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

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June 2012

SUPPLEMENTAL SPECIFICATIONS TO STANDARD SPECIFICATIONS FORM 816

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(State Funded Only Contracts)

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May 30, 2012
FEDERAL AID PROJECT NO. N/A
STATE PROJECT NOS. 310-56 & 310-57

BRANFORD RAILROAD STATION & GUILFORD RAILROAD STATION

Towns of BRANFORD & GUILFORD
Federal Aid Project No. N/A

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

COMBINED PROJECTS

There will be but one Contract for State Project No. 310-56 and State Project No.310-57. The two projects will be considered as a single contract in all respects.

CONTRACT TIME AND LIQUIDATED DAMAGES

For State Project No. 310-56 and State Project No. 310-57 Five Hundred Four Three (543) calendar days will be allowed for completion of the work and the liquidated damages charge to apply will be Two Thousand Two Hundred Fifty Dollars ($2,250.00) per calendar day.

NOTICE TO CONTRACTOR – PROJECT DESCRIPTION-BRANFORD STATION

The Project consists of the expansion of a railroad station located in Branford, Connecticut as shown and described in the Contract.

Building work for the Facility consists of a new north side platform and canopy (similar to the existing south side platform), new elevator/stair tower assemblies, a new handicap-accessible ramp and stair assembly on the south side, a new pedestrian overpass and associated sitework. The existing south side passenger shelter frame will be removed to make room for the south-side elevator and stair assembly. The steel frame, wood rafters, and wood sheathing will be re-located on a new concrete pad, and be re-used as a cover for a bicycle parking area.

The platform assembly will consist of a poured-in-place concrete foundation wall and pile cap which will be supported by piles. The foundation walls will carry galvanized steel platform beams which will support the front edge of the platform. The platform surface will consist of precast concrete planks covered with a microsilica topping applied after installation. Steel canopy frames and guardrails will be shop-fabricated and shop painted with a high-performance coating system. Wood rafters and roof sheathing, left exposed from the underside of the canopy, will be carefully assembled and treated as finished items.

The stair/elevator assembly will also be shop-fabricated and shop painted with the final exterior brick, metal cladding and windows being applied after field assembly. Once the stair/elevator assemblies are completed, the pedestrian overpass will be assembled from several shop-fabricated lengths and hoisted into place. Final finishes will be completed after the overpass is in place. Note, the overpass will be finished with a shop-applied thermal spray metalized coating and a topcoat to prolong required maintenance.

The elevator assemblies consist of a machine room-less type elevator and a heated/vented control closet on the second floor. Elevator shafts will not be conditioned.

Site work associated with the new facility consists of excavation and grading work to accommodate the station components; re-grading of site for storm runoff; installation of precast concrete stairways; installation of site retaining walls; installation of drainage structures; installation of new pavement; installation of curbing; fencing; landscaping; and exterior site lighting.

NOTICE TO CONTRACTOR – PROJECT DESCRIPTION-GUILFORD STATION

The Project consists of the expansion of a railroad station located in Guilford, Connecticut as shown and described in the Contract.

Building work for the Facility consists of an extension to the existing north side platform and canopy (similar to the existing south side platform), a new sidewalk, bike shelter and other associated sitework as described in the plans. In addition to the electrical work necessary for the platform extension, the existing station electrical system will be upgraded with a battery back-up system and a CCTV camera system will be incorporated.

The platform assembly will consist of a poured-in-place concrete foundation wall and matt footing. The foundation walls will carry galvanized steel platform beams which will support the front edge of the platform. The platform surface will consist of precast concrete planks covered with a microsilica topping applied after installation. Steel canopy frames and guardrails will be shop-fabricated and shop painted with a high-performance coating system. Wood rafters and roof sheathing, left exposed from the underside of the canopy, will be carefully assembled and treated as finished items.

Site work associated with the new facility consists of excavation and grading work to accommodate the station components; a new sidewalk and tactile edge; new site lighting bollards; installation of new pavement; installation of curbing, fencing, and landscaping.

NOTICE TO CONTRACTOR – LIMITED SPACE & AVAILABILITY OF PARKING

In order to maintain the maximum number of parking spaces available to commuters, the Contractor shall restrict its operations to the areas shown on the Contract Plans. The Contractor will not be allowed to use any of the available parking spaces for storage of equipment or materials. Further, the Contractor must provide parking spaces for its employees, the employees of its subcontractors, and the Engineer and its employees within this staging area.

NOTICE TO CONTRACTOR – USE OF STATE PROPERTY

Use of State property by the Contractor for purposes other than the construction activities included in this Contract requires advance approval from the Engineer.

This applies to activities including, but not limited to: Staging and storage areas, screening/crushing operations, asphalt or concrete plants, gravel/borrow pits, and other manufacturing and/or mining operations.

The bulk storage of fuels and lubricants shall not be permitted on State property.

The storage of hazardous materials, other than those associated with the Contractor's Project related operations, shall not be permitted on State property. The Contractor shall assume sole responsibility for the proper storage, handling, management, and disposal of hazardous materials. All remedial and punitive costs incurred by the Department as a result of the Contractor's failure to properly manage hazardous materials shall be borne by the Contractor.

The Contractor is cautioned that environmental testing of the site may be required at the Contractor's expense both prior to and upon completion of the use of the State property. The Contractor shall be responsible for restoring the site and removal of all contaminants which may have been deposited at the site during its use. The Contractor must conform to the Department's Best Management Practices, environmental permit conditions and other applicable State and federal regulations. The use and restoration of the site will be at no cost to the State of Connecticut. The use of the site will be for this specific DOT Project only. In addition, approval or denial of such request shall not be used as a reason for any time extensions or claim.

For Staging and Storage Areas

The Contractor must submit all requests in writing to the District Construction Office. The following minimum information shall be included with the request(s): a description of the proposed operation or use of the site; a site plan detailing the location of the proposed operation/use, and sedimentation and erosion controls; an area plan detailing ingress and egress to the site and proximity to residential and/or occupied buildings; copies of any required environmental permits; and planned hours of operation. The submittal shall also include photo documentation (minimum of 12 each, 8"x10" color photos) showing the preconstruction condition of the site and adjacent property at the site boundaries. If the site is State property outside of the DOT right of way, authorization from other State Agencies will also be required for use of the property or site.

For Use Other than Construction Staging and Storage Areas

The Contractor must submit all requests in writing to the District Construction Office. The request(s) shall include the same information required for storage and staging areas. In addition, the Contractor will be required to provide written confirmation that the municipality in which the site is located does not object to the proposed use of the State property. The Contractor will be required to execute a license agreement with the Department for use of State property for other than staging and storage areas.

For asphalt batching or continuous mix facilities, the Contractor shall also provide a map detailing the outer most perimeter of the facility showing all structures, land use, watercourses, wetlands, and areas of environmental concern with one-third mile of the facility perimeter. No such facility will be permitted on State property where any hospital, nursing home, school, area of critical environmental concern, watercourses, or residential housing exists within one-third mile of the perimeter of the facility (P.A. 98-216).

NOTICE TO CONTRACTOR – VERIFICATION OF PLAN DIMENSIONS AND FIELD MEASUREMENTS

The Contractor is responsible for verifying all dimensions before any work is begun. Dimensions of the existing structures shown on the plans are for general reference only; they are not guaranteed. The Contractor shall take all field measurements necessary to assure proper fit of the finished work and shall assume full responsibility for their accuracy. When shop drawings and/or working drawings based on field measurements are submitted for approval and/or review, the field measurements shall also be submitted for reference by the reviewer.

In the field, the Contractor shall examine and verify all existing and given conditions and dimensions with those shown on the plans. If field conditions and dimensions differ from those shown on the plans, the Contractor shall use the field conditions and dimensions and make the appropriate changes to those shown on the plans as approved by the Engineer. All field conditions and dimensions shall be so noted on the drawings submitted for approval.

There shall be no claim made against the Department by the Contractor for work pertaining to modifications required by any difference between actual field conditions and those shown by the details and dimensions on the contract plans. The Contractor will be paid at the unit price bid for the actual quantities of materials used or for the work performed, as indicated by the various items in the contract.

NOTICE TO CONTRACTOR – WORK ON RAILROAD PROPERTY

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

The Contractor is advised that the Railroad controls all activity in the respective right-of-way, and the Department expects that these conditions may cause delays and possibly a complete suspension of construction activity. The Contractor shall consider normal Railroad operations and associated impacts to the construction schedule. Time extensions for delays associated with normal Railroad operations will not be entitled to a time extension. If the Contractor is delayed or suspended in the completion of the work by atypical railroad operations including, but not limited to, activities associated with a derailment, major track failure, or extended power outage, the Contractor will be entitled to a time extension for every day that he can demonstrate that the delays affected the completion date of the Contract. This extension of time will be considered non-compensable and the Contractor will not be entitled to any additional compensation for damages incurred for all direct and indirect costs including, but not limited to, all delay and impact costs, and inefficiencies.

The Contractor shall be responsible for obtaining the “Temporary Permit to Enter Upon Property” included elsewhere in this Contract. The cost of obtaining this permit including the cost of complying with the Specifications attached to the permit (Insurance, Safety, Training, etc.) shall be included in the MLSI. The cost of Railroad Flag Protection necessary to complete the work shown in the Contract, as well as the cost of other work shown in the Contract to be performed by AMTRAK Forces, shall be paid directly by the State under separate Force Account Agreement.

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

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

Contractor Requirements for Work Affecting the Railroad

The Contractor shall be governed by AMTRAK EP3014 and the General Requirements and Covenants of the Contract.

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

Mr. Earl Watson III
Project Development Officer
National Railroad Passenger Corporation
30th Street Station, Mail Box Bo. 64
30th and Market Streets
Philadelphia, PA 19104
(215) 349-1393

2. In general, unless otherwise authorized by the Railroad, operations directly over or adjacent to the operating right-of-way will be performed during the following time periods:

Outage	Time
Single Track 1 or 2 Night	Sunday-Thursday 10:30PM – 5:30AM
Single Track 1 or 2	Friday Night 12:01AM-8:00AM
Single Track 1 or 2	Saturday Night 10:30PM-8:00AM
Double Track 1 & 2	Saturday and Sunday Morning 12:01AM-3:00AM
Double Track 1 & 2	Saturday and Sunday Morning 4:30AM-7:30AM

Temporary at-grade crossings across any tracks WILL NOT be permitted. Provide a minimum of 30 calendar days advance notice for scheduling any work to be performed by AMTRAK forces.

All work involving rail, ties, overhead electrification, and other track components on active tracks, unless specifically designated otherwise within the Contract, will be performed by AMTRAK employees. The Contractor may not remove abandoned rack (out of service) unless given prior written approval from the Railroad and the Engineer.

Notes:

1. Single-track outages will be considered as requests are submitted. Additional track outages will be considered for approval as requested by the Contractor for the completion of work.

2. While every effort is made to accommodate the Project needs, the above track outages cannot be guaranteed at all times. Track outages are dependent on many circumstances; including weather, availability of protective personnel, conflicts with other projects and unforeseen operating problems. Therefore, no claims may be made against AMTRAK for delays due to unavailability of track and/or power outages. Further, outages are granted on the basis of what is deemed necessary for construction, not merely for the Contractor's convenience.
3. The hours shown for track outages are not the actual time the tracks will be out of service. Time should be allowed for de-energizing and re-energizing power facilities.
4. Erection of the pedestrian bridge is to be performed on a Sunday morning between the hours of 12:01AM and 4:00AM. During this erection operation, no tracks shall remain in service. AMTRAK shall have the authority to postpone this operation, at its sole discretion, because of weather or other condition or circumstance that may arise. Should postponement occur, the erection will be rescheduled to either the following day or a subsequent weekend.

