(2)(B), or 5323(j)(2)(D), and 49 C.F.R. 661.7.

Date _____

Signature _____

Company _____

Name _____

Title _____

§661.12 Certification requirement for procurement of buses, other rolling stock and associated equipment.

If buses or other rolling stock (including train control, communication, and traction power equipment) are being procured, the appropriate certificate as set forth below shall be completed and submitted by each bidder in accordance with the requirement contained in §661.13(b) of this part.

Certificate of Compliance with Buy America Rolling Stock Requirements

The bidder or offeror hereby certifies that it will comply with the requirements of 49 U.S.C. 5323(j), and the applicable regulations of 49 CFR 661.11.

Date _____

Signature _____

Company _____

Name _____

Title _____

Certificate of Non-Compliance with Buy America Rolling Stock Requirements

The bidder or offeror hereby certifies that it cannot comply with the requirements of 49 U.S.C. 5323(j), but may qualify for an exception to the requirement consistent with 49 U.S.C. 5323(j)(2)(C), and the applicable regulations in 49 CFR 661.7.

Date _____

Signature _____

Company _____

Name _____

Title _____

Exhibit B of FTA Requirements

(To be submitted with each bid or offer exceeding $100,000)

The undersigned [Contractor] certifies, to the best of his or her knowledge and belief, that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for making lobbying contacts to an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form--LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions [as amended by "Government wide Guidance for New Restrictions on Lobbying," 61 Fed. Reg. 1413 (1/19/96). Note: Language in paragraph (2) herein has been modified in accordance with Section 10 of the Lobbying Disclosure Act of 1995 (P.L. 104-65, to be codified at 2 U.S.C. 1601, *et seq.*)]

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31, U.S.C. § 1352 (as amended by the Lobbying Disclosure Act of 1995). Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

[Note: Pursuant to 31 U.S.C. § 1352(c)(1)-(2)(A), any person who makes a prohibited expenditure or fails to file or amend a required certification or disclosure form shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such expenditure or failure.]

The Contractor, _____, certifies or affirms the truthfulness and accuracy of each statement of its certification and disclosure, if any. In addition, the Contractor understands and agrees that the provisions of 31 U.S.C. A 3801, *et seq.*, apply to this certification and disclosure, if any.

_____ Signature of Contractor's Authorized Official

_____ Name and Title of Contractor's Authorized Official

_____ Date

EXHIBIT B

TITLE VI CONTRACTOR ASSURANCES
APPENDIX A

During the performance of this contract, the contractor, for itself, its assignees and successors in interest (hereinafter referred to as the "contractor") agrees as follows:

1. **Compliance with Regulations**: The contractor (hereinafter includes consultants) will comply with the Regulations relative to Nondiscrimination in Federally-assisted programs of the United States Department of Transportation Federal Highway Administration, as they may be amended from time to time, which are herein incorporated by reference and made a part of this contract.

2. **Nondiscrimination**: The contractor, with regard to the work performed by it during the contract, will not discriminate on the grounds of race, color, national origin, sex, age, disability, income or Limited English Proficiency in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The contractor will not participate directly or indirectly in the discrimination prohibited by the Acts and Regulations, including employment practices when the contract covers any activity, project, or program set forth in Appendix B of 49 CFR Part 21.

3. **Solicitations for Subcontracts, Including Procurements of Materials and Equipment**: In all solicitations, either by bidding, or negotiation made by the contractor for work to be performed under a subcontract, including procurements of materials, or leases of equipment, each potential subcontractor or supplier will be notified by the contractor of the contractor's obligations under this contract and Acts and the Regulations relative to Non-discrimination on the grounds of race, color, or national origin.

4. **Information and Reports**: The contractor will provide all information and reports required by the Acts, the Regulations, and directives issued pursuant thereto and will permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the Recipient or the Federal Highway Administration to be pertinent to ascertain compliance with such Acts, Regulations, and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish this information, the contractor will so certify to the Recipient or the Federal Highway Administration, as appropriate, and will set forth what efforts it has made to obtain the information.

5. **Sanctions for Non-compliance**: In the event of the contractor's non-compliance with the Non-discrimination provisions of this contract, the Recipient will impose such contract sanctions as it or the Federal Highway Administration may determine to be appropriate, including, but not limited to:

    a. withholding contract payments to the contractor under the contract until the contractor complies; and/or
    b. cancelling, terminating, or suspending a contract, in whole or in part.

6. **Incorporation of Provisions**: The contractor will include the provisions of paragraphs one through six in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Acts, the Regulations and directives issued pursuant thereto. The contractor will take action with respect to any subcontract or procurement as the Recipient or the Federal Highway Administration may direct as a means of enforcing such provisions including sanctions for

noncompliance. Provided, that if the contractor becomes involved in, or is threatened with, litigation by a subcontractor, or supplier because of such direction, the contractor may request the Recipient to enter into any litigation to protect the interests of the Recipient. In addition, the contractor may request the United States to enter into the litigation to protect the interests of the United States.

TITLE VI CONTRACTOR ASSURANCES
APPENDIX E

During the performance of this contract, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "contractor") agrees to comply with the following nondiscrimination statutes and authorities; including but not limited to:

- Title VI of the Civil Rights Act of 1964 (78 Stat. 252, 42 U.S.C. § 2000d et seq.), (prohibits discrimination on the basis of race, color, national origin), as implemented by 49 C.F.R. § 21.1 et seq. and 49 C.F.R. part 303;
- The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, (42 U.S.C. § 4601) (prohibits unfair treatment of persons displaced or whose property has been acquired because of Federal or Federal-aid programs and projects);
- Federal-Aid Highway Act of 1973 (23 U.S.C. § 324 et seq.) (prohibits discrimination on the basis of sex);
- Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. § 794 et seq.) (prohibits discrimination on the basis of disability); and 49 C.F.R. part 27;
- The Age Discrimination Act of 1975, as amended (42 U.S.C. § 6101 et seq.) (prohibits discrimination on the basis of age);
- Airport and Airway Improvement Act of 1982 (Pub. L. 97-248 (1982)), as amended (prohibits discrimination based on race, creed, color, national origin, or sex);
- The Civil Rights Restoration Act of 1987 (102 Stat. 28) *(" ... which restore[d] the broad scope of coverage and to clarify the application of Title IX of the Education Amendments of 1972, section 504 of the Rehabilitation Act of 1973, the Age Discrimination Act of 1975, and Title VI of the Civil Rights Act of 1964.");*
- Titles II and III of the Americans with Disabilities Act, which prohibit discrimination on the basis of disability in the operation of public entities, public and private transportation systems, places of public accommodation, and certain testing entities (42 U.S.C. §§ 12131 --12189), as implemented by Department of Justice regulations at 28 C.F.R. parts 35 and 36, and Department of Transportation regulations at 49 C.F.R. parts 37 and 38;
- The Federal Aviation Administration's Non-discrimination statute (49 U.S.C. § 47123) (prohibits discrimination on the basis of race, color, national origin, and sex);
- Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, which ensures non-discrimination against minority populations by discouraging programs, policies, and activities with disproportionately high and adverse human health or environmental effects on minority and low-income populations;
- Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency, and resulting agency guidance, national origin discrimination includes discrimination because of limited English proficiency (LEP). To ensure compliance with Title VI, you must take reasonable steps to ensure that LEP persons have meaningful access to your programs (70 Fed. Reg. at 74087 to 74100);
- Title of the Education Amendments of 1972, as amended, which prohibits you from discriminating because of sex in education programs or activities (20 U.S.C. § 1681 et seq).

EXHIBIT C

CONTRACTOR WORKFORCE UTILIZATION (FEDERAL EXECUTIVE ORDER 11246) / EQUAL EMPLOYMENT OPPORTUNITY

1. **Project Workforce Utilization Goals:**
   These goals are applicable to all the Contractor's construction work (whether or not it is Federal or Federally assisted or funded) performed in the covered area. If the contractor performs construction work in a geographical area located outside of the covered area, it shall apply the goals established for the geographical area where the work is actually performed.

   Whenever the Contractor, or any Subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of $10,000 the provisions of these specifications which contain the applicable goals for minority and female participation.

   The goals for minority and female utilization are expressed in percentage terms for the contractor's aggregate work-force in each trade on all construction work in the covered area, are referenced in the attached Appendix A.

2. **Executive Order 11246**
   The Contractor's compliance with Executive Order 11246 and 41-CFR Part 60-4 shall be based on its implementation of the specific affirmative action obligations required by the specifications set forth in 41 CFR 60-4.3(A) and its efforts to meet the goals established for the geographical area where the contract is to be performed. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade, and the contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from contractor to contractor or from project to project for the sole purpose of meeting the contractor's goals shall be a violation of the contract, the Executive Order and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hour performed.

   If the Contractor is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each Contractor or Subcontractor participating in an approved Plan is individually required to comply with its obligations under the EEO clause, and to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other Contractors or subcontractors toward a goal in an approved Pan does not excuse any covered Contractor's of subcontractor's failure to take good faith efforts to achieve the plan goals and timetables.

   The Contractor shall implement the specific affirmative action standards provided in a through p of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. Covered Construction contractors performing

construction work in geographical areas where they do not have a federal or federally assisted construction contract shall apply the minority and female goals established for the geographical area where the work is being performed. Goals are published periodically in the Federal Register in notice form and such notices may be obtained from any Office of Federal Contract Compliance Programs (OFCCP) Office or from Federal procurement contracting officers. The Contractor is expected to make substantially uniform progress in meeting its goals in each craft during the period specified.

Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the Contractor has a collective bargaining agreement, to refer either minorities or women shall excuse the Contractors obligations under these specifications, Executive Order 11246, or the regulations promulgated pursuant hereto.

In order for the nonworking training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the Contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.

The Contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully, and shall implement affirmative action steps at least as extensive as the following:

a. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites; and in all facilities at which the Contractor's employees are assigned to work. The Contractor, where possible, will assign two or more women to each construction project. The Contractor shall specifically ensure that all foremen, superintendents, and other on-site supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.

b. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the Contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.

c. Maintain a current file of the names, addresses and telephone numbers of each minority and female off the street applicant and minority or female referral from a union, a recruitment source or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union or, if referred, not employed by the Contractor, this shall be documented in the file with the reason thereafter; along with whatever additional actions the Contractor may have taken.

d. Provide immediate written notification to the Director when the Union or Unions with which the Contractor has a collective bargaining agreement has not referred to the Contractor a minority person or women sent by the Contractor, or when the Contractor has other information that the Union referral process has impeded the Contractor's efforts to meet its obligations.

e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the sources compiled under b above.

f. Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO Policy on bulletin boards accessible to all employees at each location where construction work is performed.

g. Review, at least annually, the company EEO Policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination or other employment, decisions including specific Foreman, etc. prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.

h. Disseminate the Contractor's EEO Policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the Contractor's EEO policy with other Contractors and subcontractors with whom the Contractor does or anticipates doing business.

i. Direct its recruitment efforts, both oral and written, to minority female and community organizations, to schools with minority and female students and to minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the contractor shall send written notification to organizations such as the above, describing the openings, screening procedures and tests to be used in the selection process.

j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer and vacation employment to minority and female youth both on the site and in other areas of a Contractor's work-force.

k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR Part 60-3.

l. Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.

m. Ensure that seniority practices, job classifications, work assignments and other personnel practices, do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.

n. Ensure that all facilities and company activities are non-segregated except that separate or single user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.

o. Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.

p. Conduct a review at least annually of all supervisors' adherence to and performance under the Contractor's EEO policies and affirmative action obligations.

Contractors are encouraged to participate in voluntary associations which assist in fulfilling one or more of their affirmative action obligations (a through p). The efforts of a contractor association, joint contractor union, contractor community, or other similar group of which the contractor is a member and participant, may be asserted as fulfilling any one or more of its obligations under a through p of these specifications provided that the contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the Contractor's minority and female work-force participation, makes a good faith effort to meet with individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply, however, is the Contractor's and failure of such a group to fulfill an obligation shall not be a defense for the Contractor's noncompliance.

A single goal for minorities and a separate single goal for women have been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, the Contractor may be in violation of Executive Order 11246 if a particular group is employed in a substantially disparate manner, (for example, even though the Contractor has achieved its goals for women generally, the Contractor may be in violation of the Executive Order if a specific minority group of women is under utilized).

The Contractor shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, religion, sex, or national origin.

The Contractor shall not enter into any Subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.

The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations by the Office of Federal Contract Compliance Programs. Any Contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.

The Contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the

implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR 60-4 8.

The Contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government and to keep records. Records shall at least include for each employee the name, address, telephone numbers, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status, (e.g. mechanic, apprentice, trainee, helper, or laborer) dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.

Nothing herein provided shall be construed as a limitation upon the application of their laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g. those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

The Director of the Office of Federal Contract Compliance Programs, from time to time, shall issue goals and timetables for minority and female utilization which shall be based on appropriate work-force, demographic or other relevant data and which shall cover construction projects or construction contracts performed in specific geographical areas. The goals, which shall be applicable to each construction trade in a covered contractor's or timetables, shall be published as notices in the Federal Register, and shall be inserted by the Contracting officers and applicants, as applicable, in the Notice required by 41 CFR 60-4.2.

FEDERALLY FUNDED OR ASSISTED PROJECTS
APPENDIX A
(Labor Market Goals)

Standard Metropolitan Statistical Area (SMSA)

Female			**Minority**
Bridgeport – Stamford – Norwalk – Danbury			**10.2%**
6.9%			
Bethel	Bridgeport	Brookfield	Danbury
Darien	Derby	Easton	Fairfield
Greenwich	Milford	Monroe	New Canaan
New Fairfield	Newton	Norwalk	Redding
Shelton	Stamford	Stratford	Trumbull
Weston	Westport	Wilton	
Hartford – Bristol – New Britain			**6.9%**
6.9%			
Andover	Avon	Berlin	Bloomfield
Bolton	Bristol	Burlington	Canton
Colchester	Columbia	Coventry	Cromwell
East Granby	East Hampton	East Hartford	East Windsor
Ellington	Enfield	Farmington	Glastonbury
Granby	Hartford	Hebron	Manchester
Marlborough	New Britain	New Hartford	Newington
Plainville	Plymouth	Portland	Rocky Hill
Simsbury	South Windsor	Southington	Stafford
Suffield	Tolland	Vernon	West Hartford
Wethersfield	Willington	Windsor	Windsor Locks
New Haven – Waterbury – Meriden			**9.0%**
6.9%			
Beacon Falls	Bethany	Branford	Cheshire
Clinton	East Haven	Guilford	Hamden
Madison	Meriden	Middlebury	Naugatuck
New Haven	North Branford	North Haven	Orange
Prospect	Southbury	Thomaston	Wallingford
Waterbury	Watertown	West Haven	Wolcott
Woodbridge	Woodbury		
New London – Norwich			**4.5%**
6.9%			
Bozrah	East Lyme	Griswold	Groton
Ledyard	Lisbon	Montville	New London
Norwich	Old Lyme	Old Saybrook	Preston
Sprague	Stonington	Waterford	

Non SMSA

Female			**Minority**
Litchfield – Windham			**5.9%**
6.9%			
Abington	Ashford	Ballouville	Bantam
Barkhamsted	Bethlehem	Bridgewater	Brooklyn
Canaan	Canterbury	Central Village	Cahplin
Colebrook	Cornwall	Cornwall Bridge	Danielson
Dayville	East Canaan	East Killingly	East Woodstock
Eastford	Falls Village	Gaylordsville	Goshen
Grosvenor Dale	Hampton	Harwinton	Kent
Killignly	Lakeside	Litchfield	Moosup
Morris	New Milford	New Preston	New Preston Marble Dale
Norfolk	North Canaan	No. Grosvenordale	North Windham
Oneco	Pequabuck	Pine Meadow	Plainfield
Pleasant Valley	Pomfret	Pomfret Center	Putnam
Quinebaug	Riverton	Rogers	Roxbury
Salisbury	Scotland	Sharon	South Kent
South Woodstock	Sterling	Taconic	Terryville
Thompson	Torrington	Warren	Warrenville
Washington	Washington Depot	Wauregan	West Cornwall
Willimantic	Winchester	Winchester Center	Windham
Winsted	Woodstock	Woodstock Valley	

EXHIBIT D

Health Insurance Portability and Accountability Act of 1996 ("HIPAA").

(a) If the Contactor is a Business Associate under the requirements of the Health Insurance Portability and Accountability Act of 1996 ("HIPAA"), the Contractor must comply with all terms and conditions of this Section of the Contract. If the Contractor is not a Business Associate under HIPAA, this Section of the Contract does not apply to the Contractor for this Contract.

(b) The Contractor is required to safeguard the use, publication and disclosure of information on all applicants for, and all clients who receive, services under the Contract in accordance with all applicable federal and state law regarding confidentiality, which includes but is not limited to HIPAA, more specifically with the Privacy and Security Rules at 45 C.F.R. Part 160 and Part 164, subparts A, C, and E; and

(c) The State of Connecticut Agency named on page 1 of this Contract (hereinafter the "Department") is a "covered entity" as that term is defined in 45 C.F.R. § 160.103; and

(d) The Contractor, on behalf of the Department, performs functions that involve the use or disclosure of "individually identifiable health information," as that term is defined in 45 C.F.R. § 160.103; and

(e) The Contractor is a "business associate" of the Department, as that term is defined in 45 C.F.R. § 160.103; and

(f) The Contractor and the Department agree to the following in order to secure compliance with the HIPAA, the requirements of Subtitle D of the Health Information Technology for Economic and Clinical Health Act (hereinafter the HITECH Act), (Pub. L. 111-5, sections 13400 to 13423), and more specifically with the Privacy and Security Rules at 45 C.F.R. Part 160 and Part 164, subparts A, C, and E.

(g) Definitions

(1) "Breach shall have the same meaning as the term is defined in section 13400 of the HITECH Act (42 U.S.C. §17921(1))

(2) "Business Associate" shall mean the Contractor.

(3) "Covered Entity" shall mean the Department of the State of Connecticut named on page 1 of this Contract.

(4) "Designated Record Set" shall have the same meaning as the term "designated record set" in 45 C.F.R. § 164.501.

(5) "Electronic Health Record" shall have the same meaning as the term is defined in section 13400 of the HITECH Act (42 U.S.C. §17921(5))

(6) "Individual" shall have the same meaning as the term "individual"' in 45 C.F.R. § 160.103 and shall include a person who qualifies as a personal representative as defined in 45 C.F.R. § 164.502(g).

(7) "Privacy Rule" shall mean the Standards for Privacy of Individually Identifiable Health Information at 45 C.F.R. part 160 and parts 164, subparts A and E.

(8) "Protected Health Information" or "PHI" shall have the same meaning as the term "protected health information" in 45 C.F.R. § 160.103, limited to information created or received by the Business Associate from or on behalf of the Covered Entity.

(9) "Required by Law"' shall have the same meaning as the term "required by law" in 45 C.F.R. § 164.103.

(10) "Secretary" shall mean the Secretary of the Department of Health and Human Services or his designee.

(11) "More stringent" shall have the same meaning as the term "more stringent" in 45 C.F.R. § 160.202.

(12) "This Section of the Contract" refers to the HIPAA Provisions stated herein, in their entirety.

(13) "Security Incident" shall have the same meaning as the term "security incident" in 45 C.F.R.§ 164.304.

(14) "Security Rule" shall mean the Security Standards for the Protection of Electronic Protected Health Information at 45 C.F.R. part 160 and parts 164, subpart A and C.

(15) "Unsecured protected health information" shall have the same meaning as the term as defined in section 13402(h)(1)(A) of HITECH. Act. (42 U.S.C. §17932(h)(1)(A)).

(h) Obligations and Activities of Business Associates.

(1) Business Associate agrees not to use or disclose PHI other than as permitted or required by this Section of the Contract or as Required by Law.

(2) Business Associate agrees to use appropriate safeguards to prevent use or disclosure of PHI other than as provided for in this Section of the Contract.

(3) Business Associate agrees to use administrative, physical and technical safeguards that reasonably and appropriately protect the confidentiality, integrity, and availability of electronic protected health information that it creates, receives, maintains, or transmits on behalf of the Covered Entity.

(4) Business Associate agrees to mitigate, to the extent practicable, any harmful effect that is known to the Business Associate of a use or disclosure of PHI by Business Associate in violation of this Section of the Contract.

(5) Business Associate agrees to report to Covered Entity any use or disclosure of PHI not provided for by this Section of the Contract or any security incident of which it becomes aware.

(6) Business Associate agrees to insure that any agent, including a subcontractor, to whom it provides PHI received from, or created or received by Business Associate, on behalf of the Covered Entity, agrees to the same restrictions and conditions that apply through this Section of the Contract to Business Associate with respect to such information.

(7) Business Associate agrees to provide access, at the request of the Covered Entity, and in the time and manner agreed to by the parties, to PHI in a Designated Record Set, to Covered Entity or, as directed by Covered Entity, to an Individual in order to meet the requirements under 45 C.F.R. § 164.524.

(8) Business Associate agrees to make any amendments to PHI in a Designated Record Set that the Covered Entity directs or agrees to pursuant to 45 C.F.R. § 164.526 at the request of the Covered Entity, and in the time and manner agreed to by the parties.

(9) Business Associate agrees to make internal practices, books, and records, including policies and procedures and PHI, relating to the use and disclosure of PHI received from, or created or received by, Business Associate on behalf of Covered Entity, available to Covered Entity or to the Secretary in a time and manner agreed to by the parties or designated by the Secretary, for purposes of the Secretary determining Covered Entity's compliance with the Privacy Rule.

(10) Business Associate agrees to document such disclosures of PHI and information related to such disclosures as would be required for Covered Entity to respond to a request by an Individual for an accounting of disclosures of PHI in accordance with 45 C.F.R. § 164.528 and section 13405 of the HITECH Act (42 U.S.C. § 17935) and any regulations promulgated thereunder.

(11) Business Associate agrees to provide to Covered Entity, in a time and manner agreed to by the parties, information collected in accordance with clause h. (10) of this Section of the Contract, to permit Covered Entity to respond to a request by an Individual for an accounting of disclosures of PHI in accordance with 45 C.F.R. § 164.528 and section 13405 of the HITECH Act (42 U.S.C. § 17935) and any regulations promulgated thereunder. Business Associate agrees at the Covered Entity's direction to provide an accounting of disclosures of PHI directly to an individual in accordance with 45 C.F.R. § 164.528 and section 13405 of the HITECH Act (42 U.S.C. § 17935) and any regulations promulgated thereunder.

(12) Business Associate agrees to comply with any state or federal law that is more stringent than the Privacy Rule.

(13) Business Associate agrees to comply with the requirements of the HITECH Act relating to privacy and security that are applicable to the Covered Entity and with the requirements of 45 C.F.R. sections 164.504(e), 164.308, 164.310, 164.312, and 164.316.

(14) In the event that an individual requests that the Business Associate (a) restrict disclosures of PHI; (b) provide an accounting of disclosures of the individual's PHI; or (c) provide a copy of the individual's PHI in an electronic health record, the Business Associate agrees to notify the covered entity, in writing, within two business days of the request.

(15) Business Associate agrees that it shall not, directly or indirectly, receive any remuneration in exchange for PHI of an individual without (1) the written approval of the covered entity, unless receipt of remuneration in exchange for PHI is expressly authorized by this Contract and (2) the valid authorization of the individual, except for the purposes provided under section 13405(d)(2) of the HITECH Act,(42 U.S.C. § 17935(d)(2)) and in any accompanying regulations

(16) Obligations in the Event of a Breach

A. The Business Associate agrees that, following the discovery of a breach of unsecured protected health information, it shall notify the Covered Entity of such breach in accordance with the requirements of section 13402 of HITECH (42 U.S.C. 17932(b) and the provisions of this Section of the Contract.
B. Such notification shall be provided by the Business Associate to the Covered Entity without unreasonable delay, and in no case later than 30 days after the breach is discovered by the Business Associate, except as otherwise instructed in writing by a law enforcement official pursuant to section 13402 (g) of HITECH (42 U.S.C. 17932(g)) . A breach is considered discovered as of the first day on which it is, or reasonably should have been, known to the Business Associate. The notification shall include the identification and last known address, phone number and email address of each individual (or the next of kin of the individual if the individual is deceased) whose unsecured protected health information has been, or is reasonably believed by the Business Associate to have been, accessed, acquired, or disclosed during such breach.
C. The Business Associate agrees to include in the notification to the Covered Entity at least the following information:
    1. A brief description of what happened, including the date of the breach and the date of the discovery of the breach, if known.

    2. A description of the types of unsecured protected health information that were involved in the breach (such as full name, Social Security number, date of birth, home address, account number, or disability code).

    3. The steps the Business Associate recommends that individuals take to protect themselves from potential harm resulting from the breach.

    4. A detailed description of what the Business Associate is doing to investigate the breach, to mitigate losses, and to protect against any further breaches.

    5. Whether a law enforcement official has advised either verbally or in writing the Business Associate that he or she has determined that notification or notice to

individuals or the posting required under section 13402 of the HITECH Act would impede a criminal investigation or cause damage to national security and; if so, include contact information for said official.

D. Business Associate agrees to provide appropriate staffing and have established procedures to ensure that individuals informed by the Covered Entity of a breach by the Business Associate have the opportunity to ask questions and contact the Business Associate for additional information regarding the breach. Such procedures shall include a toll-free telephone number, an e-mail address, a posting on its Web site and a postal address. Business Associate agrees to include in the notification of a breach by the Business Associate to the Covered Entity, a written description of the procedures that have been established to meet these requirements. Costs of such contact procedures will be borne by the Contractor.

E. Business Associate agrees that, in the event of a breach, it has the burden to demonstrate that it has complied with all notifications requirements set forth above, including evidence demonstrating the necessity of a delay in notification to the Covered Entity.

(i) Permitted Uses and Disclosure by Business Associate.

(1) General Use and Disclosure Provisions Except as otherwise limited in this Section of the Contract, Business Associate may use or disclose PHI to perform functions, activities, or services for, or on behalf of, Covered Entity as specified in this Contract, provided that such use or disclosure would not violate the Privacy Rule if done by Covered Entity or the minimum necessary policies and procedures of the Covered Entity.

(2) Specific Use and Disclosure Provisions

(A) Except as otherwise limited in this Section of the Contract, Business Associate may use PHI for the proper management and administration of Business Associate or to carry out the legal responsibilities of Business Associate.

(B) Except as otherwise limited in this Section of the Contract, Business Associate may disclose PHI for the proper management and administration of Business Associate, provided that disclosures are Required by Law, or Business Associate obtains reasonable assurances from the person to whom the information is disclosed that it will remain confidential and used or further disclosed only as Required by Law or for the purpose for which it was disclosed to the person, and the person notifies Business Associate of any instances of which it is aware in which the confidentiality of the information has been breached.

(C) Except as otherwise limited in this Section of the Contract, Business Associate may use PHI to provide Data Aggregation services to Covered Entity as permitted by 45 C.F.R. § 164.504(e)(2)(i)(B).

(j) Obligations of Covered Entity.

(1) Covered Entity shall notify Business Associate of any limitations in its notice of privacy practices of Covered Entity, in accordance with 45 C.F.R. § 164.520, or to the extent that such limitation may affect Business Associate's use or disclosure of PHI.

(2) Covered Entity shall notify Business Associate of any changes in, or revocation of, permission by Individual to use or disclose PHI, to the extent that such changes may affect Business Associate's use or disclosure of PHI.

(3) Covered Entity shall notify Business Associate of any restriction to the use or disclosure of PHI that Covered Entity has agreed to in accordance with 45 C.F.R. § 164.522, to the extent that such restriction may affect Business Associate's use or disclosure of PHI.

(k) Permissible Requests by Covered Entity. Covered Entity shall not request Business Associate to use or disclose PHI in any manner that would not be permissible under the Privacy Rule if done by the Covered Entity, except that Business Associate may use and disclose PHI for data aggregation, and management and administrative activities of Business Associate, as permitted under this Section of the Contract.

(l) Term and Termination.

(1) Term. The Term of this Section of the Contract shall be effective as of the date the Contract is effective and shall terminate when the information collected in accordance with clause h. (10) of this Section of the Contract is provided to the Covered Entity and all of the PHI provided by Covered Entity to Business Associate, or created or received by Business Associate on behalf of Covered Entity, is destroyed or returned to Covered Entity, or, if it is infeasible to return or destroy PHI, protections are extended to such information, in accordance with the termination provisions in this Section.

(2) Termination for Cause Upon Covered Entity's knowledge of a material breach by Business Associate, Covered Entity shall either:

(A) Provide an opportunity for Business Associate to cure the breach or end the violation and terminate the Contract if Business Associate does not cure the breach or end the violation within the time specified by the Covered Entity; or

(B) Immediately terminate the Contract if Business Associate has breached a material term of this Section of the Contract and cure is not possible; or

(C) If neither termination nor cure is feasible, Covered Entity shall report the violation to the Secretary.

(3) Effect of Termination

(A) Except as provided in (l)(2) of this Section of the Contract, upon termination of this Contract, for any reason, Business Associate shall return or destroy all PHI received from Covered Entity, or created or received by Business Associate on behalf of Covered Entity. Business Associate shall also provide the information collected in accordance with clause h. (10) of this Section of the Contract to the Covered Entity

within ten business days of the notice of termination. This provision shall apply to PHI that is in the possession of subcontractors or agents of Business Associate. Business Associate shall retain no copies of the PHI.

(B) In the event that Business Associate determines that returning or destroying the PHI is infeasible, Business Associate shall provide to Covered Entity notification of the conditions that make return or destruction infeasible. Upon documentation by Business Associate that return or destruction of PHI is infeasible, Business Associate shall extend the protections of this Section of the Contract to such PHI and limit further uses and disclosures of PHI to those purposes that make return or destruction infeasible, for as long as Business Associate maintains such PHI. Infeasibility of the return or destruction of PHI includes, but is not limited to, requirements under state or federal law that the Business Associate maintains or preserves the PHI or copies thereof.

(m) Miscellaneous Provisions.

(1) Regulatory References. A reference in this Section of the Contract to a section in the Privacy Rule means the section as in effect or as amended.

(2) Amendment. The Parties agree to take such action as in necessary to amend this Section of the Contract from time to time as is necessary for Covered Entity to comply with requirements of the Privacy Rule and the Health Insurance Portability and Accountability Act of 1996, Pub. L. No. 104-191.

(3) Survival. The respective rights and obligations of Business Associate shall survive the termination of this Contract.

(4) Effect on Contract. Except as specifically required to implement the purposes of this Section of the Contract, all other terms of the Contract shall remain in force and effect.

(5) Construction. This Section of the Contract shall be construed as broadly as necessary to implement and comply with the Privacy Standard. Any ambiguity in this Section of the Contract shall be resolved in favor of a meaning that complies, and is consistent with, the Privacy Standard.

(6) Disclaimer. Covered Entity makes no warranty or representation that compliance with this Section of the Contract will be adequate or satisfactory for Business Associate's own purposes. Covered Entity shall not be liable to Business Associate for any claim, civil or criminal penalty, loss or damage related to or arising from the unauthorized use or disclosure of PHI by Business Associate or any of its officers, directors, employees, contractors or agents, or any third party to whom Business Associate has disclosed PHI contrary to the provisions of this Contract or applicable law. Business Associate is solely responsible for all decisions made, and actions taken, by Business Associate regarding the safeguarding, use and disclosure of PHI within its possession, custody or control.

(7) Indemnification. The Business Associate shall indemnify and hold the Covered Entity harmless from and against any and all claims, liabilities, judgments, fines, assessments, penalties, awards and any statutory damages that may be imposed or assessed pursuant to HIPAA, as amended or the

HITECH Act, including, without limitation, attorney's fees, expert witness fees, costs of investigation, litigation or dispute resolution, and costs awarded thereunder, relating to or arising out of any violation by the Business Associate and its agents, including subcontractors, of any obligation of Business Associate and its agents, including subcontractors, under this section of the contract, under HIPAA, the HITECH Act, the Privacy Rule and the Security Rule.

Notice to Executive Branch State Contractors and Prospective State Contractors of Campaign Contribution and Solicitation Limitations

This notice is provided under the authority of Connecticut General Statutes §9-612 (f) (2) and is for the purpose of informing state contractors and prospective state contractors of the following law (italicized words are defined on the reverse side of this page).

CAMPAIGN CONTRIBUTION AND SOLICITATION LIMITATIONS

No *state contractor, prospective state contractor, principal of a state contractor or principal of a prospective state contractor*, with regard to a *state contract* or *state contract solicitation* with or from a state agency in the executive branch or a quasi-public agency or a holder, or principal of a holder, of a valid prequalification certificate, shall make a contribution to (i) an exploratory committee or candidate committee established by a candidate for nomination or election to the office of Governor, Lieutenant Governor, Attorney General, State Comptroller, Secretary of the State or State Treasurer, (ii) a political committee authorized to make contributions or expenditures to or for the benefit of such candidates, or (iii) a party committee (which includes town committees).

In addition, no holder or principal of a holder of a valid prequalification certificate, shall make a contribution to (i) an exploratory committee or candidate committee established by a candidate for nomination or election to the office of State senator or State representative, (ii) a political committee authorized to make contributions or expenditures to or for the benefit of such candidates, or (iii) a party committee.