NOTICE TO CONTRACTOR – ENVIRONMENTAL INVESTIGATIONS

Environmental site investigations have been conducted that involved the sampling and laboratory analysis of soil and groundwater collected from various locations and depths within the Project limits at the proposed Branford and Guilford Shore Line East (SLE) Stations. Based on the findings of the environmental investigations, two (2) soil Areas of Environmental Concern (AOECs) exist within the Project limits. One groundwater AOEC also exists within the Project limits at the proposed Branford SLE Station. The Contractor is hereby notified that Controlled Material (soil and groundwater) within the AOECs will require special management and/or disposal procedures.

Results of the environmental investigations indicated the presence of extractable total petroleum hydrocarbons (ETPH), polynuclear aromatic hydrocarbons (PAHs), arsenic, and lead at concentrations exceeding the applicable State of Connecticut Department of Environmental Protection (DEP) Remediation Standard Regulations (RSRs) numeric criteria in soil within the Project limits.

Please note that Controlled Material within AOEC-1 is present to a maximum depth of ten (10) feet below existing grade. Controlled Material within AOEC-2 is present to a maximum depth of eight (8) feet below existing grade. Soil located greater than ten (10) feet below the existing ground surface within AOEC-1 and greater than eight (8) feet below the existing pavement within AOEC-2 is clean and is not considered Controlled Material and, therefore, does not require special management procedures beyond those required for normal construction operations and will not be measured for payment per the environmental specifications listed below.

All suitable Controlled Material excavated from a soil AOEC may be reused only in the AOEC from which it was excavated. Controlled Material excavated from an AOEC that is to be reused may be temporarily stockpiled adjacent to the excavation for immediate reuse. Controlled Material excavated from an AOEC that is to be reused at a later date within its originating AOEC must be transported to a temporary stockpile area and properly stockpiled, at the direction of the Engineer. Only the volume of soil that is reasonably estimated to be reused within an AOEC may be stockpiled in this way. Controlled Material that is to be reused within its originating AOEC must be reused in accordance with certain restrictions, as described below.

For Guilford, excess Controlled Material from AOEC-2 that cannot be reused within AOEC-2 must be transported and properly stockpiled within the designated Waste Stockpile Area (WSA) as shown on the plans, for waste characterization.

For Branford, all Controlled Material within AOEC-1 is anticipated to be suitable for re-use. In addition, a “Low Level” Area of Environmental Concern (LLAOEC) exists within the Project

limits in Branford, where regulated compounds were detected at concentrations below the RSR numeric criteria. The presence of regulated compounds in soil within the LLAOEC will not require material handling measures beyond those required for normal construction operations. Soil excavated within a LLAOEC may be reused at any location within the proposed Project limits with certain restrictions, as described below. It is anticipated that all LLAOEC will be reused in Branford. Therefore, no excess Controlled Material is anticipated to be generated from the Branford site. Excess or unsuitable soil excavated from a LLAOEC or AOEC that cannot be reused within the Project limits must stockpiled as directed by the Engineer for waste characterization.

Soil within the AOECs and LLAOECs are to be reused on-site prior to the use of other soil and/or fill such that the quantity of soil requiring off-site disposal that is generated from the AOECs and LLAOECs is minimized.

All suitable Controlled Material excavated within the soil **AOECs** shall be utilized as fill/backfill within its originating AOEC. All suitable material excavated within the **LLAOEC** shall be utilized as fill/backfill at any location within the Project limits.

Controlled Material reused within an AOEC, or LLAOEC soil reused within the Project limits, shall be reused in accordance with the following conditions: (1) such soil is deemed to be structurally suitable for use as fill by the Engineer, (2) such soil is not placed below the water table, and 3) such soil is not placed in an area subject to erosion.

The Contractor will be required to implement appropriate health and safety measures for all construction activities to be performed within the AOECs. 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 Sections which shall be reviewed by the Contractor include, but are not limited to, the following:

- Item No. 0101000A – Environmental Health and Safety
- Item No. 0101117A – Controlled Materials Handling
- Item No. 0202315A – Disposal of Controlled Materials
- Item No. 0202640A – 2” Monitoring Well Abandonment

The Contractor is alerted to the fact that a Department environmental consultant will be on site for excavation and dewatering activities within the AOECs and LLAOECs to collect soil and groundwater samples (if necessary) and to observe site conditions for the State.

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

- Task 210 – Subsurface Site Investigation, Branford Rail Station, Branford, CT. Tetra Tech Rizzo, April 2008.

- Task 210 – Subsurface Site Investigation, Shore Line East Station Enhancements, Branford, CT. Diversified Technology Consultants, Inc., December 2010.

- Branford Railroad Station Parking Lot Expansion Reuse of Low Level Areas of Environmental Concern Material (LLAOECs) at 14 Kirkham St., January 18, 2010.

- Task 210 – Subsurface Site Investigation, Guilford and Clinton Railroad Stations, Guilford and Clinton, CT. GEI Consultants, Inc., Revised June 9, 2003.

NOTICE TO CONTRACTOR – EARLY SUBMITTALS

The Contractor is hereby advised that the Department has identified the potential need to order certain materials and equipment, and thereby submit certain submittals for approval early in the construction process to insure the Project is completed within the allowable Contract Time. Submittals shall be in accordance with Form 816 Article 1.20-1.05.02. The following items have been identified as possibly requiring early ordering thereby requiring early submission of shop drawings and product data, including color selection charts and samples:

Temporary Sheet Piling – Railroad
Auger Pressure-Grouted Piles
Precast Components
Architecturally-Exposed Structural Steel Framing
Steel Windows
Fold-Up Platform Edge
Machine Room-less Elevators
Station Control Unit and Train Approach Massage System (TAMS)

The following items have been identified as possibly requiring early submission for purposes of project coordination and project work scheduling:

Selection of the Project Coordinator
Baseline Critical Path Schedule
Contractor's Submittal Schedule
Bridge Erection Plan (Approval by AMTRAK)

The lists above are not intended to be all-inclusive and do not relieve the Contractor from coordinating the activities of its subcontractors and suppliers. The Contractor will not be permitted to perform any physical work on the Project without the approval of the required submittals. Failure to properly plan for long lead items within the Contract schedule will not be justification for additional construction time.

It is recommended that the Contractor identify early in the construction sequencing process the subcontractors and suppliers associated with long lead-time items and submit the appropriate shop drawings and supporting data, including color selection charts and samples, for review upon Notice to Proceed.

NOTICE TO CONTRACTOR – ENGINEER OCCUPANCY

The Engineer and the Department personnel will occupy the Project Site during the entire construction period.

The Engineer reserves the right to occupy and to place and install equipment in completed areas of the Facility, prior to Final Inspection and the issuance of the Certificate of Compliance provided that such occupancy does not interfere with completion of the Project. Such placing of equipment and partial occupancy shall not constitute acceptance of the total Project. The Contractor shall allow and cooperate with such occupancy at no additional cost to the State.

1. The Engineer shall obtain from the Contractor written approval of such occupancy. The Engineer shall determine whether such occupancy or use is possible and, if so, will make arrangements for holding a job inspection with representatives of the Department and the Contractor.
2. Based on the inspection, a "Punch List" of outstanding or unacceptable work shall be developed.
3. The Contractor shall prepare a letter to the Engineer granting occupancy. The letter granting such occupancy shall state the terms and conditions of occupancy and include the status of completion of "Punch List" items.
4. Subsequent to the receipt of the letter granting occupancy, the Engineer shall notify the Contractor in writing that insurance coverage has been requested, and the effective date the Contractor may cancel the insurance coverage normally carried on the facility by it.
5. Prior to partial Engineer occupancy, electrical systems shall be fully operational. Required inspections and tests shall have been successfully completed. Upon occupancy the Engineer will provide operation and maintenance of electrical systems in occupied portions of the facility.

NOTICE TO CONTRACTOR – GENERAL REQUIREMENTS AND COVENANTS OF THE CONTRACT

Division I of the document entitled "State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, and Incidental Construction, Form 816, 2004," including the Division I Supplemental Specifications, shall collectively be known as the "General Requirements and Covenants of the Contract."

The Contractor is hereby advised of the potential for conflicts between provisions contained within Section 1.20 of the Form 816 with other Division I Sections of the Form 816. Where the aforementioned conflicts occur, Section 1.20 shall govern.

NOTICE TO CONTRACTOR – LIMITATION OF CONTRACTOR OPERATIONS

The Contractor shall repair at its own expense any and all damage caused by construction operations to existing facilities unless said damage is scheduled as part of the Project work. The Contractor shall take all precautions necessary to protect the existing platform and its occupants during the construction period.

During all times that the Project Site is occupied by the Engineer and Department personnel, the Contractor shall maintain the following utilities and services to the extent described to permit Department operations:

1. *Electrical Service: The Department will be responsible for paying all monthly electrical utility usage costs related to the existing south side operation facility and the temporary service for the temporary Department facilities. The Contractor shall be responsible for paying all monthly electrical usage utility costs related to their construction field office.*
2. *Telephone Service: The Contractor shall be responsible for paying all monthly telephone utility usage costs related to their construction field office.*
3. *Water Service: The Contractor shall install water service from the existing water connection at the south platform to the field trailers. This water service shall remain operational until a final connection to town water is installed and accepted by the Engineer. The Department will be responsible for paying all monthly water service utility usage costs.*
4. *Heat: From October 1 to April 1 of the following year, the Contractor shall maintain 68 degrees F space temperature throughout all of the field trailers occupied by the Department. The Contractor will be responsible for paying for fuel oil.*
5. *Sanitary Drainage: The Contractor is responsible for emptying the sewage holding tanks in the field trailers at its expense.*

(Branford Station Only): Access to the existing south stair tower area for purposes of demolition work will not be granted until Final Inspection of the south side handicap ramp and platform stair has been completed and the areas of the platform remaining open are capable of being occupied safely by passengers.

NOTICE TO CONTRACTOR – MEASUREMENT AND PAYMENT

This Project is being bid with both lump sum and unit price items. The bid items include unit price and lump sum items which are IN ADDITION TO the Major Lump Sum Items, hereby referred to as “MLSI”. The MLSI of the Project includes both item number 0063521A, titled "Rail Facility Upgrade Site No. 1.", and item number 0063522A, titled "Rail Facility Upgrade Site No. 2."

The unit price and lump sum bid items will be measured for payment on a unit price or lump sum basis (whichever is applicable) for which a separate bid price is required, at the quantities as indicated in the Bid Proposal Form. Standard Form 816 Items are referenced by their standard item numbers. Refer to the applicable article of Form 816 for the requirements for these items. Special Provisions included in this Contract are referenced by their item number followed by an "A" suffix. Refer to the Special Provisions contained within this Contract for requirements for these items. All work depicted on the Contract Plans and described in the Contract Specifications, including mobilization, is included in the MLSI of the Project, with the exception of the unit price or other lump sum items listed on the Bid Proposal Form. Any work that is outside the limits stated under “Method of Measurement” and “Basis of Payment” for a specific item, other than the MLSI, but is shown on the Contract Plans or described in the Contract Specifications, is included in the MLSI. Any work that is incidental to an item which is not specifically described or included in the item, but which is required for performance and completion of the work required under the Contract, is included in the MLSI.