On and after January 1, 2011, no state contractor, prospective state contractor, principal of a state contractor or principal of a prospective state contractor, with regard to a state contract or state contract solicitation with or from a state agency in the executive branch or a quasi-public agency or a holder, or principal of a holder of a valid prequalification certificate, shall **knowingly** *solicit* contributions from the state contractor's or prospective state contractor's employees or from a *subcontractor* or *principals of the subcontractor* on behalf of (i) an exploratory committee or candidate committee established by a candidate for nomination or election to the office of Governor, Lieutenant Governor, Attorney General, State Comptroller, Secretary of the State or State Treasurer, (ii) a political committee authorized to make contributions or expenditures to or for the benefit of such candidates, or (iii) a party committee.

DUTY TO INFORM

State contractors and prospective state contractors are required to inform their principals of the above prohibitions, as applicable, and the possible penalties and other consequences of any violation thereof.

PENALTIES FOR VIOLATIONS

Contributions or solicitations of contributions made in violation of the above prohibitions may result in the following civil and criminal penalties:

Civil penalties—Up to $2,000 or twice the amount of the prohibited contribution, whichever is greater, against a principal or a contractor. Any state contractor or prospective state contractor which fails to make reasonable efforts to comply with the provisions requiring notice to its principals of these prohibitions and the possible consequences of their violations may also be subject to civil penalties of up to $2,000 or twice the amount of the prohibited contributions made by their principals.

Criminal penalties—Any knowing and willful violation of the prohibition is a Class D felony, which may subject the violator to imprisonment of not more than 5 years, or not more than $5,000 in fines, or both.

CONTRACT CONSEQUENCES

In the case of a state contractor, contributions made or solicited in violation of the above prohibitions may result in the contract being voided.

In the case of a prospective state contractor, contributions made or solicited in violation of the above prohibitions shall result in the contract described in the state contract solicitation not being awarded to the prospective state contractor, unless the State Elections Enforcement Commission determines that mitigating circumstances exist concerning such violation.

The State shall not award any other state contract to anyone found in violation of the above prohibitions for a period of one year after the election for which such contribution is made or solicited, unless the State Elections Enforcement Commission determines that mitigating circumstances exist concerning such violation.

Additional information may be found on the website of the State Elections Enforcement Commission, www.ct.gov/seec. Click on the link to "Lobbyist/Contractor Limitations."

DEFINITIONS

"State contractor" means a person, business entity or nonprofit organization that enters into a state contract. Such person, business entity or nonprofit organization shall be deemed to be a state contractor until December thirty-first of the year in which such contract terminates. "State contractor" does not include a municipality or any other political subdivision of the state, including any entities or associations duly created by the municipality or political subdivision exclusively amongst themselves to further any purpose authorized by statute or charter, or an employee in the executive or legislative branch of state government or a quasi-public agency, whether in the classified or unclassified service and full or part-time, and only in such person's capacity as a state or quasi-public agency employee.

"Prospective state contractor" means a person, business entity or nonprofit organization that (i) submits a response to a state contract solicitation by the state, a state agency or a quasi-public agency, or a proposal in response to a request for proposals by the state, a state agency or a quasi-public agency, until the contract has been entered into, or (ii) holds a valid prequalification certificate issued by the Commissioner of Administrative Services under section 4a-100. "Prospective state contractor" does not include a municipality or any other political subdivision of the state, including any entities or associations duly created by the municipality or political subdivision exclusively amongst themselves to further any purpose authorized by statute or charter, or an employee in the executive or legislative branch of state government or a quasi-public agency, whether in the classified or unclassified service and full or part-time, and only in such person's capacity as a state or quasi-public agency employee.

"Principal of a state contractor or prospective state contractor" means (i) any individual who is a member of the board of directors of, or has an ownership interest of five per cent or more in, a state contractor or prospective state contractor, which is a business entity, except for an individual who is a member of the board of directors of a nonprofit organization**,** (ii) an individual who is employed by a state contractor or prospective state contractor, which is a business entity, as president, treasurer or executive vice president, (iii) an individual who is the chief executive officer of a state contractor or prospective state contractor, which is not a business entity, or if a state contractor or prospective state contractor has no such officer, then the officer who duly possesses comparable powers and duties, (iv) an officer or an employee of any state contractor or prospective state contractor who has *managerial or discretionary responsibilities with respect to a state contract,* (v) the spouse or a *dependent child* who is eighteen years of age or older of an individual described in this subparagraph, or (vi) a political committee established or controlled by an individual described in this subparagraph or the business entity or nonprofit organization that is the state contractor or prospective state contractor.

"State contract" means an agreement or contract with the state or any state agency or any quasi-public agency, let through a procurement process or otherwise, having a value of fifty thousand dollars or more, or a combination or series of such agreements or contracts having a value of one hundred thousand dollars or more in a calendar year, for (i) the rendition of services, (ii) the furnishing of any goods, material, supplies, equipment or any items of any kind, (iii) the construction, alteration or repair of any public building or public work, (iv) the acquisition, sale or lease of any land or building, (v) a licensing arrangement, or (vi) a grant, loan or loan guarantee. "State contract" does not include any agreement or contract with the state, any state agency or any quasi-public agency that is exclusively federally funded, an education loan, a loan to an individual for other than commercial purposes or any agreement or contract between the state or any state agency and the United States Department of the Navy or the United States Department of Defense.

"State contract solicitation" means a request by a state agency or quasi-public agency, in whatever form issued, including, but not limited to, an invitation to bid, request for proposals, request for information or request for quotes, inviting bids, quotes or other types of submittals, through a competitive procurement process or another process authorized by law waiving competitive procurement.

"Managerial or discretionary responsibilities with respect to a state contract" means having direct, extensive and substantive responsibilities with respect to the negotiation of the state contract and not peripheral, clerical or ministerial responsibilities.

"Dependent child" means a child residing in an individual's household who may legally be claimed as a dependent on the federal income tax of such individual.

"Solicit" means (A) requesting that a contribution be made, (B) participating in any fundraising activities for a candidate committee, exploratory committee, political committee or party committee, including, but not limited to, forwarding tickets to potential contributors, receiving contributions for transmission to any such committee, serving on the committee that is hosting a fundraising event, introducing the candidate or making other public remarks at a fundraising event, being honored or otherwise recognized at a fundraising event, or bundling contributions, (C) serving as chairperson, treasurer or deputy treasurer of any such committee, or (D) establishing a political committee for the sole purpose of soliciting or receiving contributions for any committee. Solicit does not include: (i) making a contribution that is otherwise permitted by Chapter 155 of the Connecticut General Statutes; (ii) informing any person of a position taken by a candidate for public office or a public official, (iii) notifying the person of any activities of, or contact information for, any candidate for public office; or (iv) serving as a member in any party committee or as an officer of such committee that is not otherwise prohibited in this section.

"Subcontractor" means any person, business entity or nonprofit organization that contracts to perform part or all of the obligations of a state contractor's state contract. Such person, business entity or nonprofit organization shall be deemed to be a subcontractor until December thirty first of the year in which the subcontract terminates. "Subcontractor" does not include (i) a municipality or any other political subdivision of the state, including any entities or associations duly created by the municipality or political subdivision exclusively amongst themselves to further any purpose authorized by statute or charter, or (ii) an employee in the executive or legislative branch of state government or a quasi-public agency, whether in the classified or unclassified service and full or part-time, and only in such person's capacity as a state or quasi-public agency employee.

"Principal of a subcontractor" means (i) any individual who is a member of the board of directors of, or has an ownership interest of five per cent or more in, a subcontractor, which is a business entity, except for an individual who is a member of the board of directors of a nonprofit organization, (ii) an individual who is employed by a subcontractor, which is a business entity, as president, treasurer or executive vice president, (iii) an individual who is the chief executive officer of a subcontractor, which is not a business entity, or if a subcontractor has no such officer, then the officer who duly possesses comparable powers and duties, (iv) an officer or an employee of any subcontractor who has managerial or discretionary responsibilities with respect to a subcontract with a state contractor, (v) the spouse or a dependent child who is eighteen years of age or older of an individual described in this subparagraph, or (vi) a political committee established or controlled by an individual described in this subparagraph or the business entity or nonprofit organization that is the subcontractor.

EXHIBIT F

(Federal wage rate package will be inserted here for final executed contract only. Refer to NTC – Federal Wage Determinations)

EXHIBIT G

(State wages will be inserted here)

Construction Contracts - Required Contract Provisions
(State Funded Only Contracts)

Index

18. Tangible Personal Property

19. Bid Rigging and/or Fraud – Notice to Contractor

20. Consulting Agreement Affidavit

Index of Exhibits

1. Title VI of the Civil Rights Act of 1964 / Nondiscrimination Requirements

The Contractor shall comply with Title VI of the Civil Rights Act of 1964 as amended (42 U.S.C. 2000 et seq.), all requirements imposed by the regulations of the United States Department of Transportation (49 CFR Part 21) issued in implementation thereof, and the Title VI Contractor Assurances attached hereto at Exhibit A, all of which are hereby made a part of this Contract.

2. Contractor Work Force Utilization / Equal Employment Opportunity

(a) The Contractor shall comply with the Contractor Work Force Utilization / Equal Employment Opportunity requirements attached at Exhibit B and hereby made part of this Contract, whenever a contractor or subcontractor at any tier performs construction work in excess of $10,000. These goals shall be included in each contract and subcontract. Goal achievement is calculated for each trade using the hours worked under each trade.

(b) Companies with contracts, agreements or purchase orders valued at $10,000 or more will develop and implement an Affirmative Action Plan utilizing the ConnDOT Affirmative Action Plan Guideline. This Plan shall be designed to further the provision of equal employment opportunity to all persons without regard to their race, color, religion, sex or national origin, and to promote the full realization of equal employment opportunity through a positive continuation program. Plans shall be updated as required by ConnDOT.

3. Contract Wage Rates

The Contractor shall comply with:

The State wage rate requirements indicated in Exhibit E hereof are hereby made part of this Contract.

Prevailing Wages for Work on State Highways; Annual Adjustments. With respect to contracts for work on state highways and bridges on state highways, the Contractor shall comply with the provisions of Section 31-54 and 31-55a of the Connecticut General Statutes, as revised.

As required by section 1.05.12 (Payrolls) of the State of Connecticut, Department of Transportation's Standard Specification for Roads, Bridges and Incidental Construction (FORM 816), as may be revised, every Contractor or subcontractor performing project work on a federal aid project is required to post the relevant prevailing wage rates as determined by the United States Secretary of Labor. The wage rate determinations shall be posted in prominent and easily accessible places at the work site.

4. Americans with Disabilities Act of 1990, as Amended

This provision applies to those Contractors who are or will be responsible for compliance with the terms of the Americans with Disabilities Act of 1990, as amended (42 U.S.C. 12101 et seq.), (Act), during the term of the Contract. The Contractor represents that it is familiar with the terms of this Act and that it is in compliance with the Act. Failure of the Contractor to satisfy this standard as the same applies to performance under this Contract, either now or during the term of the Contract as it may be amended, will render the Contract voidable at the option of the State upon notice to the contractor. The Contractor warrants that it will hold the State harmless and indemnify the State from any liability which may be imposed upon the State as a result of any failure of the Contractor to be in compliance with this Act, as the same applies to performance under this Contract.

5. Connecticut Statutory Labor Requirements

(a) Construction, Alteration or Repair of Public Works Projects; Wage Rates. The Contractor shall comply with Section 31-53 of the Connecticut General Statutes, as revised. The wages paid on an hourly basis to any person performing the work of any mechanic, laborer or worker on the work herein contracted to be done and the amount of payment or contribution paid or payable on behalf of each such person to any employee welfare fund, as defined in subsection (i) of section 31-53 of the Connecticut General Statutes, shall be at a rate equal to the rate customary or prevailing for the same work in the same trade or occupation in the town in which such public works project is being constructed. Any contractor who is not obligated by agreement to make payment or contribution on behalf of such persons to any such employee welfare fund shall pay to each mechanic, laborer or worker as part of such person's wages the amount of payment or contribution for such person's classification on each pay day.

(b) Debarment List. Limitation on Awarding Contracts. The Contractor shall comply with Section 3l-53a of the Connecticut General Statutes, as revised.

(c) Construction Safety and Health Course. The Contractor shall comply with section 31-53b of the Connecticut General Statutes, as revised. The contractor shall furnish proof to the Labor Commissioner with the weekly certified payroll form for the first week each employee begins work on such project that any person performing the work of a mechanic, laborer or worker pursuant to the classifications of labor under section 31-53 of the Connecticut General Statutes, as revised, on such public works project, pursuant to such contract, has completed a course of at least ten hours in duration in construction safety and health approved by the federal Occupational Safety and Health Administration or, has completed a new miner training program approved by the Federal Mine Safety and Health Administration in accordance with 30 CFR 48 or, in the case of telecommunications employees, has completed at least ten hours of training in accordance with 29 CFR 1910.268.

Any employee required to complete a construction safety and health course as required that has not completed the course, shall have a maximum of fourteen (14) days to complete the course. If the employee has not been brought into compliance, they shall be removed from the project until such time as they have completed the required training.

Any costs associated with this notice shall be included in the general cost of the contract. In addition, there shall be no time granted to the contractor for compliance with this notice. The contractor's compliance with this notice and any associated regulations shall not be grounds for claims as outlined in Section 1.11 – "Claims".

(d) Awarding of Contracts to Occupational Safety and Health Law Violators Prohibited. The Contract is subject to Section 31-57b of the Connecticut General Statutes, as revised.

(e) Residents Preference in Work on Other Public Facilities. NOT APPLICABLE TO FEDERAL AID CONTRACTS. Pursuant to Section 31-52a of the Connecticut General Statutes, as revised, in the employment of mechanics, laborers or workmen to perform the work specified herein, preference shall be given to residents of the state who are, and continuously for at least six months prior to the date hereof have been, residents of this state, and if no such person is available, then to residents of other states

6. Tax Liability - Contractor's Exempt Purchase Certificate (CERT – 141)

The Contractor shall comply with Chapter 219 of the Connecticut General Statutes pertaining to tangible personal property or services rendered that is/are subject to sales tax. The Contractor is responsible for determining its tax liability. If the Contractor purchases materials or supplies pursuant to the Connecticut Department of Revenue Services' "Contractor's Exempt Purchase Certificate (CERT-141)," as may be revised, the Contractor acknowledges and agrees that title to such materials and supplies installed or placed in the project will vest in the State simultaneously with passage of title from the retailers or vendors thereof, and the Contractor will have no property rights in the materials and supplies purchased.

Forms and instructions are available anytime by:

Internet: Visit the DRS website at www.ct.gov/DRS to download and print Connecticut tax forms; or Telephone: Call 1-800-382-9463 (Connecticut calls outside the Greater Hartford calling area only) and select Option 2 or call 860-297-4753 (from anywhere).

7. Executive Orders

This contract is subject to the provisions of Executive Order No. Three of Governor Thomas J. Meskill, promulgated June 16, 1971, concerning labor employment practices, Executive Order No. Seventeen of Governor Thomas J. Meskill, promulgated February 15, 1973, concerning the listing of employment openings and Executive Order No. Sixteen of Governor John G. Rowland promulgated August 4, 1999, concerning violence in the workplace, all of which are incorporated into and are made a part of the contract as if they had been fully set forth in it. The contract may also be subject to Executive Order No. 14 of Governor M. Jodi Rell, promulgated April 17, 2006, concerning procurement of cleaning products and services and to Executive Order No. 49 of Governor Dannel P. Malloy, promulgated May 22, 2015, mandating disclosure of certain gifts to public employees and contributions to certain candidates for office. If Executive Order No. 14 and/or Executive Order No. 49 are applicable, they are deemed to be incorporated into and are made a part of the contract as if they had been fully set forth in it. At the Contractor's request, the Department shall provide a copy of these orders to the Contractor.

8. Non Discrimination Requirement (pursuant to section 4a-60 and 4a-60a of the Connecticut General Statutes, as revised): References to "minority business enterprises" in this Section are not applicable to Federal-aid projects/contracts. Federal-aid projects/contracts are instead subject to the Federal Disadvantaged Business Enterprise Program.

(a) For purposes of this Section, the following terms are defined as follows:

(1) "Commission" means the Commission on Human Rights and Opportunities;
(2) "Contract" and "contract" include any extension or modification of the Contract or contract;
(3) "Contractor" and "contractor" include any successors or assigns of the Contractor or contractor;
(4) "Gender identity or expression" means a person's gender-related identity, appearance or behavior, whether or not that gender-related identity, appearance or behavior is different from that traditionally associated with the person's physiology or assigned sex at birth, which gender-related identity can be shown by providing evidence including, but not limited to, medical history, care or treatment of the gender-related identity, consistent and uniform assertion of the gender-related identity or any other evidence that the gender-related identity is sincerely held, part of a person's core identity or not being asserted for an improper purpose.
(5) "good faith" means that degree of diligence which a reasonable person would exercise in the performance of legal duties and obligations;

(6) "good faith efforts" shall include, but not be limited to, those reasonable initial efforts necessary to comply with statutory or regulatory requirements and additional or substituted efforts when it is determined that such initial efforts will not be sufficient to comply with such requirements;

(7) "marital status" means being single, married as recognized by the state of Connecticut, widowed, separated or divorced;

(8) "mental disability" means one or more mental disorders, as defined in the most recent edition of the American Psychiatric Association's "Diagnostic and Statistical Manual of Mental Disorders", or a record of or regarding a person as having one or more such disorders;

(9) "minority business enterprise" means any small contractor or supplier of materials fifty-one percent or more of the capital stock, if any, or assets of which is owned by a person or persons: (1) who are active in the daily affairs of the enterprise, (2) who have the power to direct the management and policies of the enterprise, and (3) who are members of a minority, as such term is defined in subsection (a) of Connecticut General Statutes § 32-9n; and

(10) "public works contract" means any agreement between any individual, firm or corporation and the State or any political subdivision of the State other than a municipality for construction, rehabilitation, conversion, extension, demolition or repair of a public building, highway or other changes or improvements in real property, or which is financed in whole or in part by the State, including, but not limited to, matching expenditures, grants, loans, insurance or guarantees.