The following unit price items will only be measured for payment up to the perimeter located 5 feet outside of the foundation wall for the platforms, stair assemblies and stair tower building walls:

Item No. 0213011, “Granular Fill”
Item No. 0205003A, “Trench Excavation 0’-10’ Deep”
Item No. 1208906A, “Sign Face - Sheet Aluminum - Bright Wide Angle Retroreflective Sheeting”
Work associated with these items located within the vertical construction limits (as defined above) is included in the MLSI.

The following unit price items will be measured for payment, whether or not they are enclosed within the vertical construction limits:

Item No. 0000985A, “Track Monitoring”
Item No. 0062680A, “Tactile Warning Strip”
Item No. 0101117A, “Controlled Material Handling”
Item No. 0101126A, “Disposal of Hazardous Waste”

Item No. 0202315A, “Formation of Subgrade”
Item No. 0212002, “Subbase”
Item No. 0728020, “Stone Ballast”
Item No. 0751711 “6” Underdrain”
Item No. 0755009 “Geotextile”
Item No. 0811001 “Concrete Curbing”
Item No. 09113043 “8’ Polyvinyl Chloride Chain Link Fence”
Item No. 0921001A, “Concrete Sidewalk”
Item No. 1700003A, “Contractor Supplied Materials to Others”

Platform/Site Amenities

There will be no separate payment for platform/site amenities, including, but not limited to benches, trash receptacles, bicycle racks, etc. The cost of these site amenities, including any hardware and any required excavation and backfill, is included in the MLSI.

Signs

There will be no separate payment for signage, including but not limited to station identification signs, kiosks, accessible route signage, tactile signage, schedule holders and other pedestrian wayfinding signs. The cost of these signs, including any hardware and any required excavation and backfill, and installation is included in the MLSI. Vehicular signage, including directional signage, stop signs and parking signs, including any posts, hardware, footings, installation, and any required excavation and backfill, will be paid for these separate items will be measured for payment on a unit price for which a separate bid price is required at the quantities as indicated in the Bid Proposal Form.

Electrical Pads and Bases

There will be no separate payment for concrete associated with the fabrication and installation of light pole bases, equipment pads, or for protection of electrical conduit and service entrances. The cost of concrete, including reinforcing, spacers, formwork, excavation and backfill, is included in the MLSI.

Electrical

There will be no separate payment for excavation and backfill associated with the installation of site electrical items including, but not limited to; exterior lighting; video monitoring equipment; internally lit signs; illuminated egress signs; fire alarm components; train approach message boards; emergency kiosks; communication cable and conduit; or any other electrical cable, conduit, or service connection components. The cost of excavation for all site electrical items is included in the MLSI.

Water Connections

There will be no separate payment for the excavation, backfill and materials required for; and the installation of, the hose bib(s). All associated material and installation costs for the water service are included in the MLSI.

Railroad Grounding Connections

There will be no separate payment for necessary components to complete the station grounding connections, including connection to the railroad counterpoise wire and associated excavation and backfill. The costs for all grounding items are included in the MLSI.

Station Downspouts, Leaders, and Splash Blocks

There will be no separate payment for necessary components to complete the drainage systems from the vertical construction to the discharge of the associated runoff. Downspouts, leaders, splash blocks, and all necessary excavation and backfill are included in the MLSI.

NOTICE TO CONTRACTOR – MUNICIPAL DEMOLITION PERMIT

In accordance with CGS 29-401 through 29-415, the Contractor is hereby advised of the need to apply for and obtain a demolition permit from the municipality for each building to be demolished as part of this Project prior to initiating any demolition activities. Said statutes permit a waiting period from the demolition permit application of not more than 90 days. The Contractor shall schedule its work and bid the Project accordingly.

NOTICE TO CONTRACTOR – NOTICE OF INTENT TO CONSTRUCT

The Contractor is hereby advised that a Notice of Intent to Construct (NOIC) will be issued as the Building Permit for this Project in accordance with CGS. The Contractor will not be required to apply for a Building Permit from the local Building Official.

NOTICE TO CONTRACTOR – OFF-SITE STAGING AND STORAGE

The Contractor is hereby advised that due to the restrictive Project Limits and other operational constraints identified in the Contract, off-site staging and storage of materials and equipment may be required. Arrangement for off-site staging and storage of materials and equipment shall be the responsibility of the Contractor. Payment for off-site staging and storage of materials and equipment shall be in accordance with Form 816 Article 1.09.06. The Contractor shall bid the Project accordingly.

NOTICE TO CONTRACTOR - PAINTING REQUIREMENTS

All painting contractors and painting subcontractors performing any work which shall be part of the project as well as those to be used for lead paint removal, containment and collection, surface preparation, or coating of structural steel must have been certified by the Society for Protective Coatings (SSPC) Painting Contractor Certification Program (PCCP), QP-1 and QP-2. This certification must be full and not interim. The painting contractors and painting subcontractors must remain so certified for the duration of the project. If a contractor's or subcontractor's certification expires, the painting firm will not be allowed to perform any work 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. At the option of the Engineer, if such a delay continues for more than 60 calendar days, the Department may engage another SSPC certified contractor to perform the painting work at the prime contractor's expense. Upon request by the Department, the bidder shall provide the Department with documentation of such certifications within five (5) days of such request.

NOTICE TO CONTRACTOR – POTENTIAL FOR ASBESTOS CONTAINING MATERIALS

The Contractor is hereby advised that it is the expressed intent of the Department that no materials containing asbestos of any kind or amount be installed in Department facilities as a result of any work being performed under this Contract.

For all materials that have a probability of containing asbestos, the Contractor shall provide a certification letter on the manufacturer's letterhead along with the regular submittal package to prove that asbestos is not contained in the materials. These materials will not be approved without the required manufacturer certification letter. The manufacturer certification letter shall be formatted in the following manner:

[Addressed to:] Commissioner of Transportation
Department of Transportation
P.O. Box 317546
Newington, Connecticut 06131-7546

Project Title and Number

[We] hereby certify that all materials manufactured by [Insert Manufacturer Name] are asbestos-free.

[Signature:] [Name of authorized signatory]
[Title]

The Contractor shall submit manufacturer certification letters for all materials specified in the following Contract provisions (including CSI-formatted specifications contained within a particular special provision):

1. DIVISION 3 SECTION 035320 – MICROSILICA CONCRETE OVERLAY
2. DIVISION 4 SECTION 042113 – BRICK MASONRY
3. DIVISION 4 SECTION 044313.16 - ADHERED STONE MASONRY VENEER
4. DIVISION 7 SECTION 071113 - BITUMINOUS DAMPPROOFING
5. DIVISION 7 SECTION 074113.16 - STANDING-SEAM METAL ROOF PANELS
6. DIVISION 7 SECTION 074243 - COMPOSITE WALL PANELS
7. DIVISION 7 SECTION 074600 – SIDING

8. DIVISION 7 SECTION 074650 – CELLULAR PVC TRIM

9. DIVISION 7 SECTION 078413 - PENETRATION FIRESTOPPING

10. DIVISION 7 SECTION 079200 - JOINT SEALANTS

11. DIVISION 8 SECTION 088000 – GLAZING

12. DIVISION 9 SECTION 092900 - GYPSUM BOARD

13. DIVISION 9 SECTION 099610 – GRAFFITI CONTROL

14. DIVISION 26 SECTION 263353 - STATIC UNINTERRUPTIBLE POWER SUPPLY

The above list may not be all-inclusive and does not relieve the Contractor from its responsibility to provide manufacturer certification letters that are required under other Contract provisions. Furthermore, the Department may at any time require the Contractor to submit manufacturer certification letters proving that other materials do not contain asbestos.

Failure of the Contractor to provide the required documentation will result in the immediate removal of the material from the Project by the Contractor at its expense. The Contractor shall be responsible for all costs incurred as a result of such required action, and replacements thereof, in order to complete the Project.

Any asbestos containing material that is found to have been installed as a result of work performed under this Contract will be required to be removed by the Contractor at its expense as soon as such determination is made. The Contractor shall also replace the removed material with appropriate material that is in compliance with the Contract. The Contractor is also responsible to pay for any asbestos testing charges the Department incurred in order to prove that the material contains asbestos fibers. This obligation will extend throughout the one-year warranty period after the issuance of the Certificate of Compliance.

The Contractor shall complete and sign the attached certification form assuring the Department that no asbestos-containing materials have been used in the construction of this Project. This form shall be submitted prior to the Semi-Final Inspection. The Certificate of Compliance will not be issued without this completed and signed certification form.

CONTRACTOR CERTIFICATION:
RE/ ASBESTOS CONTENT OF MATERIALS

State of Connecticut
Department of Transportation
PO Box 317546
Newington, CT 06131-7546

1. Project Number: _____

2. Project Name: _____

3. Contractor Name: _____

4. This is to certify that I have read, understood, and complied with the terms and conditions identified under the "NOTICE TO CONTRACTOR – POTENTIAL FOR ASBESTOS CONTAINING MATERIALS" included in this Contract.

   I fully understand that it is the requirement of the Connecticut Department of Transportation that only materials that do not contain asbestos of any kind or amount are to be utilized in the construction of this Project.

   I therefore certify that, to the best of my knowledge, all materials installed under this Contract are asbestos-free.

   For the one-year warranty period after the issuance of the Certificate of Compliance, I agree to remove any asbestos-containing material identified by the Connecticut Department of Transportation and reinstall an approved, non-asbestos-containing material that is in compliance with the original Contract at no additional cost to the State.

5. Date of Certificate of Compliance: _____

6. Date of the Asbestos Certification: _____

7. Signature of Authorized Party Agreeing to the Terms & Conditions Identified Herein & as Further Stated in the Contract:

_____	_____
Signature	Title
_____	_____
Printed Name	Date

NOTICE TO CONTRACTOR – PRE-INSTALLATION MEETINGS

The Engineer will conduct a pre-installation meeting at the Project Site before each of the following construction activities:

1. Pre-demolition: Form 816 Article 1.20-1.08.03 – Prosecution of Work, subsection 4 – Selective Demolition.
2. Auger Pressure Grouted Piles
3. Cast-in-Place Concrete, Section 033000.
4. Precast Concrete, Section 034100.
5. Microsilica Concrete Overlay, Section 035320.
6. Adhered Stone Masonry Veneer, Section 044313.
7. Thermal Spray Metalizing and Sealing Coats, Section 050310.
8. Standing Seam Metal Roof Panels, Section 074113.
9. Composite Wall Panels, Section 074243.
10. Tactile Warning Strip – Surface Applied, Section 093050.
11. Platform Fold-Up Edge
12. Staining and Transparent Finishing, Section 099300.
13. Porcelain Enameled Steel Panel Signs, Section 104250.
14. Electric Traction Elevators, Section 142100.
15. Station Control Unit, Section 285110.
16. Train Approach Message System, Section 285116.

The above list may not be all-inclusive and does not relieve the Contractor from its responsibility to provide pre-installation meetings that are required under other Contract provisions.

NOTICE TO CONTRACTOR – PROMPT PAYMENT TO SUBCONTRACTORS

Your attention is called to the serious problem of delayed payments to subcontractors for work completed and for which payment has been made by this Department to the general contractor or consultant.

Section 49-41a and Section 49-41c of the Connecticut General Statutes require general contractors to pay their subcontractors within thirty (30) days of having received payment by the State for work performed or materials furnished by such subcontractor. In turn, subcontractors have thirty (30) days upon receiving payment from the general contractor to pay their subcontractors.

Therefore, it is vital that prompt payments be made in accordance with the spirit and intent of the law.

NOTICE TO CONTRACTOR – RAILROAD SAFETY TRAINING

All individuals employed by the Contractor and its subcontractors shall attend AMTRAK's Safety Contractor/Leasee Employee Training Class prior to entering onto the Railroad's property or coming within twenty-five (25) feet of the centerline of the track or energized wires. It is the Contractor's responsibility to arrange this Safety Training. All costs associated with this class shall be included in the Major Lump Sum Item for the project. The current rate schedule for this training is as follows:

Maximum cost is $90.00 per person to be performed at a Connecticut Amtrak Training Site (Groton or Hamden) based upon availability.

NOTICE TO CONTRACTOR – SOLE SOURCE PRODUCTS

For operational purposes, the Department has determined the need to sole source products specified in the following Contract provisions (including specific CSI-formatted Specifications contained within a particular Special Provision):

1. Platform Fold-Up Platform Edge (Refer to Contract Drawings):

   ADA SOLUTIONS, INC.
   Helmut Klohn
   Operations Manager
   Phone: (800)-372-0519
   Cell: (978)-618-1284
   Fax: (978)-262-9125
   www.adatile.com

2. Benches and Trash Receptacles, Section 104060

   Landscape Forms
   East Coast Sales Team
   (269)-337-1337
   eastcoast@landscapeforms.com

3. Station Control Unit, Section 285100

   Penta Corporation
   bchandler@penta-corp.com
   Bobby Chandler
   Phone: (504)-733-1700
   Cell: (504)-415-2648
   Fax: (504)-734-5041
   www.penta-corp.com

4. Train Approach Message System, Section 285116

   DAKTRONICS
   Koreen Bjorklund
   Koreen.bjorklund@daktronics.com
   Phone: (604)-692-0200 ext. 81332
   Cell: (860)-833-5265

No "Or Equals" will be permitted. Said products shall be installed only by their factory authorized installer or service representative. The Contractor shall bid the Project accordingly.

NOTICE TO CONTRACTOR – STATION OPERATION

The Contractor is reminded that there will be no interruption of station services during construction. The Contractor is responsible for providing a safe, accessible, well marked route for passengers to reach any temporary facilities and all platforms at all times, and for maintaining any temporary structures so that they remain free from hazards. The Contractor shall schedule work that will require closure of a platform during night hours, after station operations have ceased. The Contractor shall put in place temporary barricades and safety devices, as required, to return the entire platform to operation for the following morning. For further guidance refer to NOTICE TO CONTRACTOR – LIMITATION OF OPERATIONS and to Section 1.08 – Prosecution and Progress.

NOTICE TO CONTRACTOR – AMTRAK SPECIFICATIONS

The Contractor is hereby notified that the following Amtrak specifications and requirements are included in the CSI-formatted specification section and are applicable and are hereby made part of this contract. These procedures must be allowed by the contractor when working on Amtrak right of way.

Section	rev. #	Date	Title
01141A	3	02/03/2006	Safety and Protection of Railroad Traffic and Property.
01142A	1	12/15/2005	Submission Documentation Required for Amtrak Review and Approval of Plans for Bridge Erection, Demolition and Other Crane/Hoisting Operations over Railroad Right-of-Way
01520A	1	08/07/2001	Requirements for Temporary Protection Shields for Demolition and Construction of Overhead Bridges and other Structures
02261A	3	06/20/2008	Requirements for Temporary Sheeting and Shoring to Support Amtrak Tracks

NOTICE TO CONTRACTOR – BIDDER'S QUESTIONS

The Contractor is hereby notified that during the bidding period, bidder's questions shall be submitted by the Contractor in writing to the Transportation Manager of Contracts for the State of Connecticut Department of Transportation, according to the State of Connecticut "Construction Contract Bidding and Award Manual". Questions shall be E-mailed to the attention of the Manager of Contracts at DOTContracts@ct.gov, faxed questions will no longer be accepted.

The Department cannot ensure a response to inquiries received later than ten (10) days prior to the original scheduled opening of the related bid. ConnDOT will issue an addendum addressing all questions that are made part of the bidding documents.

Refer to Article 1.02.04 of the Standard Specifications for additional information.

NOTICE TO CONTRACTOR – BUILDING AND FIRE CODES

The Contractor is hereby advised of the requirement to purchase one set of all building and fire codes listed in Form 816 Article 1.20-1.02.13 for the Engineer's use. Upon receipt of a Notice to Proceed on the Project, these codes shall be provided to the Engineer. If any codes are not readily available, the Contractor shall provide the Engineer with a copy of the code order form along with an anticipated delivery date. At the end of the Project, the codes will remain the property of the Engineer. The Contractor shall bid the Project accordingly.

NOTICE TO CONTRACTOR – CADD FILES

The Contractor is hereby advised that the Department will provide CADD Files to the Contractor (upon request) in Microstation v8i format for their use during the construction of the Project. The Contractor shall make such request to the Engineer, and the Designer will provide the CADD Files within 14 calendar days.

The Contractor shall bid the Project accordingly.

Welcome
to the
Connecticut Department of Transportation
File Library Information
provided by the
Office of Information Systems

File(s) From the Connecticut Department of Transportation (ConnDOT) Office of Information Systems (OIS)

The ConnDOT OIS is committed to providing electronic access to appropriate files. We make every reasonable effort to do so in a cross-platform and complex multi-protocol environment. We constantly test and retest our connectivity and solutions to ensure the greatest degree of ease of access and compatibility.

If the Receiver proceeds, the Receiver agrees to the following terms and conditions:

1. The State of Connecticut, Department of Transportation (hereinafter referred to as ConnDOT) makes no warranty of any kind, express or implied, with respect to the file(s) which are the subject of this agreement, and specifically makes no warranty that said file(s) shall be merchantable or fit for any particular purpose. Furthermore, any description of said file(s) shall not be deemed to create an express warranty that such files shall conform to said description. The exhibition of any sample or model shall not be regarded as part of the basis of this agreement and shall not create an express warranty that the whole of the file(s) provided hereunder shall conform to any sample or model.

2. Receiver assumes all risk and liability for any losses, damages, claims or expenses resulting from the use, possession or resale of any file(s) furnished by ConnDOT pursuant to this agreement.

3. Receiver agrees to indemnify, defend and hold harmless ConnDOT, its officers, agents, and employees from and against any and all claims, suits, losses, damages or costs, including reasonable attorney's fees, arising from or by reason of receivers' use, possession or resale with respect to any of the file(s) furnished by ConnDOT pursuant to this agreement, and such indemnification shall survive acceptance of said file(s) by receiver.

4. Receiver agrees that it will not advertise, order for resale, or sell the file(s) furnished hereunder.

5. Receiver agrees that the ConnDOT has made every reasonable effort to provide information in a file format which offers cross-platform solutions (for both application and file compression). Some ConnDOT files are compressed. Compressed files can be identified by a file extension, (e.g., .sit, .bin, .hqx, .zip or .arc).

6. Receiver agrees that ConnDOT cannot be held responsible for problems arising from files which have been converted for use in non-native applications (e.g. Microsoft Word documents read in WordPerfect, Microstation design files to Autocad).

7. Receiver agrees that ConnDOT cannot provide the files in other file or compression formats, and agrees to use the files in the format provided.

8. These terms and conditions constitute the complete and final agreement of the parties hereto.

Receiver <u>ACCEPTS</u> the aforementioned terms and conditions.

SIGNATURE:_____ DATE:_____

NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS

General: The list of special provisions (including CSI-formatted specifications) in the Table below may not be all-inclusive and does not relieve the Contractor from its responsibility to provide spare parts, operation and maintenance manuals, training, and warranties that are required under other Contract provisions.

This Table will be forwarded to **Mr. Richard Jankovich, Office of Rails,** for concurrence prior to the Semi-Final Inspection.

Spare Parts: The Contractor shall deliver spare parts on products listed in the Table below to the Project Site.

Operation and Maintenance Maunals: Submit 4 copies of each manual to the Designer. The Designer and **Mr. Richard Jankovich, Office of Rails,** will review the manuals for conformance to the Contract. The manuals will be processed in accordance with Form 816 Article 1.20-1.05.02, with 3 copies being forwarded to **Mr. Richard Jankovich** and one copy being sent to the Engineer.

Materials and Finishes Maintenance Manual: The Contractor shall provide complete information in the materials and finishes manual on products listed in the Table below.

Equipment and Systems Maintenance Manuals: The Contractor shall provide complete information in the equipment and systems manual on products listed in the Table below.

Training: The Contractor shall provide training on products listed in the Table below.

Warranties: Submit 4 copies of written warranties, including special warranties to the Designer. The Designer and **Mr. Richard Jankovich, Office of Rails,** will review the warranties for conformance to the Contract. The warranties will be processed in accordance with Form 816 Article 1.20-1.05.02, with 3 copies being forwarded to **Mr. Richard Jankovich** and one copy being sent to the Engineer.

The Contractor shall provide special warranties on products and installations listed in the Table below.

TABLE

Special Provision (including CSI-formatted Specifications)	Warranties	Spare Parts	Training	Operation and Maintenance Manuals
CSI-Formatted Section #017823				X
CSI-Formatted Section #033000				
CSI-Formatted Section #034100				

Special Provision (including CSI-formatted Specifications)	Warranties	Spare Parts	Training	Operation and Maintenance Manuals
CSI-Formatted Section #035320				
CSI-Formatted Section #042113				
CSI-Formatted Section #044313.16				
CSI-Formatted Section #047200				
CSI-Formatted Section #050310	X			
CSI-Formatted Section #051200				
CSI-Formatted Section #051213				
CSI-Formatted Section #054000				
CSI-Formatted Section #055000				
CSI-Formatted Section #055100				
CSI-Formatted Section #055213				
CSI-Formatted Section #055300				
CSI-Formatted Section #061063				
CSI-Formatted Section #071113				
CSI-Formatted Section #074113.16	X			X
CSI-Formatted Section #074243	X			X
CSI-Formatted Section #074600	X			X
CSI-Formatted Section #074650	X			
CSI-Formatted Section #077100	X			
CSI-Formatted Section #077253				
CSI-Formatted Section #078413				
CSI-Formatted Section #079200	X			
CSI-Formatted Section #081119				
CSI-Formatted Section #085123	X			
CSI-Formatted Section #087100	X			
CSI-Formatted Section #088000	X			
CSI-Formatted Section #089000				
CSI-Formatted Section #092900				
CSI-Formatted Section #093050		X		X
CSI-Formatted Section #099113				
CSI-Formatted Section #099300				
CSI-Formatted Section #099600				
CSI-Formatted Section #099610	X			
CSI-Formatted Section #104060	X			
CSI-Formatted Section #104070	X			
CSI-Formatted Section #104250	X			

Special Provision (including CSI-formatted Specifications)	Warranties	Spare Parts	Training	Operation and Maintenance Manuals
CSI-Formatted Section #104260	X			
CSI-Formatted Section #142100	X			X
CSI-Formatted Section #260400	X			X
CSI-Formatted Section #260526				
CSI-Formatted Section #260533				
CSI-Formatted Section #260553				
CSI-Formatted Section #262416	X	X		
CSI-Formatted Section #262726		X		
CSI-Formatted Section #263353	X			
CSI-Formatted Section #265600	X	X		X
CSI-Formatted Section #282300	X			X
CSI-Formatted Section #285110				
CSI-Formatted Section #285116				X
CSI-Formatted Section #285223	X	X		X

NOTICE TO CONTRACTOR – COLD WEATHER CONCRETE ACTIVITIES

The Contractor is hereby advised of the potential need for cold weather concrete activities. The Contractor shall strictly adhere to all required cold weather concrete procedures as specified within the Contract and conduct its activities accordingly. The Contractor shall bid the Project accordingly.