For purposes of this Section, the terms "Contract" and "contract" do not include a contract where each contractor is (1) a political subdivision of the State of Connecticut, including, but not limited to municipalities, unless the contract is a municipal public works contract or quasi-public agency project contract, (2) any other state of the United States, including but not limited to, the District of Columbia, Puerto Rico, U.S. territories and possessions, and federally recognized Indian tribal governments, as defined in Connecticut General Statutes § 1-267, (3) the federal government, (4) a foreign government, or (5) an agency of a subdivision, state or government described in subdivision (1), (2), (3), or (4) of this subsection.

(b) (1) The Contractor agrees and warrants that in the performance of the Contract such Contractor will not discriminate or permit discrimination against any person or group of persons on the grounds of race, color, religious creed, age, marital status, national origin, ancestry, sex, gender identity or expression, status as a veteran, intellectual disability, mental disability or physical disability, including, but not limited to, blindness, unless it is shown by such Contractor that such disability prevents performance of the work involved, in any manner prohibited by the laws of the United States or of the State of Connecticut; and the Contractor further agrees to take affirmative action to insure that applicants with job-related qualifications are employed and that employees are treated when employed without regard to their race, color, religious creed, age, marital status, national origin, ancestry, sex, gender identity or expression, status as a veteran, intellectual disability, mental disability or physical disability, including, but not limited to, blindness, unless it is shown by the Contractor that such disability prevents performance of the work involved; (2) the Contractor agrees, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, to state that it is an "affirmative action-equal opportunity employer" in accordance with regulations adopted by the Commission; (3) the Contractor agrees to provide each labor union or representative of workers with which the Contractor has a collective bargaining agreement or other contract or understanding and each vendor with which the Contractor has a contract or understanding, a notice to be provided by the Commission, advising the labor union or workers' representative of the Contractor's commitments under this section and to post copies of the notice in conspicuous places available to employees and applicants for employment; (4) the Contractor

agrees to comply with each provision of this Section and Connecticut General Statutes §§ 46a-68e and 46a-68f and with each regulation or relevant order issued by said Commission pursuant to Connecticut General Statutes §§ 46a-56, 46a-68e and 46a-68f; and (5) the Contractor agrees to provide the Commission on Human Rights and Opportunities with such information requested by the Commission, and permit access to pertinent books, records and accounts, concerning the employment practices and procedures of the Contractor as relate to the provisions of this Section and Connecticut General Statutes § 46a-56. If the contract is a public works contract, the Contractor agrees and warrants that he will make good faith efforts to employ minority business enterprises as subcontractors and suppliers of materials on such public works projects.

(c) Determination of the Contractor's good faith efforts shall include, but shall not be limited to, the following factors: The Contractor's employment and subcontracting policies, patterns and practices; affirmative advertising, recruitment and training; technical assistance activities and such other reasonable activities or efforts as the Commission may prescribe that are designed to ensure the participation of minority business enterprises in public works projects.

(d) The Contractor shall develop and maintain adequate documentation, in a manner prescribed by the Commission, of its good faith efforts.

(e) The Contractor shall include the provisions of subsection (b) of this Section in every subcontract or purchase order entered into in order to fulfill any obligation of a contract with the State and such provisions shall be binding on a subcontractor, vendor or manufacturer unless exempted by regulations or orders of the Commission. The Contractor shall take such action with respect to any such subcontract or purchase order as the Commission may direct as a means of enforcing such provisions including sanctions for noncompliance in accordance with Connecticut General Statutes §46a-56; provided if such Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the Commission, the Contractor may request the State of Connecticut to enter into any such litigation or negotiation prior thereto to protect the interests of the State and the State may so enter.

(f) The Contractor agrees to comply with the regulations referred to in this Section as they exist on the date of this Contract and as they may be adopted or amended from time to time during the term of this Contract and any amendments thereto.

(g) (1) The Contractor agrees and warrants that in the performance of the Contract such Contractor will not discriminate or permit discrimination against any person or group of persons on the grounds of sexual orientation, in any manner prohibited by the laws of the United States or the State of Connecticut, and that employees are treated when employed without regard to their sexual orientation; (2) the Contractor agrees to provide each labor union or representative of workers with which such Contractor has a collective bargaining agreement or other contract or understanding and each vendor with which such Contractor has a contract or understanding, a notice to be provided by the Commission on Human Rights and Opportunities advising the labor union or workers' representative of the Contractor's commitments under this section, and to post copies of the notice in conspicuous places available to employees and applicants for employment; (3) the Contractor agrees to comply with each provision of this section and with each regulation or relevant order issued by said Commission pursuant to Connecticut General Statutes § 46a-56; and (4) the Contractor agrees to provide the Commission on Human Rights and Opportunities with such information requested by the Commission, and permit access to pertinent books, records and accounts, concerning the employment practices and procedures of the Contractor which relate to the provisions of this Section and Connecticut General Statutes § 46a-56.

(h) The Contractor shall include the provisions of the foregoing paragraph in every subcontract or purchase order entered into in order to fulfill any obligation of a contract with the State and such provisions shall be binding on a subcontractor, vendor or manufacturer unless exempted by regulations or orders of the Commission. The Contractor shall take such action with respect to any such subcontract or purchase order as the Commission may direct as a means of enforcing such

provisions including sanctions for noncompliance in accordance with Connecticut General Statutes § 46a-56; provided, if such Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the Commission, the Contractor may request the State of Connecticut to enter into any such litigation or negotiation prior thereto to protect the interests of the State and the State may so enter.

Please be aware the Nondiscrimination Certifications can be found at the Office of Policy and Management website:

https://portal.ct.gov/OPM/Fin-PSA/Forms/Nondiscrimination-Certification

9. Whistleblower Provision

The following clause is applicable if the Contract has a value of Five Million Dollars ($5,000,000) or more.

Whistleblowing. This Contract may be subject to the provisions of Section 4-61dd of the Connecticut General Statutes. In accordance with this statute, if an officer, employee or appointing authority of the Contractor takes or threatens to take any personnel action against any employee of the Contractor in retaliation for such employee's disclosure of information to any employee of the contracting state or quasi-public agency or the Auditors of Public Accounts or the Attorney General under the provisions of subsection (a) of such statute, the Contractor shall be liable for a civil penalty of not more than five thousand dollars for each offense, up to a maximum of twenty per cent of the value of this Contract. Each violation shall be a separate and distinct offense and in the case of a continuing violation, each calendar day's continuance of the violation shall be deemed to be a separate and distinct offense. The State may request that the Attorney General bring a civil action in the Superior Court for the Judicial District of Hartford to seek imposition and recovery of such civil penalty. In accordance with subsection (f) of such statute, each large state contractor, as defined in the statute, shall post a notice of the provisions of the statute relating to large state contractors in a conspicuous place which is readily available for viewing by the employees of the Contractor.

10. Connecticut Freedom of Information Act

(a) Disclosure of Records. This Contract may be subject to the provisions of section 1-218 of the Connecticut General Statutes. In accordance with this statute, each contract in excess of two million five hundred thousand dollars between a public agency and a person for the performance of a governmental function shall (a) provide that the public agency is entitled to receive a copy of records and files related to the performance of the governmental function, and (b) indicate that such records and files are subject to FOIA and may be disclosed by the public agency pursuant to FOIA. No request to inspect or copy such records or files shall be valid unless the request is made to the public agency in accordance with FOIA. Any complaint by a person who is denied the right to inspect or copy such records or files shall be brought to the Freedom of Information Commission in accordance with the provisions of sections 1-205 and 1-206 of the Connecticut General Statutes.

(b) Confidential Information. The State will afford due regard to the Contractor's request for the protection of proprietary or confidential information which the State receives from the Contractor. However, all materials associated with the Contract are subject to the terms of the FOIA and all corresponding rules, regulations and interpretations. In making such a request, the Contractor may not merely state generally that the materials are proprietary or confidential in nature and not, therefore, subject to release to third parties. Those particular sentences, paragraphs, pages or sections that the Contractor believes are exempt from disclosure under the FOIA must be specifically identified as such. Convincing explanation and rationale sufficient to justify each exemption consistent with the FOIA must

accompany the request. The rationale and explanation must be stated in terms of the prospective harm to the competitive position of the Contractor that would result if the identified material were to be released and the reasons why the materials are legally exempt from release pursuant to the FOIA. To the extent that any other provision or part of the Contract conflicts or is in any way inconsistent with this section, this section controls and shall apply and the conflicting provision or part shall not be given effect. If the Contractor indicates that certain documentation is submitted in confidence, by specifically and clearly marking the documentation as "CONFIDENTIAL," DOT will first review the Contractor's claim for consistency with the FOIA (that is, review that the documentation is actually a trade secret or commercial or financial information and not required by statute), and if determined to be consistent, will endeavor to keep such information confidential to the extent permitted by law. See, *e.g.*, Conn. Gen. Stat. §1-210(b)(5)(A-B). The State, however, has no obligation to initiate, prosecute or defend any legal proceeding or to seek a protective order or other similar relief to prevent disclosure of any information that is sought pursuant to a FOIA request. Should the State withhold such documentation from a Freedom of Information requester and a complaint be brought to the Freedom of Information Commission, the Contractor shall have the burden of cooperating with DOT in defense of that action and in terms of establishing the availability of any FOIA exemption in any proceeding where it is an issue. In no event shall the State have any liability for the disclosure of any documents or information in its possession which the State believes are required to be disclosed pursuant to the FOIA or other law.

11. Service of Process

The Contractor, if not a resident of the State of Connecticut, or, in the case of a partnership, the partners, if not residents, hereby appoints the Secretary of State of the State of Connecticut, and his successors in office, as agent for service of process for any action arising out of or as a result of this Contract; such appointment to be in effect throughout the life of this Contract and six (6) years thereafter.

12. Substitution of Securities for Retainages on State Contracts and Subcontracts

This Contract is subject to the provisions of Section 3-ll2a of the General Statutes of the State of Connecticut, as revised.

13. Health Insurance Portability and Accountability Act of 1996 (HIPAA)

The Contractor shall comply, if applicable, with the Health Insurance Portability and Accountability Act of 1996 and, pursuant thereto, the provisions attached at Exhibit C, and hereby made part of this Contract.

14. Forum and Choice of Law

Forum and Choice of Law. The parties deem the Contract to have been made in the City of Hartford, State of Connecticut. Both parties agree that it is fair and reasonable for the validity and construction of the Contract to be, and it shall be, governed by the laws and court decisions of the State of Connecticut, without giving effect to its principles of conflicts of laws. To the extent that any immunities provided by Federal law or the laws of the State of Connecticut do not bar an action against the State, and to the extent that these courts are courts of competent jurisdiction, for the purpose of venue, the complaint shall be made returnable to the Judicial District of Hartford only or shall be brought in the United States District Court for the District of Connecticut only, and shall not be

transferred to any other court, provided, however, that nothing here constitutes a waiver or compromise of the sovereign immunity of the State of Connecticut. The Contractor waives any objection which it may now have or will have to the laying of venue of any Claims in any forum and further irrevocably submits to such jurisdiction in any suit, action or proceeding.

15. Summary of State Ethics Laws

Pursuant to the requirements of section 1-101qq of the Connecticut General Statutes, the summary of State ethics laws developed by the State Ethics Commission pursuant to section 1-81b of the Connecticut General Statutes is incorporated by reference into and made a part of the Contract as if the summary had been fully set forth in the Contract.

16. Audit and Inspection of Plants, Places of Business and Records

(a) The State and its agents, including, but not limited to, the Connecticut Auditors of Public Accounts, Attorney General and State's Attorney and their respective agents, may, at reasonable hours, inspect and examine all of the parts of the Contractor's and Contractor Parties' plants and places of business which, in any way, are related to, or involved in, the performance of this Contract. For the purposes of this Section, "Contractor Parties" means the Contractor's members, directors, officers, shareholders, partners, managers, principal officers, representatives, agents, servants, consultants, employees or any one of them or any other person or entity with whom the Contractor is in privity of oral or written contract and the Contractor intends for such other person or entity to Perform under the Contract in any capacity.

(b) The Contractor shall maintain, and shall require each of the Contractor Parties to maintain, accurate and complete Records. The Contractor shall make all of its and the Contractor Parties' Records available at all reasonable hours for audit and inspection by the State and its agents.

(c) The State shall make all requests for any audit or inspection in writing and shall provide the Contractor with at least twenty-four (24) hours' notice prior to the requested audit and inspection date. If the State suspects fraud or other abuse, or in the event of an emergency, the State is not obligated to provide any prior notice.

(d) The Contractor shall keep and preserve or cause to be kept and preserved all of its and Contractor Parties' Records until three (3) years after the latter of (i) final payment under this Agreement, or (ii) the expiration or earlier termination of this Agreement, as the same may be modified for any reason. The State may request an audit or inspection at any time during this period. If any Claim or audit is started before the expiration of this period, the Contractor shall retain or cause to be retained all Records until all Claims or audit findings have been resolved.

(e) The Contractor shall cooperate fully with the State and its agents in connection with an audit or inspection. Following any audit or inspection, the State may conduct and the Contractor shall cooperate with an exit conference.

(f) The Contractor shall incorporate this entire Section verbatim into any contract or other agreement that it enters into with any Contractor Party.

17. Campaign Contribution Restriction

For all State contracts, defined in Conn. Gen. Stat. §9-612(f)(1) as having a value in a calendar year of $50,000 or more, or a combination or series of such agreements or contracts having a value of $100,000 or more, the authorized signatory to this contract expressly acknowledges receipt of the State Elections Enforcement Commission's notice advising state contractors of state campaign contribution and solicitation prohibitions, and will inform its principals of the contents of the notice, as set forth in "Notice to Executive Branch State Contractors and Prospective State Contractors of Campaign Contribution and Solicitation Limitations," a copy of which is attached hereto and hereby made a part of this contract, attached as Exhibit D.

18. Tangible Personal Property

(a) The Contractor on its behalf and on behalf of its Affiliates, as defined below, shall comply with the provisions of Conn. Gen. Stat. §12-411b, as follows:

(1) For the term of the Contract, the Contractor and its Affiliates shall collect and remit to the State of Connecticut, Department of Revenue Services, any Connecticut use tax due under the provisions of Chapter 219 of the Connecticut General Statutes for items of tangible personal property sold by the Contractor or by any of its Affiliates in the same manner as if the Contractor and such Affiliates were engaged in the business of selling tangible personal property for use in Connecticut and had sufficient nexus under the provisions of Chapter 219 to be required to collect Connecticut use tax;
(2) A customer's payment of a use tax to the Contractor or its Affiliates relieves the customer of liability for the use tax;
(3) The Contractor and its Affiliates shall remit all use taxes they collect from customers on or before the due date specified in the Contract, which may not be later than the last day of the month next succeeding the end of a calendar quarter or other tax collection period during which the tax was collected;
(4) The Contractor and its Affiliates are not liable for use tax billed by them but not paid to them by a customer; and
(5) Any Contractor or Affiliate who fails to remit use taxes collected on behalf of its customers by the due date specified in the Contract shall be subject to the interest and penalties provided for persons required to collect sales tax under chapter 219 of the general statutes.

(b) For purposes of this section of the Contract, the word "Affiliate" means any person, as defined in section 12-1 of the general statutes, that controls, is controlled by, or is under common control with another person. A person controls another person if the person owns, directly or indirectly, more than ten per cent of the voting securities of the other person. The word "voting security" means a security that confers upon the holder the right to vote for the election of members of the board of directors or similar governing body of the business, or that is convertible into, or entitles the holder to receive, upon its exercise, a security that confers such a right to vote. "Voting security" includes a general partnership interest.

(c) The Contractor represents and warrants that each of its Affiliates has vested in the Contractor plenary authority to so bind the Affiliates in any agreement with the State of Connecticut. The Contractor on its own behalf and on behalf of its Affiliates shall also provide, no later than 30 days after receiving a request by the State's contracting authority, such information as the State may require to ensure, in the State's sole determination, compliance with the provisions of Chapter 219 of the Connecticut General Statutes, including, but not limited to, §12-411b.