NOTICE TO CONTRACTOR – COLD WEATHER PAVING POLICY

General Conditions:

The Contractor's operations shall employ paving practices, consistent with the terms and conditions of the "Standard Specification for Roads, Bridges and Incidental Construction, Form 816" and all pertinent supplemental specifications and special provisions set forth in the contract.

The paving schedule will be reviewed by project personnel and the contractor. If it is anticipated that the placement of the HOT MIXED ASPHALT (HMA) for a project will begin or continue into the months in which the temperatures may not meet specification, the District will be notified immediately. Upon receipt, the District will review the proposed paving schedule to contract requirements. Authorization to place the HMA pavement outside of the contract specifications and provisions, and the specific requirements of this policy will only be given by the Office of Construction (OOC). The District will be required to forward a written request to the OOC for review and approval.

All requests shall be submitted in writing to the OOC from the District Engineer (DE) to the Manager of Construction Operations or the Construction Administrator. The request shall include all of the information listed in the attached Exhibit 1 of the cold weather paving policy.

HMA Placement:

No deviations from the requirements set forth in the Bituminous Concrete specification. Section 4.06.03-8 "Placing of mixture" and 4.06.03-9 "Compaction" will be allowed without prior approval of the Office of Construction.

The paving operation will not commence if the forecasted low temperatures (for both day and nighttime operations) are expected to fall below the minimum placing temperatures allowed in the specification. More specifically, if the forecasted air temperature is expected to fall below the minimum allowed air or base temperature in the bituminous concrete specifications, the paving operation <u>shall not</u> commence.

The forecast shall be obtained from the latest weather service information received at the DOT Highway Operations Center in Newington. The information is transmitted to the District by 2 p.m. each working day. In the event the information is unavailable at the District, the Highway Operations Center may be called directly at Telephone No. (860) 594-3447, 24 hours a day, to obtain the weather forecast. The forecasted temperatures shall be documented on the inspector's daily report.

Night Paving Operation:

Any scheduled night paving operations which are expected to begin or continue after October 15th will not be allowed without prior approval from the Office of Construction. Any requests for such authorization will be submitted in writing by the District at least one week in advance of the expected paving.

Day Paving Operation:

HMA paving operations will not be permitted after November 15th in any year without prior approval from the Office of Construction. Any requests for such authorization will be submitted in writing by the District at least one week in advance of the expected paving.

COLD WEATHER PAVING POLICY

EXHIBIT 1

The following information is required for "Cold Weather Paving Approval"

1. Project Nos. 310-0056 & 310-0057
2. Route and town:
3. Anticipated paving schedule: include no. days and hours of work
4. Plant location(s)
5. Rate of production
6. Average haul distance
7. No. of trucks
8. Paver speed (distance/min)
9. Delivered mix temperature (+/- 5 degrees)
10. Number of paving lanes
11. Maximum length and width of paver pass
12. Average compacted lift thickness
13. Number of rollers (include capacity, type and drum width)
14. Name of contractor representative responsible for the placement and compaction process
15. Name of D.O.T. representatives (Inspector, Project Engineer) in charge of paving operation
16. Name of D.O.T. representative responsible for determining "go" or "no go" decision based on forecasted weather conditions
17. Reason(s) for request to allow paving under cold weather conditions
18. Impacts of not proceeding with paving under cold weather conditions
19. District Engineer's recommendation regarding cold weather paving

NOTICE TO CONTRACTOR – DEMOLITION & HAZARDOUS MATERIALS ABATEMENT

The Contractor is hereby notified that structures requiring hazardous materials abatement are included within the project scope. The building scheduled for abatement is located at the Westbrook Maintenance Garage in Westbrook, Connecticut.

Hazardous materials within proposed construction areas which shall require proper handling and disposal include asbestos containing materials (ACM), lead based paint (LBP), an aboveground storage tank (AST), and additional hazardous or otherwise regulated items (mercury lamps & ampoules, PCB/DEHP ballasts, used electronics, air conditioners, etc.).

Abatement and demolition activities will require the services of specialty contractors holding certain specific licenses and/or personnel with specific training (e.g. Demolition Contractor, Asbestos Contractor, Spill Contractor, ODS Service Technicians, Haz-Com Trained Personnel, Waste Transporters, Disposal Facilities, etc.), as well as the submission of specific notification forms, permits, postings, certifications, and/or work plans (e.g. demolition permits, notice to abutters, intent to demolish postings and legal notices, asbestos abatement and demolition notifications, disposal facility material acceptance certifications, transporter and disposal facility permits, waste shipment records/manifests/bills of lading, etc.)

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

- Item No. 0020801A – Asbestos Abatement
- Item No. 0020902A – Lead Compliance for Building Renovation & Demolition
- Item No. 0100071A – Removal and Disposal of Underground Petroleum Tank
- Item No. 0101143A – Handling and Disposal of Regulated Items
- Item No. 0999001A – Disposal of Buildings

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

NOTICE TO CONTRACTOR – ELECTRONIC CONSTRUCTION SUBMITTALS

The Contractor is hereby notified that all submittals including shop and working drawings, computations and calculations, catalog cuts, data sheets and all other materials the Contractor submits to ConnDOT, the Engineer or the Designer shall be prepared and submitted in digital format. All correspondence including drawings submitted for review and/or approval, submittals, etc. will be transmitted by all parties in digital format, in accordance with the latest ConnDOT Policies and Procedures. No additional payment will be made to the Contractor for the preparation, submission or receipt of documents in digital format.

NOTICE TO CONTRACTOR – STORAGE AND STAGING AREAS

The Contractor's attention is directed to the fact that only limited stockpiling and storage within the project are available for his use. It may be required that the Contractor, according to his means and methods, make arrangements to have available for his use sufficient storage and staging areas outside of the limits of the project.

There shall be no staging and/or storing of material on-site without review and approval by the Department to ensure no environmental impacts.

NOTICE TO CONTRACTOR – SUBMITTALS

The Contractor is hereby notified that submittals including shop and working drawings, computations and calculations, catalog cuts, data sheets and all other materials the Contractor submits to ConnDOT shall be PREPARED AND SUBMITTED IN DIGITAL FORMAT. All correspondence including drawings submitted for review and/or approval, submittals, etc. will be transmitted by all parties in digital format, in accordance with the latest ConnDOT Policies and Procedures

Transmittal of Submittals: Unless otherwise stipulated, all submittals requiring review for conformance with the Contract shall be digitally transmitted to Michael Baker Engineering, Inc., ATTN: Mr. Robert Wright, 500 Enterprise Drive, Suite 2B, Rocky Hill, Connecticut 06067

A transmittal letter shall be sent to Mr. Theodore H. Nezames, P.E., Transportation Principal Engineer, Facilities Design, Bureau of Engineering and Construction, Connecticut Department of Transportation, 2800 Berlin Turnpike, P.O. Box 317546, Newington, CT 06131-7546, Room 3405, ATTN: Mr. Bruce Olmstead, P.E.

Copies of the transmittal letter shall be sent to the District 2 Administrative Office, 171 Salem Turnpike, Norwich, Connecticut 06360, ATTN: Mr. Carl E. Nelson, P.E., District Engineer

Submittals requiring review for conformance with the Contract that shall be printed and submitted directly to the District Engineer in lieu of the Designer are listed below. Copies of the transmittal letters shall be sent to the Transportation Principal Engineer, Facilities Design.

Concrete Mix Design Certifications.
Asphalt Mix Design Certifications.
Erosion Control Plan and Materials.
Demolition Plan.
Disposal Plan.
Welding (Welder) Certificates.
Certified Test Reports, Material Certificates, etc. from Form 816 Standard Items (non “A” Items from Bid List).

Submittals requiring review for conformance with the Environmental Contract work shall be printed and hand delivered or sent by mail directly to Mr. Gregory Dorosh,
Manager of Environmental Compliance, Bureau of Engineering and Construction, Connecticut Department of Transportation, 2800 Berlin Turnpike, P.O. Box 317546, Newington, CT 06131-7546, Room 3127. Copies of the transmittal letters shall be sent to the Transportation Principal Engineer, Facilities Design and to the District Engineer.

Health and Safety Plan.
Disposal Plan and Site.

Submittal Preparation and Processing: The Contractor shall provide the Designer with complete submittal packages (Product Data, Shop Drawings, Samples, and Quality Assurance Submittals, as applicable) for individual elements of Project work for a concurrent review of all information. Incomplete submittal packages will be returned to the Contractor without being reviewed.

Unless digitally submitted as specified herein, the Contractor shall submit 9 copies of each required submittal for the Designer's review. The Contractor shall add 1 printed copy of the following CSI Sections for outside agency (FM Global) review:

1. Division 07 Section 074113, "Standing Seam Metal Roof Panels."

Shop Drawings: Unless digitally submitted as specified herein, the Contractor shall submit 1 correctable translucent reproducible print and 8 blue- or black-line prints for the Designer's review. The Contractor shall add 1 printed blue- or black-line print for each of the above noted CSI Sections for outside agency review.

Samples: Where Samples are for selection of color, pattern, texture or similar characteristics from a range of choices, submit 2 full sets of the standard and custom choices for the material or product. Where Samples illustrate assembly details, workmanship, fabrication techniques, connections, operation and similar characteristics, submit 1 sample (or set, if applicable).

Designer's Action: The Designer will digitally return submittals marked with action taken and corrections or modifications required.

Shop Drawings: The Designer will return shop drawings digitally. The digital copy shall be considered a "Record Document" and maintained as such.

Samples: The Designer will return one set of samples marked with the action taken. The set of samples shall be maintained at the Project site when returned.

Maintenance manuals and warranties will not be returned unless they are Rejected.

NOTICE TO CONTRACTOR – TACTILE WARNING STRIP

The installation of the Tactile Warning Strip requires close coordination between the Contractor and the supplier/installer. This coordination is the sole responsibility of the Contractor and there will be no compensation for delays caused by the lack of coordination.

NOTICE TO CONTRACTOR – TRACK MONITORING

Scope: If any work that could potentially affect the stability of the track is occurring within 50 feet of a track, or within the influence line of a track, then monitoring points shall be established along the track. The influence line descends from a point one foot horizontally away from the outside end of the tie bottom one unit vertically for every unit and a half horizontally.

Safety: All work close enough to foul a track must only be performed under the direction of qualified railroad personnel. People performing track monitoring are classified as Roadway Workers and must be trained in Roadway Worker Protection.