19. Bid Rigging and/or Fraud – Notice to Contractor

The Connecticut Department of Transportation is cooperating with the U.S. Department of Transportation and the Justice Department in their investigation into highway construction contract bid rigging and/or fraud.

A toll-free "HOT LINE" telephone number 800-424-9071 has been established to receive information from contractors, subcontractors, manufacturers, suppliers or anyone with knowledge of bid rigging and/or fraud, either past or current. The "HOT LINE" telephone number will be available during normal working hours (8:00 am – 5:00 pm EST). Information will be treated confidentially and anonymity respected.

20. Consulting Agreement Affidavit

The Contractor shall comply with Connecticut General Statutes Section 4a-81(a) and 4a-81(b), as revised. Pursuant to Public Act 11-229, after the initial submission of the form, if there is a change in

the information contained in the form, a contractor shall submit the updated form, as applicable, either (i) not later than thirty (30) days after the effective date of such change or (ii) prior to execution of any new contract, whichever is earlier.

The Affidavit/Form may be submitted in written format or electronic format through the Department of Administrative Services (DAS) website.

EXHIBIT A

TITLE VI CONTRACTOR ASSURANCES

During the performance of this Contract, the contractor, for itself, its assignees and successors in interest (hereinafter referred to as the "Contractor") agrees as follows:

1. **Compliance with Regulations:** The Contractor shall comply with the regulations relative to nondiscrimination in federally assisted programs of the United States Department of Transportation (hereinafter, "USDOT"), Title 49, Code of Federal Regulations, Part 21, as they may be amended from time to time (hereinafter referred to as the "Regulations"), which are herein incorporated by reference and made a part of this contract.

2. **Nondiscrimination:** The Contractor, with regard to the work performed by it during the Contract, shall not discriminate on the grounds of race, color, national origin, sex, age, or disability in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The Contractor shall not participate either directly or indirectly in the discrimination prohibited by Subsection 5 of the Regulations, including employment practices when the Contract covers a program set forth in Appendix B of the Regulations.

3. **Solicitations for Subcontracts, Including Procurements of Materials and Equipment:**
In all solicitations either by competitive bidding or negotiation made by the Contractor for work to be performed under a subcontract, including procurements of materials or leases of equipment, each potential subcontractor or supplier shall be notified by the Contractor of the Contractor's obligations under this contract and the Regulations relative to nondiscrimination on the grounds of race, color, national origin, sex, age, or disability.

4. **Information and Reports:** The Contractor shall provide all information and reports required by the Regulations or directives issued pursuant thereto and shall permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the Connecticut Department of Transportation (ConnDOT) or the Funding Agency (FHWA, FTA and FAA) to be pertinent to ascertain compliance with such Regulations, orders, and instructions. Where any information required of a Contractor is in the exclusive possession of another who fails or refuses to furnish this information, the Contractor shall so certify to ConnDOT or the Funding Agency, as appropriate, and shall set forth what efforts it has made to obtain the information.

5. **Sanctions for Noncompliance:** In the event of the Contractor's noncompliance with the nondiscrimination provisions of this Contract, the ConnDOT shall impose such sanctions as it or the Funding Agency may determine to be appropriate, including, but not limited to:

A. Withholding contract payments until the Contractor is in-compliance; and/or
B. Cancellation, termination, or suspension of the Contract, in whole or in part.

6. **Incorporation of Provisions:** The Contractor shall include the provisions of paragraphs 1 through 5 in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Regulations or directives issued pursuant thereto. The Contractor shall take such action with respect to any subcontract or procurement as the ConnDOT or the Funding Agency may -direct as a means of enforcing such provisions including sanctions for noncompliance. Provided, however, that in the event a Contractor becomes involved in, or is threatened with, litigation with a subcontractor or supplier as a result of such direction, the Contractor may request the ConnDOT to enter into such litigation to protect the interests of the Funding Agency, and, in addition, the Contractor may request the United States to enter into such litigation to protect the interests of the United States

EXHIBIT B

CONTRACTOR WORKFORCE UTILIZATION / EQUAL EMPLOYMENT OPPORTUNITY

1. **Project Workforce Utilization Goals:**
These goals are applicable to all the Contractor's construction work (whether or not it is Federal or Federally assisted or funded) performed in the covered area. If the contractor performs construction work in a geographical area located outside of the covered area, it shall apply the goals established for the geographical area where the work is actually performed.

Whenever the Contractor, or any Subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of $10,000 the provisions of these specifications which contain the applicable goals for minority and female participation.

The goals for minority and female utilization are expressed in percentage terms for the contractor's aggregate work-force in each trade on all construction work in the covered area, are referenced in the Appendix A below.

STATE FUNDED PROJECTS (only)
APPENDIX A
(Labor Market Goals)

LABOR MARKET AREA GOAL			***Minority***
Female			
Bridgeport			**22.7%**
1.4%			
Ansonia	Beacon Falls	Bridgeport	Derby
Easton	Fairfield	Milford	Monroe
Oxford	Seymour	Shelton	Stratford
Trumbull			
Danbury			**10.7%**
3.8%			
Bethel	Bridgewater	Brookfield	Danbury
Kent	New Fairfield	New Milford	Newtown
Redding	Ridgefield	Roxbury	Sherman
Washington			
Danielson			**4.3%**
1.8%			
Brooklyn	Eastford	Hampton	Killingly
Pomfret	Putnam	Scotland	Sterling
Thompson	Voluntown	Union	Woodstock
Hartford			**13.7%**
2.1%			
Andover	Ashford	Avon	Barkhamsted

Belin	Bloomfield	Bolton	Bristol
Burlington	Canton	Chaplin	Colchester
Columbia	Coventry	Cromwell	Durham
East Granby	East Haddam	East Hampton	East Hartford
East Windsor	Ellington	Enfield	Farmington
Glastonbury	Granby	Haddam	Hartford
Harwinton	Hebron	Lebanon	Manchester
Mansfield	Marlborough	Middlefield	Middletown
Newington	Plainville	Plymouth	Portland
Rocky Hill	Simsbury	Somers	South Windsor
Southington	Stafford	Suffield	Tolland
Vernon	West Hartford	Wethersfield	Willington
Winchester	Windham	Windsor	Windsor Locks

Lower River 1.8%				**4.3%**
Chester	Deep River	Essex	Old Lyme	
Westbrook				

LABOR MARKET AREA GOAL ***Minority*** **Female**

New Haven 3.1%				**17.9%**
Bethany	Branford	Cheshire	Clinton	
East Haven	Guilford	Hamden	Killingworth	
Madison	Meriden	New Haven	North Branford	
North Haven	Orange	Wallingford	West Haven	
Woodbridge				

New London 3.1%				**7.4%**
Bozrah	Canterbury	East Lyme	Franklin	
Griswold	Groton	Ledyard	Lisbon	
Montville	New London	North Stonington	Norwich	
Old Lyme	Old Saybrook	Plainfield	Preston	
Salem	Sprague	Stonington	Waterford	
Hopkinton	RI – Westerly Rhode Island			

Stamford 2.1%				**33.2%**
Darien	Greenwich	New Canaan	Norwalk	
Stamford	Weston	Westport	Wilton	

Torrington 1.8%				**4.3%**
Canaan	Colebrook	Cornwall	Goshen	
Hartland	Kent	Litchfield	Morris	
Norfolk	North Canaan	Salisbury	Sharon	

Torrington	Warren		

Waterbury				**12.4%**
1.6%				
Bethlehem	Middlebury	Naugatuck	Prospect	
Southbury	Thomaston	Waterbury	Watertown	
Wolcott	Woodbury			

Rev. 4/24/2019

EXHIBIT C

Health Insurance Portability and Accountability Act of 1996 ("HIPAA").

(a) If the Contactor is a Business Associate under the requirements of the Health Insurance Portability and Accountability Act of 1996 ("HIPAA"), the Contractor must comply with all terms and conditions of this Section of the Contract. If the Contractor is not a Business Associate under HIPAA, this Section of the Contract does not apply to the Contractor for this Contract.

(b) The Contractor is required to safeguard the use, publication and disclosure of information on all applicants for, and all clients who receive, services under the Contract in accordance with all applicable federal and state law regarding confidentiality, which includes but is not limited to HIPAA, more specifically with the Privacy and Security Rules at 45 C.F.R. Part 160 and Part 164, subparts A, C, and E; and

(c) The State of Connecticut Agency named on page 1 of this Contract (hereinafter the "Department") is a "covered entity" as that term is defined in 45 C.F.R. § 160.103; and

(d) The Contractor, on behalf of the Department, performs functions that involve the use or disclosure of "individually identifiable health information," as that term is defined in 45 C.F.R. § 160.103; and

(e) The Contractor is a "business associate" of the Department, as that term is defined in 45 C.F.R. § 160.103; and

(f) The Contractor and the Department agree to the following in order to secure compliance with the HIPAA, the requirements of Subtitle D of the Health Information Technology for Economic and Clinical Health Act (hereinafter the HITECH Act), (Pub. L. 111-5, sections 13400 to 13423), and more specifically with the Privacy and Security Rules at 45 C.F.R. Part 160 and Part 164, subparts A, C, and E.

(g) Definitions

(1) "Breach shall have the same meaning as the term is defined in section 13400 of the HITECH Act (42 U.S.C. §17921(1))

(2) "Business Associate" shall mean the Contractor.

(3) "Covered Entity" shall mean the Department of the State of Connecticut named on page 1 of this Contract.

(4) "Designated Record Set" shall have the same meaning as the term "designated record set" in 45 C.F.R. § 164.501.

(5) "Electronic Health Record" shall have the same meaning as the term is defined in section 13400 of the HITECH Act (42 U.S.C. §17921(5))

(6) "Individual" shall have the same meaning as the term "individual"' in 45 C.F.R. § 160.103 and shall include a person who qualifies as a personal representative as defined in 45 C.F.R. § 164.502(g).

(7) "Privacy Rule" shall mean the Standards for Privacy of Individually Identifiable Health Information at 45 C.F.R. part 160 and parts 164, subparts A and E.

(8) "Protected Health Information" or "PHI" shall have the same meaning as the term "protected health information" in 45 C.F.R. § 160.103, limited to information created or received by the Business Associate from or on behalf of the Covered Entity.

(9) "Required by Law"' shall have the same meaning as the term "required by law" in 45 C.F.R. § 164.103.

(10) "Secretary" shall mean the Secretary of the Department of Health and Human Services or his designee.

(11) "More stringent" shall have the same meaning as the term "more stringent" in 45 C.F.R. § 160.202.

(12) "This Section of the Contract" refers to the HIPAA Provisions stated herein, in their entirety.

(13) "Security Incident" shall have the same meaning as the term "security incident" in 45 C.F.R.§ 164.304.

(14) "Security Rule" shall mean the Security Standards for the Protection of Electronic Protected Health Information at 45 C.F.R. part 160 and parts 164, subpart A and C.

(15) "Unsecured protected health information" shall have the same meaning as the term as defined in section 13402(h)(1)(A) of HITECH. Act. (42 U.S.C. §17932(h)(1)(A)).

(h) Obligations and Activities of Business Associates.

(1) Business Associate agrees not to use or disclose PHI other than as permitted or required by this Section of the Contract or as Required by Law.

(2) Business Associate agrees to use appropriate safeguards to prevent use or disclosure of PHI other than as provided for in this Section of the Contract.

(3) Business Associate agrees to use administrative, physical and technical safeguards that reasonably and appropriately protect the confidentiality, integrity, and availability of electronic protected health information that it creates, receives, maintains, or transmits on behalf of the Covered Entity.

(4) Business Associate agrees to mitigate, to the extent practicable, any harmful effect that is known to the Business Associate of a use or disclosure of PHI by Business Associate in violation of this Section of the Contract.

(5) Business Associate agrees to report to Covered Entity any use or disclosure of PHI not provided for by this Section of the Contract or any security incident of which it becomes aware.

(6) Business Associate agrees to insure that any agent, including a subcontractor, to whom it provides PHI received from, or created or received by Business Associate, on behalf of the Covered Entity, agrees to the same restrictions and conditions that apply through this Section of the Contract to Business Associate with respect to such information.

(7) Business Associate agrees to provide access, at the request of the Covered Entity, and in the time and manner agreed to by the parties, to PHI in a Designated Record Set, to Covered Entity or, as directed by Covered Entity, to an Individual in order to meet the requirements under 45 C.F.R. § 164.524.

(8) Business Associate agrees to make any amendments to PHI in a Designated Record Set that the Covered Entity directs or agrees to pursuant to 45 C.F.R. § 164.526 at the request of the Covered Entity, and in the time and manner agreed to by the parties.

(9) Business Associate agrees to make internal practices, books, and records, including policies and procedures and PHI, relating to the use and disclosure of PHI received from, or created or received by, Business Associate on behalf of Covered Entity, available to Covered Entity or to the Secretary in a time and manner agreed to by the parties or designated by the Secretary, for purposes of the Secretary determining Covered Entity's compliance with the Privacy Rule.

(10) Business Associate agrees to document such disclosures of PHI and information related to such disclosures as would be required for Covered Entity to respond to a request by an Individual for an accounting of disclosures of PHI in accordance with 45 C.F.R. § 164.528 and section 13405 of the HITECH Act (42 U.S.C. § 17935) and any regulations promulgated thereunder.

(11) Business Associate agrees to provide to Covered Entity, in a time and manner agreed to by the parties, information collected in accordance with clause h. (10) of this Section of the Contract, to permit Covered Entity to respond to a request by an Individual for an accounting of disclosures of PHI in accordance with 45 C.F.R. § 164.528 and section 13405 of the HITECH Act (42 U.S.C. § 17935) and any regulations promulgated thereunder. Business Associate agrees at the Covered Entity's direction to provide an accounting of disclosures of PHI directly to an individual in accordance with 45 C.F.R. § 164.528 and section 13405 of the HITECH Act (42 U.S.C. § 17935) and any regulations promulgated thereunder.

(12) Business Associate agrees to comply with any state or federal law that is more stringent than the Privacy Rule.

(13) Business Associate agrees to comply with the requirements of the HITECH Act relating to privacy and security that are applicable to the Covered Entity and with the requirements of 45 C.F.R. sections 164.504(e), 164.308, 164.310, 164.312, and 164.316.

(14) In the event that an individual requests that the Business Associate (a) restrict disclosures of PHI; (b) provide an accounting of disclosures of the individual's PHI; or (c) provide a copy of the individual's PHI in an electronic health record, the Business Associate agrees to notify the covered entity, in writing, within two business days of the request.

(15) Business Associate agrees that it shall not, directly or indirectly, receive any remuneration in exchange for PHI of an individual without (1) the written approval of the covered entity, unless receipt of remuneration in exchange for PHI is expressly authorized by this Contract and (2) the valid authorization of the individual, except for the purposes provided under section 13405(d)(2) of the HITECH Act,(42 U.S.C. § 17935(d)(2)) and in any accompanying regulations

(16) Obligations in the Event of a Breach

A. The Business Associate agrees that, following the discovery of a breach of unsecured protected health information, it shall notify the Covered Entity of such breach in accordance with the requirements of section 13402 of HITECH (42 U.S.C. 17932(b) and the provisions of this Section of the Contract.
B. Such notification shall be provided by the Business Associate to the Covered Entity without unreasonable delay, and in no case later than 30 days after the breach is discovered by the Business Associate, except as otherwise instructed in writing by a law enforcement official pursuant to section 13402 (g) of HITECH (42 U.S.C. 17932(g)) . A breach is considered discovered as of the first day on which it is, or reasonably should have been, known to the Business Associate. The notification shall include the identification and last known address, phone number and email address of each individual (or the next of kin of the individual if the individual is deceased) whose unsecured protected health information has been, or is reasonably believed by the Business Associate to have been, accessed, acquired, or disclosed during such breach.
C. The Business Associate agrees to include in the notification to the Covered Entity at least the following information:
    1. A brief description of what happened, including the date of the breach and the date of the discovery of the breach, if known.

    2. A description of the types of unsecured protected health information that were involved in the breach (such as full name, Social Security number, date of birth, home address, account number, or disability code).

    3. The steps the Business Associate recommends that individuals take to protect themselves from potential harm resulting from the breach.

    4. A detailed description of what the Business Associate is doing to investigate the breach, to mitigate losses, and to protect against any further breaches.

    5. Whether a law enforcement official has advised either verbally or in writing the Business Associate that he or she has determined that notification or notice to

individuals or the posting required under section 13402 of the HITECH Act would impede a criminal investigation or cause damage to national security and; if so, include contact information for said official.

D. Business Associate agrees to provide appropriate staffing and have established procedures to ensure that individuals informed by the Covered Entity of a breach by the Business Associate have the opportunity to ask questions and contact the Business Associate for additional information regarding the breach. Such procedures shall include a toll-free telephone number, an e-mail address, a posting on its Web site and a postal address. Business Associate agrees to include in the notification of a breach by the Business Associate to the Covered Entity, a written description of the procedures that have been established to meet these requirements. Costs of such contact procedures will be borne by the Contractor.

E. Business Associate agrees that, in the event of a breach, it has the burden to demonstrate that it has complied with all notifications requirements set forth above, including evidence demonstrating the necessity of a delay in notification to the Covered Entity.

(i) Permitted Uses and Disclosure by Business Associate.

(1) General Use and Disclosure Provisions Except as otherwise limited in this Section of the Contract, Business Associate may use or disclose PHI to perform functions, activities, or services for, or on behalf of, Covered Entity as specified in this Contract, provided that such use or disclosure would not violate the Privacy Rule if done by Covered Entity or the minimum necessary policies and procedures of the Covered Entity.

(2) Specific Use and Disclosure Provisions

(A) Except as otherwise limited in this Section of the Contract, Business Associate may use PHI for the proper management and administration of Business Associate or to carry out the legal responsibilities of Business Associate.

(B) Except as otherwise limited in this Section of the Contract, Business Associate may disclose PHI for the proper management and administration of Business Associate, provided that disclosures are Required by Law, or Business Associate obtains reasonable assurances from the person to whom the information is disclosed that it will remain confidential and used or further disclosed only as Required by Law or for the purpose for which it was disclosed to the person, and the person notifies Business Associate of any instances of which it is aware in which the confidentiality of the information has been breached.

(C) Except as otherwise limited in this Section of the Contract, Business Associate may use PHI to provide Data Aggregation services to Covered Entity as permitted by 45 C.F.R. § 164.504(e)(2)(i)(B).

(j) Obligations of Covered Entity.

(1) Covered Entity shall notify Business Associate of any limitations in its notice of privacy practices of Covered Entity, in accordance with 45 C.F.R. § 164.520, or to the extent that such limitation may affect Business Associate's use or disclosure of PHI.

(2) Covered Entity shall notify Business Associate of any changes in, or revocation of, permission by Individual to use or disclose PHI, to the extent that such changes may affect Business Associate's use or disclosure of PHI.

(3) Covered Entity shall notify Business Associate of any restriction to the use or disclosure of PHI that Covered Entity has agreed to in accordance with 45 C.F.R. § 164.522, to the extent that such restriction may affect Business Associate's use or disclosure of PHI.

(k) Permissible Requests by Covered Entity. Covered Entity shall not request Business Associate to use or disclose PHI in any manner that would not be permissible under the Privacy Rule if done by the Covered Entity, except that Business Associate may use and disclose PHI for data aggregation, and management and administrative activities of Business Associate, as permitted under this Section of the Contract.

(l) Term and Termination.

(1) Term. The Term of this Section of the Contract shall be effective as of the date the Contract is effective and shall terminate when the information collected in accordance with clause h. (10) of this Section of the Contract is provided to the Covered Entity and all of the PHI provided by Covered Entity to Business Associate, or created or received by Business Associate on behalf of Covered Entity, is destroyed or returned to Covered Entity, or, if it is infeasible to return or destroy PHI, protections are extended to such information, in accordance with the termination provisions in this Section.

(2) Termination for Cause Upon Covered Entity's knowledge of a material breach by Business Associate, Covered Entity shall either:

(A) Provide an opportunity for Business Associate to cure the breach or end the violation and terminate the Contract if Business Associate does not cure the breach or end the violation within the time specified by the Covered Entity; or

(B) Immediately terminate the Contract if Business Associate has breached a material term of this Section of the Contract and cure is not possible; or

(C) If neither termination nor cure is feasible, Covered Entity shall report the violation to the Secretary.

(3) Effect of Termination

(A) Except as provided in (l)(2) of this Section of the Contract, upon termination of this Contract, for any reason, Business Associate shall return or destroy all PHI received from Covered Entity, or created or received by Business Associate on behalf of Covered Entity. Business Associate shall also provide the information collected in accordance with clause h. (10) of this Section of the Contract to the Covered Entity

within ten business days of the notice of termination. This provision shall apply to PHI that is in the possession of subcontractors or agents of Business Associate. Business Associate shall retain no copies of the PHI.

(B) In the event that Business Associate determines that returning or destroying the PHI is infeasible, Business Associate shall provide to Covered Entity notification of the conditions that make return or destruction infeasible. Upon documentation by Business Associate that return or destruction of PHI is infeasible, Business Associate shall extend the protections of this Section of the Contract to such PHI and limit further uses and disclosures of PHI to those purposes that make return or destruction infeasible, for as long as Business Associate maintains such PHI. Infeasibility of the return or destruction of PHI includes, but is not limited to, requirements under state or federal law that the Business Associate maintains or preserves the PHI or copies thereof.

(m) Miscellaneous Provisions.

(1) Regulatory References. A reference in this Section of the Contract to a section in the Privacy Rule means the section as in effect or as amended.

(2) Amendment. The Parties agree to take such action as in necessary to amend this Section of the Contract from time to time as is necessary for Covered Entity to comply with requirements of the Privacy Rule and the Health Insurance Portability and Accountability Act of 1996, Pub. L. No. 104-191.

(3) Survival. The respective rights and obligations of Business Associate shall survive the termination of this Contract.

(4) Effect on Contract. Except as specifically required to implement the purposes of this Section of the Contract, all other terms of the Contract shall remain in force and effect.

(5) Construction. This Section of the Contract shall be construed as broadly as necessary to implement and comply with the Privacy Standard. Any ambiguity in this Section of the Contract shall be resolved in favor of a meaning that complies, and is consistent with, the Privacy Standard.

(6) Disclaimer. Covered Entity makes no warranty or representation that compliance with this Section of the Contract will be adequate or satisfactory for Business Associate's own purposes. Covered Entity shall not be liable to Business Associate for any claim, civil or criminal penalty, loss or damage related to or arising from the unauthorized use or disclosure of PHI by Business Associate or any of its officers, directors, employees, contractors or agents, or any third party to whom Business Associate has disclosed PHI contrary to the provisions of this Contract or applicable law. Business Associate is solely responsible for all decisions made, and actions taken, by Business Associate regarding the safeguarding, use and disclosure of PHI within its possession, custody or control.

(7) Indemnification. The Business Associate shall indemnify and hold the Covered Entity harmless from and against any and all claims, liabilities, judgments, fines, assessments, penalties, awards and any statutory damages that may be imposed or assessed pursuant to HIPAA, as amended or the

HITECH Act, including, without limitation, attorney's fees, expert witness fees, costs of investigation, litigation or dispute resolution, and costs awarded thereunder, relating to or arising out of any violation by the Business Associate and its agents, including subcontractors, of any obligation of Business Associate and its agents, including subcontractors, under this section of the contract, under HIPAA, the HITECH Act, the Privacy Rule and the Security Rule.

Notice to Executive Branch State Contractors and Prospective State Contractors of Campaign Contribution and Solicitation Limitations

This notice is provided under the authority of Connecticut General Statutes §9-612 (f) (2) and is for the purpose of informing state contractors and prospective state contractors of the following law (italicized words are defined on the reverse side of this page).

CAMPAIGN CONTRIBUTION AND SOLICITATION LIMITATIONS

No *state contractor, prospective state contractor, principal of a state contractor or principal of a prospective state contractor*, with regard to a *state contract* or *state contract solicitation* with or from a state agency in the executive branch or a quasi-public agency or a holder, or principal of a holder, of a valid prequalification certificate, shall make a contribution to (i) an exploratory committee or candidate committee established by a candidate for nomination or election to the office of Governor, Lieutenant Governor, Attorney General, State Comptroller, Secretary of the State or State Treasurer, (ii) a political committee authorized to make contributions or expenditures to or for the benefit of such candidates, or (iii) a party committee (which includes town committees).

In addition, no holder or principal of a holder of a valid prequalification certificate, shall make a contribution to (i) an exploratory committee or candidate committee established by a candidate for nomination or election to the office of State senator or State representative, (ii) a political committee authorized to make contributions or expenditures to or for the benefit of such candidates, or (iii) a party committee.

On and after January 1, 2011, no state contractor, prospective state contractor, principal of a state contractor or principal of a prospective state contractor, with regard to a state contract or state contract solicitation with or from a state agency in the executive branch or a quasi-public agency or a holder, or principal of a holder of a valid prequalification certificate, shall **knowingly** *solicit* contributions from the state contractor's or prospective state contractor's employees or from a *subcontractor* or *principals of the subcontractor* on behalf of (i) an exploratory committee or candidate committee established by a candidate for nomination or election to the office of Governor, Lieutenant Governor, Attorney General, State Comptroller, Secretary of the State or State Treasurer, (ii) a political committee authorized to make contributions or expenditures to or for the benefit of such candidates, or (iii) a party committee.

DUTY TO INFORM

State contractors and prospective state contractors are required to inform their principals of the above prohibitions, as applicable, and the possible penalties and other consequences of any violation thereof.

PENALTIES FOR VIOLATIONS

Contributions or solicitations of contributions made in violation of the above prohibitions may result in the following civil and criminal penalties:

Civil penalties—Up to $2,000 or twice the amount of the prohibited contribution, whichever is greater, against a principal or a contractor. Any state contractor or prospective state contractor which fails to make reasonable efforts to comply with the provisions requiring notice to its principals of these prohibitions and the possible consequences of their violations may also be subject to civil penalties of up to $2,000 or twice the amount of the prohibited contributions made by their principals.

Criminal penalties—Any knowing and willful violation of the prohibition is a Class D felony, which may subject the violator to imprisonment of not more than 5 years, or not more than $5,000 in fines, or both.

CONTRACT CONSEQUENCES

In the case of a state contractor, contributions made or solicited in violation of the above prohibitions may result in the contract being voided.

In the case of a prospective state contractor, contributions made or solicited in violation of the above prohibitions shall result in the contract described in the state contract solicitation not being awarded to the prospective state contractor, unless the State Elections Enforcement Commission determines that mitigating circumstances exist concerning such violation.

The State shall not award any other state contract to anyone found in violation of the above prohibitions for a period of one year after the election for which such contribution is made or solicited, unless the State Elections Enforcement Commission determines that mitigating circumstances exist concerning such violation.

Additional information may be found on the website of the State Elections Enforcement Commission, www.ct.gov/seec. Click on the link to "Lobbyist/Contractor Limitations."

DEFINITIONS

"State contractor" means a person, business entity or nonprofit organization that enters into a state contract. Such person, business entity or nonprofit organization shall be deemed to be a state contractor until December thirty-first of the year in which such contract terminates. "State contractor" does not include a municipality or any other political subdivision of the state, including any entities or associations duly created by the municipality or political subdivision exclusively amongst themselves to further any purpose authorized by statute or charter, or an employee in the executive or legislative branch of state government or a quasi-public agency, whether in the classified or unclassified service and full or part-time, and only in such person's capacity as a state or quasi-public agency employee.

"Prospective state contractor" means a person, business entity or nonprofit organization that (i) submits a response to a state contract solicitation by the state, a state agency or a quasi-public agency, or a proposal in response to a request for proposals by the state, a state agency or a quasi-public agency, until the contract has been entered into, or (ii) holds a valid prequalification certificate issued by the Commissioner of Administrative Services under section 4a-100. "Prospective state contractor" does not include a municipality or any other political subdivision of the state, including any entities or associations duly created by the municipality or political subdivision exclusively amongst themselves to further any purpose authorized by statute or charter, or an employee in the executive or legislative branch of state government or a quasi-public agency, whether in the classified or unclassified service and full or part-time, and only in such person's capacity as a state or quasi-public agency employee.

"Principal of a state contractor or prospective state contractor" means (i) any individual who is a member of the board of directors of, or has an ownership interest of five per cent or more in, a state contractor or prospective state contractor, which is a business entity, except for an individual who is a member of the board of directors of a nonprofit organization**,** (ii) an individual who is employed by a state contractor or prospective state contractor, which is a business entity, as president, treasurer or executive vice president, (iii) an individual who is the chief executive officer of a state contractor or prospective state contractor, which is not a business entity, or if a state contractor or prospective state contractor has no such officer, then the officer who duly possesses comparable powers and duties, (iv) an officer or an employee of any state contractor or prospective state contractor who has *managerial or discretionary responsibilities with respect to a state contract,* (v) the spouse or a *dependent child* who is eighteen years of age or older of an individual described in this subparagraph, or (vi) a political committee established or controlled by an individual described in this subparagraph or the business entity or nonprofit organization that is the state contractor or prospective state contractor.

"State contract" means an agreement or contract with the state or any state agency or any quasi-public agency, let through a procurement process or otherwise, having a value of fifty thousand dollars or more, or a combination or series of such agreements or contracts having a value of one hundred thousand dollars or more in a calendar year, for (i) the rendition of services, (ii) the furnishing of any goods, material, supplies, equipment or any items of any kind, (iii) the construction, alteration or repair of any public building or public work, (iv) the acquisition, sale or lease of any land or building, (v) a licensing arrangement, or (vi) a grant, loan or loan guarantee. "State contract" does not include any agreement or contract with the state, any state agency or any quasi-public agency that is exclusively federally funded, an education loan, a loan to an individual for other than commercial purposes or any agreement or contract between the state or any state agency and the United States Department of the Navy or the United States Department of Defense.

"State contract solicitation" means a request by a state agency or quasi-public agency, in whatever form issued, including, but not limited to, an invitation to bid, request for proposals, request for information or request for quotes, inviting bids, quotes or other types of submittals, through a competitive procurement process or another process authorized by law waiving competitive procurement.

"Managerial or discretionary responsibilities with respect to a state contract" means having direct, extensive and substantive responsibilities with respect to the negotiation of the state contract and not peripheral, clerical or ministerial responsibilities.

"Dependent child" means a child residing in an individual's household who may legally be claimed as a dependent on the federal income tax of such individual.

"Solicit" means (A) requesting that a contribution be made, (B) participating in any fundraising activities for a candidate committee, exploratory committee, political committee or party committee, including, but not limited to, forwarding tickets to potential contributors, receiving contributions for transmission to any such committee, serving on the committee that is hosting a fundraising event, introducing the candidate or making other public remarks at a fundraising event, being honored or otherwise recognized at a fundraising event, or bundling contributions, (C) serving as chairperson, treasurer or deputy treasurer of any such committee, or (D) establishing a political committee for the sole purpose of soliciting or receiving contributions for any committee. Solicit does not include: (i) making a contribution that is otherwise permitted by Chapter 155 of the Connecticut General Statutes; (ii) informing any person of a position taken by a candidate for public office or a public official, (iii) notifying the person of any activities of, or contact information for, any candidate for public office; or (iv) serving as a member in any party committee or as an officer of such committee that is not otherwise prohibited in this section.

"Subcontractor" means any person, business entity or nonprofit organization that contracts to perform part or all of the obligations of a state contractor's state contract. Such person, business entity or nonprofit organization shall be deemed to be a subcontractor until December thirty first of the year in which the subcontract terminates. "Subcontractor" does not include (i) a municipality or any other political subdivision of the state, including any entities or associations duly created by the municipality or political subdivision exclusively amongst themselves to further any purpose authorized by statute or charter, or (ii) an employee in the executive or legislative branch of state government or a quasi-public agency, whether in the classified or unclassified service and full or part-time, and only in such person's capacity as a state or quasi-public agency employee.

"Principal of a subcontractor" means (i) any individual who is a member of the board of directors of, or has an ownership interest of five per cent or more in, a subcontractor, which is a business entity, except for an individual who is a member of the board of directors of a nonprofit organization, (ii) an individual who is employed by a subcontractor, which is a business entity, as president, treasurer or executive vice president, (iii) an individual who is the chief executive officer of a subcontractor, which is not a business entity, or if a subcontractor has no such officer, then the officer who duly possesses comparable powers and duties, (iv) an officer or an employee of any subcontractor who has managerial or discretionary responsibilities with respect to a subcontract with a state contractor, (v) the spouse or a dependent child who is eighteen years of age or older of an individual described in this subparagraph, or (vi) a political committee established or controlled by an individual described in this subparagraph or the business entity or nonprofit organization that is the subcontractor.

EXHIBIT E

(state wages will be inserted here)

Project: Project No. 151-171; Safety And Operational Improvements

Minimum Rates and Classifications
for Heavy/Highway Construction

Connecticut Department of Labor
Wage and Workplace Standards Division

ID#: **H** 26652

By virtue of the authority vested in the Labor Commissioner under provisions of Section 31-53 of the General Statutes of Connecticut, as amended, the following are declared to be the prevailing rates and welfare payments and will apply only where the contract is advertised for bid within 20 days of the date on which the rates are established. Any contractor or subcontractor not obligated by agreement to pay to the welfare and pension fund shall pay this amount to each employee as part of his/her hourly wages.