Points: Each location shall include a point on the top of rail marked with paint or crayon on the field side of the rail and used for vertical measurements, and a point on the tie for horizontal measurements. In wood ties, the point shall be marked with a PK nail or similar surveyor's marker; on concrete or steel ties the point shall be marked with paint.

Point Locations: Reference points shall be established along the track beginning at the point where the work is closest to the track. Points shall continue to be placed at intervals of 50 feet along the track to the point where the work ends or does not meet the condition outlined above, and then at 50 feet, 100 feet, and 200 feet away from the end point(s). Where more than one track may be affected, points shall be established on each track that could be affected.

Measurement Accuracy: Monitoring points shall be established to within 0.001 feet, and monitoring shall be done to 0.01 feet.

Monitoring: Monitoring shall be performed at the beginning and end of every shift of work. Points shall be measured, the measurements recorded, and the numbers compared with previous measurements. All points shall be measured each time monitoring occurs, except for the points 200 feet away from the end of work; these points shall only be measured if any of the other measurements exceeds an allowable deviation.

Allowable Deviations: If track is found to have moved either vertically or horizontally by more than on half of the Amtrak Maintenance limits as specified in Amtrak's MW-1000 for the particular class of track involved, then all work shall cease immediately and the contractor shall immediately notify the designated Amtrak Project Engineer. Work may not resume until the designated Amtrak Project Engineer has inspected the site and approved.

Track Maintenance: Deficiencies in track surface and alignment caused by construction activities shall be corrected solely by Amtrak forces at project expense.

For measurement and payment for work described in this Notice to Contractor see ITEM #0000985A –TRACK MONITORING.

TRACK CLASS	MAX. PASSENGER SPEED (MPH)	CROSS LEVEL (INCHES) The Difference in Cross Level Between Any Two Points Less Than		DEVIATION FROM PROFILE 31' CHORD INCHES		DEVIATION FROM HORIZONTAL ALIGNMENT INCHES	DEVIATION FROM HORIZONTAL ALIGNMENT INCHES
		10'	62'	31' CHORD	62' CHORD	31' CHORD	62' CHORD
MAINTENANCE LIMITS							
1	15	1	2 ¼	2 ⅝	2 ¼	N/A	3 ¾
2	30	1	1 ⅝	2 ¼	2	N/A	2 ¼
3	60	1	1	1 ½	1 ⅝	N/A	1 ¼
4	80	1	1	1 ⅛	1 ½	N/A	1
5	90	1	1	¾	1	N/A	½
6	110	¾	1	¾	¾	⅜	½
7	125	¾	1	¾	¾	⅜	⅜
8	160	¾	1	½	¾	⅜	⅜
9	200	¾	1	⅜	½	⅜	⅜
½ MAINTENANCE LIMITS							
1	15	½	1⅛	1 5/16	1 ⅛	N/A	1 ⅞
2	30	½	13/16	1 ⅛	1	N/A	1 ⅛
3	60	½	½	¾	13/16	N/A	⅝
4	80	½	½	9/16	¾	N/A	½
5	90	½	½	⅜	½	N/A	¼
6	110	⅜	½	⅜	⅜	3/16	¼
7	125	⅜	½	⅜	⅜	3/16	3/16
8	160	⅜	½	¼	⅜	3/16	3/16
9	200	⅜	½	3/16	¼	3/16	3/16

NOTICE TO CONTRACTOR – ENVIRONMENTAL INVESTIGATIONS

Environmental site investigations have been conducted that involved the sampling and laboratory analysis of soil and groundwater collected from various locations and depths within the Project limits at the proposed Branford and Guilford Shore Line East (SLE) Stations. Based on the findings of the environmental investigations, two (2) soil Areas of Environmental Concern (AOECs) exist within the Project limits. One groundwater AOEC also exists within the Project limits at the proposed Branford SLE Station. The Contractor is hereby notified that Controlled Material (soil and groundwater) within the AOECs will require special management and/or disposal procedures.

Results of the environmental investigations indicated the presence of extractable total petroleum hydrocarbons (ETPH), polynuclear aromatic hydrocarbons (PAHs), arsenic, and lead at concentrations exceeding the applicable State of Connecticut Department of Environmental Protection (DEP) Remediation Standard Regulations (RSRs) numeric criteria in soil within the Project limits.

Please note that Controlled Material within AOEC-1 is present to a maximum depth of ten (10) feet below existing grade. Controlled Material within AOEC-2 is present to a maximum depth of eight (8) feet below existing grade. Soil located greater than ten (10) feet below the existing ground surface within AOEC-1 and greater than eight (8) feet below the existing pavement within AOEC-2 is clean and is not considered Controlled Material and, therefore, does not require special management procedures beyond those required for normal construction operations and will not be measured for payment per the environmental specifications listed below.

All suitable Controlled Material excavated from a soil AOEC may be reused only in the AOEC from which it was excavated. Controlled Material excavated from an AOEC that is to be reused may be temporarily stockpiled adjacent to the excavation for immediate reuse. Controlled Material excavated from an AOEC that is to be reused at a later date within its originating AOEC must be transported to a temporary stockpile area and properly stockpiled, at the direction of the Engineer. Only the volume of soil that is reasonably estimated to be reused within an AOEC may be stockpiled in this way. Controlled Material that is to be reused within its originating AOEC must be reused in accordance with certain restrictions, as described below.

For Guilford, excess Controlled Material from AOEC-2 that cannot be reused within AOEC-2 must be transported and properly stockpiled within the designated Waste Stockpile Area (WSA) as shown on the plans, for waste characterization.

For Branford, all Controlled Material within AOEC-1 is anticipated to be suitable for re-use. In addition, a “Low Level” Area of Environmental Concern (LLAOEC) exists within the Project

limits in Branford, where regulated compounds were detected at concentrations below the RSR numeric criteria. The presence of regulated compounds in soil within the LLAOEC will not require material handling measures beyond those required for normal construction operations. Soil excavated within a LLAOEC may be reused at any location within the proposed Project limits with certain restrictions, as described below. It is anticipated that all LLAOEC will be reused in Branford. Therefore, no excess Controlled Material is anticipated to be generated from the Branford site. Excess or unsuitable soil excavated from a LLAOEC or AOEC that cannot be reused within the Project limits must stockpiled as directed by the Engineer for waste characterization.

Soil within the AOECs and LLAOECs are to be reused on-site prior to the use of other soil and/or fill such that the quantity of soil requiring off-site disposal that is generated from the AOECs and LLAOECs is minimized.

All suitable Controlled Material excavated within the soil **AOECs** shall be utilized as fill/backfill within its originating AOEC. All suitable material excavated within the **LLAOEC** shall be utilized as fill/backfill at any location within the Project limits.

Controlled Material reused within an AOEC, or LLAOEC soil reused within the Project limits, shall be reused in accordance with the following conditions: (1) such soil is deemed to be structurally suitable for use as fill by the Engineer, (2) such soil is not placed below the water table, and 3) such soil is not placed in an area subject to erosion.

The DEP groundwater classification within the Project limits of the Branford SLE Station is "GB". Groundwater was encountered at depths ranging from 4.5 to 7.5 feet below existing grade during the environmental investigations in several locations within the Project limits. Total PAHs were detected in groundwater in one location (RR-13) at a concentration exceeding the maximum pollutant concentration listed in the DEP General Permit for the Discharge of Groundwater Remediation Wastewater Directly to a Surface Water. **Contractor Take Note: Groundwater encountered within the GWAOEC at the proposed Branford SLE Station will require containment and off-site disposal at a treatment facility in accordance with Item No. 0204210A – Handling Contaminated Groundwater.**

The Contractor will be required to implement appropriate health and safety measures for all construction activities to be performed within the AOECs. 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 Sections which shall be reviewed by the Contractor include, but are not limited to, the following:

- Item No. 0101000A – Environmental Health and Safety

- Item No. 0101117A – Controlled Materials Handling
- Item No. 0202315A – Disposal of Controlled Materials
- Item No. 0202640A – 2" Groundwater Monitoring Well Abandonment
- Item No. 0204210A – Handling Contaminated Groundwater

The Contractor is alerted to the fact that a Department environmental consultant will be on site for excavation and dewatering activities within the AOECs and LLAOECs to collect soil and groundwater samples (if necessary) and to observe site conditions for the State.

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

- Task 210 – Subsurface Site Investigation, Branford Rail Station, Branford, CT. Tetra Tech Rizzo, April 2008.

- Task 210 – Subsurface Site Investigation, Shore Line East Station Enhancements, Branford, CT. Diversified Technology Consultants, Inc., December 2010.

- Branford Railroad Station Parking Lot Expansion Reuse of Low Level Areas of Environmental Concern Material (LLAOECs) at 14 Kirkham St., January 18, 2010.

- Task 210 – Subsurface Site Investigation, Guilford and Clinton Railroad Stations, Guilford and Clinton, CT. GEI Consultants, Inc., Revised June 9, 2003.

NOTICE TO CONTRACTOR – DIESEL VEHICLE EMISSIONS CONTROLS

All Contractor and Sub-contractor on-highway and non-road diesel powered, idle or active, construction equipment with engine horsepower (HP) ratings of 60 HP and above, that are on the project for a period in excess of 60 consecutive or non-consecutive calendar days shall be retrofitted with Emission Control Devices and/or use Clean Fuels in order to reduce diesel emissions. Regularly available on-highway diesel fuel shall be utilized in all on-highway and non-road diesel powered equipment that is not utilizing the specified Clean Fuels.

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

The reduction of emissions of carbon monoxide (CO), hydrocarbons (HC), nitrogen oxides (NOx), and particulate matter (PM_{10}) will be accomplished by installing Retrofit Emission Control Devices or by using less polluting Clean Fuels.

The Retrofit Emission Control Devices shall consist of oxidation catalysts, or similar retrofit equipment control technology that (1) is included on the Environmental Protection Agency (EPA) *Verified Retrofit Technology List* and (2) is verified by EPA or certified by the manufacturer to provide a minimum emissions reduction of 20% PM_{10}, 40% CO, and 50% HC.

The Clean Fuels shall consist of low NOx and PM_{10} emission diesel fuel that (1) can be used without engine modification, (2) is certified to provide a minimum emissions reduction of 30% PM_{10} and 10% NOx when compared to No. 2 Diesel Fuel, and (3) is included on the California Air Research Board (CARB) Verification List.

Construction shall not proceed until the contractor submits a certified list of the diesel powered construction equipment that will be retrofitted with emission control devices or that will use Clean Fuels. The list shall include (1) the equipment number, type, make, year and contractor/sub-contractor name; (2) the emission control device make, model and EPA verification number; and/or (3) the type and source of fuel to be used.

The contractor shall submit monthly summary reports, updating the same information stated above, and include certified copies of the clean fuel delivery slips for the report time period, noting which vehicles received the fuel. The addition or deletion of diesel equipment shall be included on the monthly report.

Additionally, the Contractor shall submit bi-weekly reports tracking the number of calendar days (consecutive or non-consecutive) that all Contractor and Sub-contractor on-highway and non-road diesel powered (idle or active) construction equipment with engine horsepower (HP) ratings of 60 HP and above, is on the project. The list shall include (1) the equipment number, type, make, year and contractor/sub-contractor name; (2) the number of calendar days (consecutive or non-consecutive) that the equipment has been on project; (3)

emission control device make, model and EPA verification number (if applicable); and/or (4) the type and source of fuel being used (if applicable).