Project Number: 155-171
Project Town: West Hartford
FAP Number:
State Number:
Project: Project No. 151-171; Safety And Operational Improvements

CLASSIFICATION	Hourly Rate	Benefits
1) Boilermaker	33.79	34% + 8.96
1a) Bricklayer, Cement Masons, Cement Finishers, Plasterers, Stone Masons	34.72	32.15
2) Carpenters, Piledrivermen	33.53	25.66
2a) Diver Tenders	33.53	25.66

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3) Divers	41.99	25.66
03a) Millwrights	34.04	26.09
4) Painters: (Bridge Construction) Brush, Roller, Blasting (Sand, Water, etc.), Spray	51.00	21.80
4a) Painters: Brush and Roller	34.62	21.80
4b) Painters: Spray Only	36.62	21.80
4c) Painters: Steel Only	35.62	21.80
4d) Painters: Blast and Spray	37.62	21.80

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4e) Painters: Tanks, Tower and Swing	36.62	21.80
5) Electrician (Trade License required: E-1,2 L-5,6 C-5,6 T-1,2 L-1,2 V-1,2,7,8,9)	40.00	27.67+3% of gross wage
6) Ironworkers: Ornamental, Reinforcing, Structural, and Precast Concrete Erection	36.67	35.77 + a
7) Plumbers (Trade License required: (P-1,2,6,7,8,9 J-1,2,3,4 SP-1,2) and Pipefitters (Including HVAC Work) (Trade License required: S-1,2,3,4,5,6,7,8 B-1,2,3,4 D-1,2,3,4 G-1, G-2, G-8, G-9)	43.62	32.06
----LABORERS---- -		
8) Group 1: Laborer (Unskilled), Common or General, acetylene burner, concrete specialist	30.75	20.84
9) Group 2: Chain saw operators, fence and guard rail erectors, pneumatic tool operators, powdermen	31.00	20.84

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10) Group 3: Pipelayers	31.25	20.84
11) Group 4: Jackhammer/Pavement breaker (handheld); mason tenders (cement/concrete), catch basin builders, asphalt rakers, air track operators, block paver, curb setter and forklift operators	31.25	20.84
12) Group 5: Toxic waste removal (non-mechanical systems)	32.75	20.84
13) Group 6: Blasters	32.50	20.84
Group 7: Asbestos/lead removal, non-mechanical systems (does not include leaded joint pipe)	31.75	20.84
Group 8: Traffic control signalmen	18.00	20.84
Group 9: Hydraulic Drills	29.30	18.90

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----LABORERS (TUNNEL CONSTRUCTION, FREE AIR). Shield Drive and Liner Plate Tunnels in Free Air.----		
13a) Miners, Motormen, Mucking Machine Operators, Nozzle Men, Grout Men, Shaft & Tunnel Steel & Rodmen, Shield & Erector, Arm Operator, Cable Tenders	32.98	20.84 + a
13b) Brakemen, Trackmen	32.01	20.84 + a
----CLEANING, CONCRETE AND CAULKING TUNNEL----		
14) Concrete Workers, Form Movers, and Strippers	32.01	20.84 + a
15) Form Erectors	32.34	20.84 + a
----ROCK SHAFT LINING, CONCRETE, LINING OF SAME AND TUNNEL IN FREE AIR:----		

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16) Brakemen, Trackmen, Tunnel Laborers, Shaft Laborers	32.01	20.84 + a
17) Laborers Topside, Cage Tenders, Bellman	31.90	20.84 + a
18) Miners	32.98	20.84 + a
----TUNNELS, CAISSON AND CYLINDER WORK IN COMPRESSED AIR: ----		
18a) Blaster	39.47	20.84 + a
19) Brakemen, Trackmen, Groutman, Laborers, Outside Lock Tender, Gauge Tenders	39.27	20.84 + a
20) Change House Attendants, Powder Watchmen, Top on Iron Bolts	37.29	20.84 + a

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21) Mucking Machine Operator	40.06	20.84 + a
----TRUCK DRIVERS----(*see note below)		
Two axle trucks	29.51	24.52 + a
Three axle trucks; two axle ready mix	29.62	24.52 + a
Three axle ready mix	29.67	24.52 + a
Four axle trucks, heavy duty trailer (up to 40 tons)	29.72	24.52 + a
Four axle ready-mix	29.77	24.52 + a

Heavy duty trailer (40 tons and over)	29.98	24.52 + a
Specialized earth moving equipment other than conventional type on-the road trucks and semi-trailer (including Euclids)	29.77	24.52 + a
----POWER EQUIPMENT OPERATORS----		
Group 1: Crane handling or erecting structural steel or stone, hoisting engineer (2 drums or over), front end loader (7 cubic yards or over), Work Boat 26 ft. & Over, Tunnel Boring Machines. (Trade License Required)	40.97	24.80 + a
Group 2: Cranes (100 ton rate capacity and over); Excavator over 2 cubic yards; Piledriver ($3.00 premium when operator controls hammer); Bauer Drill/Caisson. (Trade License Required)	40.64	24.80 + a
Group 3: Excavator/Backhoe under 2 cubic yards; Cranes (under 100 ton rated capacity), Gradall; Master Mechanic; Hoisting Engineer (all types of equipment where a drum and cable are used to hoist or drag material regardless of motive power of operation), Rubber Tire Excavator (Drott-1085 or similar);Grader Operator; Bulldozer Fine Grade (slopes, shaping, laser or GPS, etc.). (Trade License Required)	39.88	24.80 + a
Group 4: Trenching Machines; Lighter Derrick; Concrete Finishing Machine; CMI Machine or Similar; Koehring Loader (Skooper)	39.48	24.80 + a

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Group 5: Specialty Railroad Equipment; Asphalt Paver; Asphalt Spreader; Asphalt Reclaiming Machine; Line Grinder; Concrete Pumps; Drills with Self Contained Power Units; Boring Machine; Post Hole Digger; Auger; Pounder; Well Digger; Milling Machine (over 24" Mandrell)	38.87	24.80 + a
Group 5 continued: Side Boom; Combination Hoe and Loader; Directional Driller.	38.87	24.80 + a
Group 6: Front End Loader (3 up to 7 cubic yards); Bulldozer (rough grade dozer).	38.55	24.80 + a
Group 7: Asphalt Roller; Concrete Saws and Cutters (ride on types); Vermeer Concrete Cutter; Stump Grinder; Scraper; Snooper; Skidder; Milling Machine (24" and Under Mandrel).	38.20	24.80 + a
Group 8: Mechanic, Grease Truck Operator, Hydroblaster, Barrier Mover, Power Stone Spreader; Welder; Work Boat under 26 ft.; Transfer Machine.	37.79	24.80 + a
Group 9: Front End Loader (under 3 cubic yards), Skid Steer Loader regardless of attachments (Bobcat or Similar); Fork Lift, Power Chipper; Landscape Equipment (including hydroseeder).	37.34	24.80 + a
Group 10: Vibratory Hammer, Ice Machine, Diesel and Air Hammer, etc.	35.24	24.80 + a

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Group 11: Conveyor, Earth Roller; Power Pavement Breaker (whiphammer), Robot Demolition Equipment.	35.24	24.80 + a
Group 12: Wellpoint Operator.	35.18	24.80 + a
Group 13: Compressor Battery Operator.	34.58	24.80 + a
Group 14: Elevator Operator; Tow Motor Operator (Solid Tire No Rough Terrain).	33.41	24.80 + a
Group 15: Generator Operator; Compressor Operator; Pump Operator; Welding Machine Operator; Heater Operator.	32.99	24.80 + a
Group 16: Maintenance Engineer/Oiler	32.32	24.80 + a
Group 17: Portable asphalt plant operator; portable crusher plant operator; portable concrete plant operator.	36.76	24.80 + a

As of: Tuesday, October 22, 2019

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Group 18: Power Safety Boat; Vacuum Truck; Zim Mixer; Sweeper; (minimum for any job requiring CDL license).	34.26	24.80 + a

**NOTE: SEE BELOW

----LINE CONSTRUCTION----(Railroad Construction and Maintenance)----

20) Lineman, Cable Splicer, Technician	48.19	6.5% + 22.00
21) Heavy Equipment Operator	42.26	6.5% + 19.88
22) Equipment Operator, Tractor Trailer Driver, Material Men	40.96	6.5% + 19.21
23) Driver Groundmen	26.50	6.5% + 9.00

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23a) Truck Driver	40.96	6.5% + 17.76
----LINE CONSTRUCTION----		
24) Driver Groundmen	30.92	6.5% + 9.70
25) Groundmen	22.67	6.5% + 6.20
26) Heavy Equipment Operators	37.10	6.5% + 10.70
27) Linemen, Cable Splicers, Dynamite Men	41.22	6.5% + 12.20
28) Material Men, Tractor Trailer Drivers, Equipment Operators	35.04	6.5% + 10.45

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01) Asbestos/Toxic Waste Removal Laborers: Asbestos removal and encapsulation (except its removal from mechanical systems which are not to be scrapped), toxic waste removers, blasters. **See Laborers Group 5 and 7**

Project: Project No. 151-171; Safety And Operational Improvements

Welders: Rate for craft to which welding is incidental.

**Note: Hazardous waste removal work receives additional $1.25 per hour for truck drivers.*

***Note: Hazardous waste premium $3.00 per hour over classified rate*

ALL Cranes: When crane operator is operating equipment that requires a fully licensed crane operator to operate he receives an extra $4.00 premium in addition to the hourly wage rate and benefit contributions:

1) Crane handling or erecting structural steel or stone; hoisting engineer (2 drums or over)

2) Cranes (100 ton rate capacity and over) Bauer Drill/Caisson

3) Cranes (under 100 ton rated capacity)

Crane with 150 ft. boom (including jib) - $1.50 extra
Crane with 200 ft. boom (including jib) - $2.50 extra
Crane with 250 ft. boom (including jib) - $5.00 extra
Crane with 300 ft. boom (including jib) - $7.00 extra
Crane with 400 ft. boom (including jib) - $10.00 extra

All classifications that indicate a percentage of the fringe benefits must be calculated at the percentage rate times the "base hourly rate".

Apprentices duly registered under the Commissioner of Labor's regulations on "Work Training Standards for Apprenticeship and Training Programs" Section 31-51-d-1 to 12, are allowed to be paid the appropriate percentage of the prevailing journeymen hourly base and the full fringe benefit rate, providing the work site ratio shall not be less than one full-time journeyperson instructing and supervising the work of each apprentice in a specific trade.

~~Connecticut General Statute Section 31-55a: Annual Adjustments to wage rates by contractors doing state work ~~

The Prevailing wage rates applicable to this project are subject to annual adjustments each July 1st for the duration of the project.

Each contractor shall pay the annual adjusted prevailing wage rate that is in effect each July 1st, as posted by the Department of Labor.

It is the contractor's responsibility to obtain the annual adjusted prevailing wage rate increases directly from the Department of Labor's website.

The annual adjustments will be posted on the Department of Labor's Web page: www.ct.gov/dol.

The Department of Labor will continue to issue the initial prevailing wage rate schedule to the Contracting Agency for the project.

All subsequent annual adjustments will be posted on our Web Site for contractor access.

Contracting Agencies are under no obligation pursuant to State labor law to pay any increase due to the annual adjustment provision.

As of: Tuesday, October 22, 2019

Project: Project No. 151-171; Safety And Operational Improvements

Effective October 1, 2005 - Public Act 05-50: any person performing the work of any mechanic, laborer, or worker shall be paid prevailing wage

All Person who perform work ON SITE must be paid prevailing wage for the appropriate mechanic, laborer, or worker classification.

All certified payrolls must list the hours worked and wages paid to All Persons who perform work ON SITE regardless of their ownership i.e.: (Owners, Corporate Officers, LLC Members, Independent Contractors, et. al)

Reporting and payment of wages is required regardless of any contractual relationship alleged to exist between the contractor and such person.

~~Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clause (29 CFR 5.5 (a) (1) (ii)).

Please direct any questions which you may have pertaining to classification of work and payment of prevailing wages to the Wage and Workplace Standards Division, telephone (860)263-6790.

As of: Tuesday, October 22, 2019

Connecticut Department of Labor
Wage and Workplace Standards Division
FOOTNOTES

Please Note: If the "Benefits" listed on the schedule for the following occupations includes a letter(s) (+ a or + a+b for instance), refer to the information below.

Benefits to be paid at the appropriate prevailing wage rate for the listed occupation.

If the "Benefits" section for the occupation lists only a dollar amount, disregard the information below.

Bricklayers, Cement Masons, Cement Finishers, Concrete Finishers, Stone Masons
(Building Construction) and
(Residential- Hartford, Middlesex, New Haven, New London and Tolland Counties)

a. Paid Holiday: Employees shall receive 4 hours for Christmas Eve holiday provided the employee works the regularly scheduled day before and after the holiday. Employers may schedule work on Christmas Eve and employees shall receive pay for actual hours worked in addition to holiday pay.

Elevator Constructors: Mechanics

a. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Veterans' Day, Thanksgiving Day, Christmas Day, plus the Friday after Thanksgiving.

b. Vacation: Employer contributes 8% of basic hourly rate for 5 years or more of service or 6% of basic hourly rate for 6 months to 5 years of service as vacation pay credit.

Glaziers

a. Paid Holidays: Labor Day and Christmas Day.

Power Equipment Operators
(Heavy and Highway Construction & Building Construction)

a. Paid Holidays: New Year's Day, Good Friday, Memorial day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day, provided the employee works 3 days during the week in which the holiday falls, if scheduled, and if scheduled, the working day before and the working day after the holiday. Holidays falling on Saturday may be observed on Saturday, or if the employer so elects, on the preceding Friday.

Ironworkers

a. Paid Holiday: Labor Day provided employee has been on the payroll for the 5 consecutive work days prior to Labor Day.

Laborers (Tunnel Construction)

a. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day. No employee shall be eligible for holiday pay when he fails, without cause, to work the regular work day preceding the holiday or the regular work day following the holiday.

Roofers

a. Paid Holidays: July 4th, Labor Day, and Christmas Day provided the employee is employed 15 days prior to the holiday.

Sprinkler Fitters

a. Paid Holidays: Memorial Day, July 4th, Labor Day, Thanksgiving Day and Christmas Day, provided the employee has been in the employment of a contractor 20 working days prior to any such paid holiday.

Truck Drivers

(Heavy and Highway Construction & Building Construction)

a. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Christmas day, and Good Friday, provided the employee has at least 31 calendar days of service and works the last scheduled day before and the first scheduled day after the holiday, unless excused.

Information Bulletin
Occupational Classifications

The Connecticut Department of Labor has the responsibility to properly determine *"job classification"* on prevailing wage projects covered under C.G.S. Section 31-53(d).

Note: This information is intended to provide a sample of some occupational classifications for guidance purposes only. It is not an all-inclusive list of each occupation's duties. This list is being provided only to highlight some areas where a contractor may be unclear regarding the proper classification. If unsure, the employer should seek guidelines for CTDOL.

Below are additional clarifications of specific job duties performed for certain classifications:

- ***ASBESTOS WORKERS***

Applies all insulating materials, protective coverings, coatings and finishes to all types of mechanical systems.

- ***ASBESTOS INSULATOR***

Handle, install apply, fabricate, distribute, prepare, alter, repair, dismantle, heat and frost insulation, including penetration and fire stopping work on all penetration fire stop systems.

- ***BOILERMAKERS***

Erects hydro plants, incomplete vessels, steel stacks, storage tanks for water, fuel, etc. Builds incomplete boilers, repairs heat exchanges and steam generators.

- ***BRICKLAYERS, CEMENT MASONS, CEMENT FINISHERS, MARBLE MASONS, PLASTERERS, STONE MASONS, PLASTERERS. STONE MASONS, TERRAZZO WORKERS, TILE SETTERS***

Lays building materials such as brick, structural tile and concrete cinder, glass, gypsum, terra cotta block. Cuts, tools and sets marble, sets stone, finishes concrete, applies decorative steel, aluminum and plastic tile, applies cements, sand, pigment and marble chips to floors, stairways, etc.

- ***<u>CARPENTERS, MILLWRIGHTS. PILEDRIVERMEN. LATHERS. RESILEINT FLOOR LAYERS, DOCK BUILDERS, DIKERS, DIVER TENDERS</u>***

Constructs, erects, installs and repairs structures and fixtures of wood, plywood and wallboard. Installs, assembles, dismantles, moves industrial machinery. Drives piling into ground to provide foundations for structures such as buildings and bridges, retaining walls for earth embankments, such as cofferdams. Fastens wooden, metal or rockboard lath to walls, ceilings and partitions of buildings, acoustical tile layer, concrete form builder. Applies firestopping materials on fire resistive joint systems only. Installation of curtain/window walls only where attached to wood or metal studs. Installation of insulated material of all types whether blown, nailed or attached in other ways to walls, ceilings and floors of buildings. Assembly and installation of modular furniture/furniture systems. Free-standing furniture is not covered. This includes free standing: student chairs, study top desks, book box desks, computer furniture, dictionary stand, atlas stand, wood shelving, two-position information access station, file cabinets, storage cabinets, tables, etc.

- **LABORER, CLEANING**

• The clean up of any construction debris and the general (heavy/light) cleaning, including sweeping, wash down, mopping, wiping of the construction facility and its furniture, washing, polishing, and dusting.

- **DELIVERY PERSONNEL**

• If delivery of supplies/building materials is to one common point and stockpiled there, prevailing wages <u>are not required</u>. If the delivery personnel are involved in the distribution of the material to multiple locations within the construction site then they would have to be paid prevailing wages for the type of work performed: laborer, equipment operator, electrician, ironworker, plumber, etc.

• An example of this would be where delivery of drywall is made to a building and the delivery personnel distribute the drywall from one "stockpile" location to further sub-locations on each floor. Distribution of material around a construction site is the job of a laborer or tradesman, and not a delivery personnel.

- ***<u>ELECTRICIANS</u>***

Install, erect, maintenance, alteration or repair of any wire, cable, conduit, etc., which generates, transforms, transmits or uses electrical energy for light, heat, power or other purposes, including the Installation or maintenance of telecommunication, LAN wiring or computer equipment, and low voltage wiring. ****License required per Connecticut General Statutes: E-1,2 L-5,6 C-5,6 T-1,2 L-1,2 V-1,2,7,8,9.***

- ***ELEVATOR CONSTRUCTORS***

Install, erect, maintenance and repair of all types of elevators, escalators, dumb waiters and moving walks. ****License required by Connecticut General Statutes: R-1,2,5,6.***

- ***FORK LIFT OPERATOR***

Laborers Group 4) Mason Tenders - operates forklift solely to assist a mason to a maximum height of nine (9) feet only.

Power Equipment Operator Group 9 - operates forklift to assist any trade, and to assist a mason to a height over nine (9) feet.

- ***GLAZIERS***

Glazing wood and metal sash, doors, partitions, and 2 story aluminum storefronts. Installs glass windows, skylights, store fronts and display cases or surfaces such as building fronts, interior walls, ceilings and table tops and metal store fronts. Installation of aluminum window walls and curtain walls is the "joint" work of glaziers and ironworkers, which require equal composite workforce.

- ***IRONWORKERS***

Erection, installation and placement of structural steel, precast concrete, miscellaneous iron, ornamental iron, metal curtain wall, rigging and reinforcing steel. Handling, sorting, and installation of reinforcing steel (rebar). Metal bridge rail (traffic), metal bridge handrail, and decorative security fence installation. Installation of aluminum window walls and curtain walls is the "joint" work of glaziers and ironworkers which require equal composite workforce.

- ***INSULATOR***

• Installing fire stopping systems/materials for "Penetration Firestop Systems": transit to cables, electrical conduits, insulated pipes, sprinkler pipe penetrations, ductwork behind radiation, electrical cable trays, fire rated pipe penetrations, natural polypropylene, HVAC ducts, plumbing bare metal, telephone and communication wires, and boiler room ceilings.

- ***LABORERS***

Acetylene burners, asphalt rakers, chain saw operators, concrete and power buggy operator, concrete saw operator, fence and guard rail erector (except metal bridge rail (traffic), decorative security fence (non-metal).

installation.), hand operated concrete vibrator operator, mason tenders, pipelayers (installation of storm drainage or sewage lines on the street only), pneumatic drill operator, pneumatic gas and electric drill operator, powermen and wagon drill operator, air track operator, block paver, curb setters, blasters, concrete spreaders.

- ***PAINTERS***

Maintenance, preparation, cleaning, blasting (water and sand, etc.), painting or application of any protective coatings of every description on all bridges and appurtenances of highways, roadways, and railroads. Painting, decorating, hardwood finishing, paper hanging, sign writing, scenic art work and drywall hhg for any and all types of building and residential work.

- ***LEAD PAINT REMOVAL***

• Painter's Rate

1. Removal of lead paint from bridges.
2. Removal of lead paint as preparation of any surface to be repainted.
3. Where removal is on a Demolition project prior to reconstruction.

• Laborer's Rate

1. Removal of lead paint from any surface NOT to be repainted.
2. Where removal is on a *TOTAL* Demolition project only.

- ***PLUMBERS AND PIPEFITTERS***

Installation, repair, replacement, alteration or maintenance of all plumbing, heating, cooling and piping. ****License required per Connecticut General Statutes: P-1,2,6,7,8,9 J-1,2,3,4 SP-1,2 S-1,2,3,4,5,6,7,8 B-1,2,3,4 D-1,2,3,4.***

- ***POWER EQUIPMENT OPERATORS***

Operates several types of power construction equipment such as compressors, pumps, hoists, derricks, cranes, shovels, tractors, scrapers or motor graders, etc. Repairs and maintains equipment. ****License required, crane operators only, per Connecticut General Statutes.***

- ***ROOFERS***

Covers roofs with composition shingles or sheets, wood shingles, slate or asphalt and gravel to waterproof roofs, including preparation of surface. (demolition or removal of any type of roofing and or clean-up of any and all areas where a roof is to be relaid.)

- ***SHEETMETAL WORKERS***

Fabricate, assembles, installs and repairs sheetmetal products and equipment in such areas as ventilation, air-conditioning, warm air heating, restaurant equipment, architectural sheet metal work, sheetmetal roofing, and aluminum gutters. Fabrication, handling, assembling, erecting, altering, repairing, etc. of coated metal material panels and composite metal material panels when used on building exteriors and interiors as soffits, facia, louvers, partitions, canopies, cornice, column covers, awnings, beam covers, cladding, sun shades, lighting troughs, spires, ornamental roofing, metal ceilings, mansards, copings, ornamental and ventilation hoods, vertical and horizontal siding panels, trim, etc. The sheet metal classification also applies to the vast variety of coated metal material panels and composite metal material panels that have evolved over the years as an alternative to conventional ferrous and non-ferrous metals like steel, iron, tin, copper, brass, bronze, aluminum, etc. Fabrication, handling, assembling, erecting, altering, repairing, etc. of architectural metal roof, standing seam roof, composite metal roof, metal and composite bathroom/toilet partitions, aluminum gutters, metal and composite lockers and shelving, kitchen equipment, and walk-in coolers. To include testing and air –balancing ancillary to installation and construction.

- ***SPRINKLER FITTERS***

Installation, alteration, maintenance and repair of fire protection sprinkler systems. ****License required per Connecticut General Statutes: F-1,2,3,4.***

- ***TILE MARBLE AND TERRAZZO FINISHERS***

Assists and tends the tile setter, marble mason and terrazzo worker in the performance of their duties.

- **TRUCK DRIVERS**

~How to pay truck drivers delivering asphalt is under REVISION~

Truck Drivers are requires to be paid prevailing wage for time spent "working" directly on the site. These drivers remain covered by the prevailing wage for any time spent transporting between the actual construction location and facilities (such as fabrication, plants, mobile factories, batch plant, borrow pits, job headquarters, tool yards, etc.) dedicated exclusively, or nearly so, to performance of the contract or project, which are so located in proximity to the actual construction location that it is reasonable to include them. ****License required, drivers only, per Connecticut General Statutes.***

For example:

• Material men and deliverymen are not covered under prevailing wage as long as they are not directly involved in the construction process. If, they unload the material, they would then be covered by prevailing wage for the classification they are performing work in: laborer, equipment operator, etc.
• Hauling material off site is not covered provided they are not dumping it at a location outlined above.
• Driving a truck on site and moving equipment or materials on site would be considered covered work, as this is part of the construction process.

➢ *Any questions regarding the proper classification should be directed to:*
Public Contract Compliance Unit
Wage and Workplace Standards Division
Connecticut Department of Labor
200 Folly Brook Blvd, Wethersfield, CT 06109
(860) 263-6543.

Statute 31-55a

Last Updated: June 02, 2008

- Special Notice -

To All State and Political Subdivisions,Their Agents, and Contractors

Connecticut General Statute 31-55a - Annual adjustments to wage rates by contractors doing state work.

Each contractor that is awarded a contract on or after October 1, 2002, for (1) the construction of a state highway or bridge that falls under the provisions of section 31-54 of the general statutes, or (2) the construction, remodeling, refinishing, refurbishing, rehabilitation, alteration or repair of any public works project that falls under the provisions of section 31-53 of the general statutes shall contact the Labor Commissioner on or before July first of each year, for the duration of such contract, to ascertain the prevailing rate of wages on an hourly basis and the amount of payment or contributions paid or payable on behalf of each mechanic, laborer or worker employed upon the work contracted to be done, and shall make any necessary adjustments to such prevailing rate of wages and such payment or contributions paid or payable on behalf of each such employee, effective each July first.

- The prevailing wage rates applicable to any contract or subcontract awarded on or after October 1, 2002 are subject to annual adjustments each July 1st for the duration of any project which was originally advertised for bids on or after October 1, 2002.
- Each contractor affected by the above requirement shall pay the annual adjusted prevailing wage rate that is in effect each July 1st, as posted by the Department of Labor.
- It is the ***contractor's*** responsibility to obtain the annual adjusted prevailing wage rate increases directly from the Department of Labor's Web Site. The annual adjustments will be posted on the Department of Labor Web page: www.ctdol.state.ct.us. For those without internet access, please contact the division listed below.
- The Department of Labor will continue to issue the initial prevailing wage rate schedule to the Contracting Agency for the project. All subsequent annual adjustments will be posted on our Web Site for contractor access.

Any questions should be directed to the Contract Compliance Unit, Wage and Workplace

Standards Division, Connecticut Department of Labor, 200 Folly Brook Blvd., Wethersfield, CT 06109 at (860)263-6790.

Workplace Laws

Published by the Connecticut Department of Labor, Project Management Office

November 29, 2006

Notice

To All Mason Contractors and Interested Parties Regarding Construction Pursuant to Section 31-53 of the Connecticut General Statutes (Prevailing Wage)

The Connecticut Labor Department Wage and Workplace Standards Division is empowered to enforce the prevailing wage rates on projects covered by the above referenced statute.

Over the past few years the Division has withheld enforcement of the rate in effect for workers who operate a forklift on a prevailing wage rate project due to a potential jurisdictional dispute.

The rate listed in the schedules and in our Occupational Bulletin (see enclosed) has been as follows:

Forklift Operator:

- **Laborers (Group 4) Mason Tenders** - operates forklift solely to assist a mason to a maximum height of nine feet only.

- **Power Equipment Operator (Group 9)** - operates forklift to assist any trade and to assist a mason to a height over nine feet.

The U.S. Labor Department conducted a survey of rates in Connecticut but it has not been published and the rate in effect remains as outlined in the above Occupational Bulletin.

Since this is a classification matter and not one of jurisdiction, effective January 1, 2007 the Connecticut Labor Department will enforce the rate on each schedule in accordance with our statutory authority.

Your cooperation in filing appropriate and accurate certified payrolls is appreciated.

Informational Bulletin

THE 10-HOUR OSHA CONSTRUCTION SAFETY AND HEALTH COURSE

(applicable to public building contracts entered into *on or after July 1, 2007,* where the total cost of all work to be performed is at least $100,000)

(1) This requirement was created by Public Act No. 06-175, which is codified in Section 31-53b of the Connecticut General Statutes (pertaining to the prevailing wage statutes);

(2) The course is required for public building construction contracts (projects funded in whole or in part by the state or any political subdivision of the state) entered into on or after July 1, 2007;

(3) It is required of private employees (not state or municipal employees) and apprentices who perform manual labor for a general contractor or subcontractor on a public building project where the total cost of all work to be performed is at least $100,000;

(4) The ten-hour construction course pertains to the ten-hour Outreach Course conducted in accordance with federal OSHA Training Institute standards, and, for telecommunications workers, a ten-hour training course conducted in accordance with federal OSHA standard, 29 CFR 1910.268;

(5) The internet website for the federal OSHA Training Institute is http://www.osha.gov/fso/ote/training/edcenters/fact_sheet.html;

(6) The statutory language leaves it to the contractor and its employees to determine who pays for the cost of the ten-hour Outreach Course;

(7) Within 30 days of receiving a contract award, a general contractor must furnish proof to the Labor Commissioner that all employees and apprentices performing manual labor on the project will have completed such a course;

(8) Proof of completion may be demonstrated through either: (a) the presentation of a *bona fide* student course completion card issued by the federal OSHA Training Institute; *or* (2) the presentation of documentation provided to an employee by a trainer certified by the Institute pending the actual issuance of the completion card;

(9) Any card with an issuance date more than 5 years prior to the commencement date of the construction project shall not constitute proof of compliance;

(10) Each employer shall affix a copy of the construction safety course completion card to the certified payroll submitted to the contracting agency in accordance with Conn. Gen. Stat. § 31-53(f) on which such employee's name first appears;

(11) Any employee found to be in non-compliance shall be subject to removal from the worksite if such employee does not provide satisfactory proof of course completion to the Labor Commissioner by the fifteenth day after the date the employee is determined to be in noncompliance;

(12) Any such employee who is determined to be in noncompliance may continue to work on a public building construction project for a maximum of fourteen consecutive calendar days while bringing his or her status into compliance;

(13) The Labor Commissioner may make complaint to the prosecuting authorities regarding any employer or agent of the employer, or officer or agent of the corporation who files a false certified payroll with respect to the status of an employee who is performing manual labor on a public building construction project;

(14) The statute provides the minimum standards required for the completion of a safety course by manual laborers on public construction contracts; any contractor can exceed these minimum requirements; and

(15) Regulations clarifying the statute are currently in the regulatory process, and shall be posted on the CTDOL website as soon as they are adopted in final form.

(16) Any questions regarding this statute may be directed to the Wage and Workplace Standards Division of the Connecticut Labor Department via the internet website of http://www.ctdol.state.ct.us/wgwkstnd/wgemenu.htm; or by telephone at (860)263-6790.

THE ABOVE INFORMATION IS PROVIDED EXCLUSIVELY AS AN EDUCATIONAL RESOURCE, AND IS NOT INTENDED AS A SUBSTITUTE FOR LEGAL INTERPRETATIONS WHICH MAY ULTMATELY ARISE CONCERNIG THE CONSTRUCTION OF THE STATUTE OR THE REGULATIONS.

Sec. 31-53b. **Construction safety and health course**. **Proof of completion required for employees on public building projects. Enforcement. Regulations**. (a) Each contract entered into on or after July 1, 2007, for the construction, remodeling, refinishing, refurbishing, rehabilitation, alteration or repair of any public building project by the state or any of its agents, or by an political subdivision of the state or any of its agents, where the total cost of all work to be performed by all contractors and subcontractors in connection with the contract is at least one hundred thousand dollars, shall contain a provision requiring that, not later than thirty days after the date such contract is awarded, each contractor furnish proof to the Labor Commissioner that all employees performing manual labor on or in such public building, pursuant to such contract, have completed a course of at least ten hours in duration in construction safety and health approved by the federal Occupational Safety and Health Administration or, in the case of telecommunications employees, have completed at least ten hours of training in accordance with 29 CFR 1910.268.

(b) Any employee required to complete a construction safety and health course required under subsection (a) of this section who has not completed the course shall be subject to removal from the worksite if the employee does not provide documentation of having completed such course by the fifteenth day after the date the employee is found to be in noncompliance. The Labor Commissioner or said commissioner's designee shall enforce this section.

(c) Not later than January 1, 2007, the Labor Commissioner shall adopt regulations, in accordance with the provisions of chapter 54, to implement the provisions of subsections (a) and (b) of this section. Such regulations shall require that the ten-hour construction safety and health courses required under subsection (a) of this section be conducted in accordance with federal Occupational Safety and Health Administration Training Institute standards, or in accordance with 29 CFR 1910.268, as appropriate. The Labor Commissioner shall accept as sufficient proof of compliance with the provisions of subsection (a) or (b) of this section a student course completion card issued by the federal Occupational Safety and Health Administration Training Institute, or such other proof of compliance said commissioner deems appropriate, dated no earlier than five years before the commencement date of such public works project.

(d) For the purposes of this section, "public building" means a structure, paid for in whole or in part with state funds, within a roof and within exterior walls or fire walls, designed for the housing, shelter, enclosure and support or employment of people, animals or property of any kind, including, but not limited to, sewage treatment plants and water treatment plants, "Public building" does not include site work, roads or bridges, rail lines, parking lots or underground water, sewer or drainage systems including pump houses or other utility systems.

CONNECTICUT DEPARTMENT OF LABOR
WAGE AND WORKPLACE STANDARDS DIVISION

CONTRACTORS WAGE CERTIFICATION FORM

I,_____of _____
Officer, Owner, Authorized Rep. Company Name

do hereby certify that the _____
Company Name

_____
Street

_____
City

and all of its subcontractors will pay all workers on the

_____
Project Name and Number

_____
Street and City

the wages as listed in the schedule of prevailing rates required for such project (a copy of which is attached hereto).

_____
Signed

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

_____
Notary Public

☞ Return to:

Connecticut Department of Labor
Wage & Workplace Standards Division
200 Folly Brook Blvd.
Wethersfield, CT 06109