The contractor shall establish truck-staging zones for vehicles that are waiting to load or unload material at the contract area. Such zones shall be located where the emissions from the trucks will have minimum impact on abutters and the general public. Idling of delivery and/or dump trucks, or other equipment shall not be permitted during periods of non-active use, and it should be limited to three minutes in accordance with the Regulations of Connecticut State Agencies Section 22a-174-18(b)(3)(c):

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

(i) When a mobile source is forced to remain motionless because of traffic conditions or mechanical difficulties over which the operator has no control,

(ii) When it is necessary to operate defrosting, heating or cooling equipment to ensure the safety or health of the driver or passengers,

(iii) When it is necessary to operate auxiliary equipment that is located in or on the mobile source to accomplish the intended use of the mobile source,

(iv) To bring the mobile source to the manufacturer's recommended operating temperature,

(v) When the outdoor temperature is below twenty degrees Fahrenheit (20 degrees F),

(vi) When the mobile source is undergoing maintenance that requires such mobile source be operated for more than three (3) consecutive minutes, or

(vii) When a mobile source is in queue to be inspected by U.S. military personnel prior to gaining access to a U.S. military installation."

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

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

If any diesel powered construction equipment is found to be in non-compliance with this specification, the contractor will be issued a Notice of Non-Compliance and given a 24 hour period in which to bring the equipment into compliance or remove it from the project. If the contractor then does not comply with these "Diesel Vehicle Emissions Controls", the Engineer

shall withhold all payments for the work performed on any item(s) on which the non-conforming equipment was utilized for the time period in which the equipment was out of compliance.

Any costs associated with this "Diesel Vehicle Emissions Controls" 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".

NOTICE TO CONTRACTOR – DUST CONTROL

The Contractor is responsible for controlling air pollution at all times during work of this contract, 24 hours a day, 7 days per week, including non-working hours, weekends and holidays, in conformance with the item "Water for Dust Control".

The Contractor shall comply with all State and Federal regulations pertaining to dust control. Particular attention shall be made to the Regulations of Connecticut State Agencies Section 22a-174-18a,b "Control of Particulate Emissions".

The contractor shall submit a dust control plan to the Engineer within 30 days after the Award of the Contract. The dust control plan shall include contact information for the responsible individual(s) from the contractor (24-hour availability) who have authority to implement necessary controls. The plan should detail dust control procedures for anticipated activities that may typically generate dust (ex. Jack hammering, saw-cutting pavement, haul roads, material storage sites, etc.).

The cost for the dust control submittal associated with this "Dust Control" notice shall be included in the general cost of the contract. Payment for the application of dust control items included in the Contract ("Water for Dust Control") will be under those respective items.

NOTICE TO CONTRACTOR – FORM 816 REFERENCES ON STANDARD DRAWINGS

The Contract includes standard Connecticut Department of Transportation drawings with material and pay limit references to Form 816. For work shown on these drawings that is included under the Major Lump Sum Item (MLSI) for the Project, the Contractor shall disregard these references. Concrete shall comply with the requirements of CSI Specification Section 033000 under the MLSI.

Pay limits for unit price and lump sum items other than the MLSI shall be in accordance with Method of Measurement (Part 4), and Basis of Payment (Part 5) of the appropriate special provision section. Concrete for unit price items other than the MLSI shall be in accordance with Form 816, unless specifically noted otherwise.

NOTICE TO CONTRACTOR – PEDESTRIAN BRIDGE STRUCTURE

The Contractor is hereby advised that he is responsible for obtaining all permits such as Oversized Load and Over Height, that may be required for delivery of the Branford Station pedestrian bridge, and for developing a delivery route, approved by the Department, to the Project site prior to fabrication of the pedestrian bridge. Refer to Form 816 Article 1.07.05 for additional information in this regard.

An erection plan for the pedestrian shall be submitted to the Engineer and to AMTRAK, and no work on the installation of the pedestrian bridge shall commence until the erection plan has been approved.

The Department has determined that, in order to minimize disruption to the railroad, all structural steel, the entire corrugated steel deck, the electrical conduits under the steel deck, the wood sheathing and the majority of the metal roofing for the bridge (with the exception of identified or approved lifting points for installation) be in place prior to placing the bridge. Steel windows and other finishes can be installed after the bridge is erected, however AMTRAK will require all openings in the side of the bridge be temporarily covered following erection.

The Contractor is responsible for any damage to the pedestrian bridge, steel deck, and metal roof deck during transport and placing operations, and shall make all necessary repairs and or replacements to the Engineer's satisfaction.

The Contract includes additional information regarding this activity. The Contractor shall comply with all requirements of the NOTICE TO CONTRACTOR – WORK ON RAILROAD PROPERTY to install the pedestrian bridge during off-peak hours.

The Contractor shall bid the Project accordingly.

NOTICE TO CONTRACTOR – PROTECTION OF EXISTING UTILITIES

Existing utilities shall be maintained during construction except as specifically stated herein and/or noted on the plans and as coordinated with the utilities. The Contractor shall verify the location of underground, structure mounted and overhead utilities. Construction work within the vicinity of utilities shall be performed in accordance with current safety regulations.

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

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

Contractors are cautioned that it is their responsibility to verify locations, conditions, and field dimensions of all existing features, as actual conditions may differ from the information shown on the plans or contained elsewhere in the specifications.

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

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

Any damage to any existing private and public utility, as a result of the Contractors operations, shall be repaired to the utilities and Engineer's satisfaction at no cost to the State or the Utilities, including all materials, labor, etc., required to complete the repairs.

The Contractor's attention is directed to the requirements of Section 1.07.13 – "Contractor's Responsibilities for Adjacent Property and Services".

Prior to opening an excavation, effort shall be made to determine whether underground installations, i.e., water, sanitary, gas, electric ducts, communication ducts, etc., will be encountered and, if so, where such underground installations are located. When the excavation approaches the estimated location of such an installation, the exact location shall be determined by careful probing or hand digging, and when it is uncovered, proper supports shall be provided for the existing installation. Utility companies shall be contacted and advised of proposed work prior to the start of actual excavation, as noted above.

For any work to be accomplished under this Contract within the Amtrak Right of Way, Call-Before-you-Dig (CBYD) does not coordinate the mark out of any underground utilities within the railroad right of way. The Contractor is responsible for coordinating with Amtrak for the mark out of any utilities located within their right of way and for locating these utilities prior to performing any excavations.

NOTICE TO CONTRACTOR – SIGN INVENTORY

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

NOTICE TO CONTRACTOR – SAFEGUARDING OF RESIDENCES AND COMMERCIAL PROPERTIES

The Contractor shall maintain and protect traffic operations at all driveways and provide adequate sightline. The Contractor shall not restrict sightline with construction equipment when not actively working. The Contractor shall also safeguard pedestrian operation and maintain access to properties at all times.

NOTICE TO CONTRACTOR – NOISE POLLUTION

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

All methods and devices employed to minimize noise shall be subject to the continuing approval of the Engineer. The maximum allowable level of noise at the nearest residence or occupied building shall be 90 decibels on the "A" weighted scale (dBA). Any operation that exceeds this standard will cease until a different construction methodology is developed to allow work to proceed within the 90 dBA limit.

NOTICE TO CONTRACTOR – STANDARD SPECIFICATIONS

Whenever and wherever "ConnDOT Form 816," "Form 816," "Standard Specifications" are referenced herein, this shall mean and refer to "State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, and Incidental Construction, Form 816", including the Supplemental Specifications.

NOTICE TO CONTRACTOR – SITE CLEANLINESS

The Contractor is hereby notified that the all areas utilized for construction activities including all onsite and offsite facilities shall be maintained so as to be free of rubbish, trash and deleterious construction debris at all times. The use of covered and secured trash receptacles is required. All receptacles will be regularly emptied and maintained.

There will be no direct payment for maintaining the site cleanliness of the construction areas under the contract.

NOTICE TO CONTRACTOR – UTILITY SERVICE CONNECTIONS AND RELOCATIONS

The electric, telephone, water service to the Project Site, and fiber optic lines along the Amtrak right-of-way require service connections and/or relocations from/to the applicable utility company's facilities. Utility service connection relocations and installations to the point of the utility service are included as shown and described within the Contract.

The Contractor is responsible for notifying the utility company prior to the need for the utility connection, and for coordinating the service connection and/or relocation requirements with the utility company. The Contractor shall coordinate with the following utility companies:

Electric:
Mr. Neal Sorenson
Electric Service Designer
Madison New Service
The Connecticut Light and Power Company (CL&P)
135 New Road
Madison, Connecticut 06443
(203) 245-5416
Sorenn@nu.com

Telephone:
Mr. John Pliakus
AT&T
(860) 450-2793

Water:
Mr. Gerry McDermott
Senior Technical Services Project Coordinator
The Connecticut Water Company
93 West Main Street
Clinton, CT 06413
(860) 664-6125
GMcDermott@ctwater.com

Fiber Optic:
Verizon (MCI)/Amtrak C&S
Mr. Erik C. Johnson
PHONE: (617) 590-2641
Eric.C.Johnson@Verizonbusiness.com

AT&T Corp. (Long Lines)
Mr. Mark P. Burkhart,
Manager Technical Analysis Senior Cable Engineer
AT&T Corp. (Long Lines)

139 Bacon Pond Road
Woodbury, CT 06798
(203) 266-4372
markburkhart@att.com

Jeffrey Fischer
Project Manager
Northeast Division – East
AMTRAK
Office: 860-446-3709
Cell: 401-265-9140
Fischej@Amtrak.com

Where known, utility company representatives are identified elsewhere within the Contract.

An allowance is included in the Contract to reimburse the Utility Companies for work required to modify and/or add new utility connections as described in the Contract drawings. The Contractor shall include these allowances in its Contract bid. Refer to Item # 1700001A, "Service Connections (Estimated Cost)" for additional information in this regard. The Contractor is responsible for coordinating this work with the utility company and for administrative requirements for reimbursing the utility company.

NOTICE TO CONTRACTOR - VOLUNTARY PARTNERING

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

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

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

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

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

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

NOTICE TO CONTRACTOR - PROCUREMENT OF MATERIALS

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

NOTICE TO CONTRACTOR - CONNECTICUT DEPARTMENT OF TRANSPORTATION DISCLAIMER

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

It is the responsibility of each bidder and all other interested parties to obtain all bidding related information and documents from official sources within the Department.

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

NOTICE TO CONTRACTOR - GENERAL PERMIT FOR STORMWATER DISCHARGE

This notice is provided to summarize the requirements of the Connecticut Department of Environmental Protection's General Permit for the Discharge of Stormwater and Dewatering Wastewaters associated with Construction Activities (Permit) issued on April 9, 2010. When construction activities will result in the disturbance of a total of 1 acre (0.4047 ha) or more of land regardless of phasing, the Connecticut Department of Transportation (Department) will incorporate a Stormwater Registration (Registration) and Stormwater Pollution Control Plan (SWPCP) as part of the Contract documents in order to insure compliance with all conditions of this Permit. The Permit's 'Construction activities' means activities including but not limited to clearing and grubbing, grading, excavation, and dewatering.

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

The District Engineer is responsible to sign the Registration and will be the permittee for all Department construction projects. For all local town/municipal projects, the District Engineer is not responsible to sign the Registration as the local town or municipality will be the signed permittee.

If the Contractor requires a modification to the SWPCP, it shall be in accordance with the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control and the 2004 Connecticut Stormwater Quality Manual or as revised or amended. The Department shall approve or reject the modification to the SWPCP and notify the Contractor in writing as to any revisions or additional information required for approval within 30 days of the date of the Contractor's submission. No damage for delays will be granted to the Contractor based on time taken by the Department to review the Contractor's proposal, or to apply for or secure the Permit amendment, modification or revision as per Section 1.10 - Environmental Compliance, of the Standard Specifications for Roads, Bridges, and Incidental Construction Form 816 and any Supplements thereto. At no time shall the Contractor proceed with the proposed Permit amendment, modification, or revision unless the Engineer approves, in writing, the Contractor's request.

At a minimum, the Contractor along with qualified personnel (provided by the permittee) shall inspect the site for non stabilized areas, structural control measures, and locations where vehicles enter or exit the site at least once every seven calendar days and within twenty four hours of the end of a storm that is 0.1 inches (2.54 mm) or greater. If a potential source of pollution is identified, pollution preventive measures shall be implemented within twenty four hours and the SWPCP must be amended within three calendar days.

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

Erosion and Sedimentation Control Provisions:
Unless specifically outlined in the Contract Plans and/or SWPCP, the Contractor is not allowed to disturb more than two (2) acres (0.8094 ha) of erodible material per discharge point at any one time regardless of phasing. If the Contractor elects to deviate from the Contract Plans and/or SWPCP to disturb more than two (2) acres (0.8094 ha) of erodible material per discharge point at any one time regardless of phasing, the Contractor must provide a sequenced staging plan outlining the proposed disturbed activities. In all cases, the Contractor must meet the following conditions:

- *If the area of disturbance is maintained less than two (2) acres* (0.8094 ha) *per discharge point*, the Contractor may disturb additional areas if and only if the previously disturbed areas are temporarily or permanently stabilized using acceptable measures such as the standard controls which are provided in the SWPCP or as shown on the Contract Plans.

- *If the construction activities create an area of disturbance to be at least two (2) acres* (0.8094 ha) *per discharge point but no more than five (5) acres (2.0235 ha) per discharge point*, the Contactor must submit to the Engineer a revised SWPCP for review and approval. The SWPCP must include locations of the temporary sedimentation trap/temporary sedimentation basin per discharge point with a capacity to contain 134 cubic yards per acre (102.5 m^3 per 0.4047 ha) of material. The Contractor shall design and construct the temporary sedimentation trap/temporary sedimentation basin in accordance with the 2002 Connecticut Guidelines for Soil and Sediment Control. The Contractor shall provide an inspection and maintenance plan for the temporary sedimentation trap/temporary sedimentation basin as part of the amended SWPCP.

- *If the area of disturbance has a potential to reach more than five (5) acres (2.0235 ha) per discharge point*, the Contactor must submit to the Engineer a revised SWPCP for review and approval. The SWPCP must include locations of the engineered sedimentation basin per discharge point with a capacity to contain 134 cubic yards per acre (102.5 m^3 per 0.4047 ha) of material. The Contractor shall design and construct the engineered sedimentation basin in accordance with the 2004 Connecticut Stormwater Quality Manual. The Contractor shall provide an inspection and maintenance plan for the engineered sedimentation basin as part of the amended SWPCP.

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

NOTICE TO CONTRACTOR - GORE AREAS

Gore areas will no longer be available for disposal of surplus material.

NOTICE TO CONTRACTOR - VEHICLE EMISSIONS

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

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

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

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

(i) When a mobile source is forced to remain motionless because of traffic conditions or mechanical difficulties over which the operator has no control,

(ii) When it is necessary to operate defrosting, heating or cooling equipment to ensure the safety or health of the driver or passengers,

(iii) When it is necessary to operate auxiliary equipment that is located in or on the mobile source to accomplish the intended use of the mobile source,

(iv) To bring the mobile source to the manufacturer's recommended operating temperature,

(v) When the outdoor temperature is below twenty degrees Fahrenheit (20 degrees F),

(vi) When the mobile source is undergoing maintenance that requires such mobile source be operated for more than three (3) consecutive minutes, or

(vii) When a mobile source is in queue to be inspected by U.S. military personnel prior to gaining access to a U.S. military installation."

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

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

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

Any costs associated with this "Vehicle Emissions" notice shall be included in the general cost of the contract. In addition, there shall be no time granted to the contractor for compliance with this notice. The contractor's compliance with this notice and any associated regulations shall not be grounds for claims as outlined in Section 1.11 – "Claims".

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

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

Mix Designation Equivalency Table

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

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

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

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

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

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

NOTICE TO CONTRACTOR - SUPERPAVE DESIGN LEVEL INFORMATION

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

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

Project Nos. 310 – 56 & 310-57 will require the following Superpave Design Level(s):				
Mix Designation	**PG Binder**	**Project Nos. 310-56 & 310-57**	**Route** _____ _____	**Route** _____ _____
	PG64-22	**Design Level**	**Design Level**	**Design Level**
HMA S0.25	-	-	-	-
HMA S0.375	-	3	-	-
HMA S0.5	-	3	-	-
HMA S1	-	3	-	-

NOTICE TO CONTRACTOR - TRAFFIC DRUMS AND TRAFFIC CONES

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

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

- 3M Scotchlite Diamond Grade Flexible Work Zone Sheeting, Model 3910 for the white stripes and Model 3914 for the orange stripes,

- Avery Dennison WR-7100 Series Reboundable Prismatic Sheeting, Model WR-7100 for the white stripes and Model WR-7114 for the orange stripes.

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

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

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

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

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

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

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

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

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

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

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

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

SECTION 1.01 – DEFINITIONS OF TERMS AND PERMISSIBLE ABBREVIATIONS

1.01.01--Definitions:

Delete the following term:

"**SHOP DRAWINGS:** Drawings, including . . . in the Contract." **[Redefined in 1.20-1.05.02]**

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

1.03.07--Insurance:

"Before the Contract is executed, the Contractor must file with the Commissioner a certificate of insurance, executed by an insurance company satisfactory to the Commissioner, on the form provided by the Department, stating that with respect to the Contract, the Contractor carries insurance at least in accordance with the requirements and stipulations listed below. State of Connecticut, Department of Transportation, Form Number CON-32 entitled "CERTIFICATE OF INSURANCE" shall be the only acceptable form to be used by the Contractor as evidence of required insurance coverage. Continuance of the required insurance during the entire term of the Contract shall be the responsibility of the Contractor and is a condition of the Contract.

The Contractor and its insurer may not assert the defense of sovereign immunity in the adjustment of claims or in the defense of any claim or suit brought against the Contractor or the State, unless the State, in writing, requests it to do so or consents to its doing so. The Contractor shall assume and pay all costs and billings for premiums, deductibles, self-insured retentions and audit charges earned and payable under the required insurance.

The State must be named as an additional insured party for the insurance required under paragraph 2, 3, 6, and 7. stipulated below. Each policy shall waive right of recovery (waiver of subrogation) against the State of Connecticut.

1. **Worker's Compensation Insurance:** With respect to all operations the Contractor performs and all those performed for it by subcontractors, the Contractor and each such subcontractor shall carry Workers' Compensation as required by State Statute and Employers' Liability with a limit not less then $100,000 per occurrence, $500,000 disease policy limit, and $100,000 disease each employee. Each such contractor's Workers' Compensation policy shall contain the U.S. Longshoreman's and Harbor Workers' Act endorsement when work is to be performed over or adjacent to a navigable water.

2. **Commercial General Liability Insurance:** With respect to the operations it performs and also those performed for it by subcontractors, the Contractor shall carry commercial general liability insurance, including Contractual Liability, Products and Completed Operations, Broad Form Property Damage and Independent Contractors. Limits shall be no less then $1,000,000 each occurrence and $2,000,000 annual aggregate. If underground work is to be undertaken, policy shall have coverage for and exclusions removed for "x, c and u". Products and completed operations insurance for ongoing and completed operations shall be maintained for a period of three (3) years after completion. Coverage shall be on a primary basis.

3. **Automobile Liability Insurance:** The Contractor shall obtain automobile liability insurance covering the operation of all motor vehicles, including those hired or borrowed, that are used in connection with the Project; said insurance shall provide coverage of at least $1,000,000 for each accident or occurrence resulting in damages from (1) bodily injury to or death of persons and/or

(2) injury to or destruction of property. If an insurance policy shows an aggregate limit as part of the automobile liability coverage, the aggregate limit must be at least $2,000,000.

4. **Umbrella Liability Insurance:** In the amount of $20,000,000 combined single limit each occurrence in excess of the coverage described in paragraphs 1, 2 and 3.

5. **Owner's and Contractor's Protective Liability Insurance for and in the Name of the State:** With respect to the Contractor's Project operations and also those of its subcontractors, the Contractor shall carry, for and on behalf of the State, insurance which shall provide coverage of at least $1,000,000 for each accident or occurrence resulting in damages from (1) bodily injury to or death of persons and/or (2) injury to or destruction of property. Subject to that limit per accident or occurrence, the policy shall provide and aggregate coverage of at least $2,000,000 for all pertinent damages arising during the policy period.

6. **Railroad Protective Liability Insurance:** When the Contract involves work on, over or under the right of way of any railroad company, the Contractor shall carry, with respect to its Project operations and also those of its subcontractors, Railroad Protective Liability Insurance for, and on behalf of, the railroad company as named insured and the State as additional insured, providing coverage of at least $2,000,000 for each accident or occurrence resulting in damages from (1) bodily injury to or death of all persons and/or (2) injury to or destruction of property. Subject to that limit per accident or occurrence, the policy shall provide an aggregate coverage of at least $6,000,000 for all damages during the policy period.

For additional insurance requirements for work in AMTRAK Territory, see the NOTICE TO CONTRACTOR – AMTRAK SPECIFICATIONS, including all references.

7. **Builder's Risk Insurance:** The Contractors shall maintain comprehensive replacement cost builder's risk (completed value) insurance providing coverage for the entire work at the Project site, including all fixtures, machinery and equipment, any heating, cooling and constituting a permanent part of the building and shall cover portions of work located away from the site, but intended for use at the site. If it is determined that all or a portion of the project is located with an area designated as a Special Flood Hazard Area, the contractor shall maintain flood insurance (no less than $10,000,000 sublimit). The State of Connecticut shall be named as Loss Payee. Equipment breakdown coverage may be sub limited to 50% of the project cost.

8. **Termination or Change of Insurance:** Each insurance policy required by this Article must be endorsed to provide that the insurance company shall notify the Department by certified mail at least 30 days in advance of the termination or any alteration of the terms of the policy. No such change shall be made without the prior written approval of the Commissioner.

The Contractor shall keep all the required insurance in continuous effect until the date that the Department designates for the termination of the Contractor's responsibility, as determined under Article 1.08.13.

9. **Claims:** Each insurance policy required by this Article must state that the insurance company shall agree to investigate and defend the insured parties, at the insurer's expense, against all claims for damages, even if groundless.

10. **Compensation:** There shall be no direct compensation allowed the Contractor on account of any premium or other charge necessary to obtain and keep in effect any insurance or bonds in connection with the Project, but the cost thereof shall be considered included in the general cost of the Project work.

1.03.08--Notice to Proceed and Commencement of Work:

"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

1.05.02--Plans, Working Drawings, and Shop Drawings:

Delete the entire subsection entitled "3. Shop Drawings:"

1.05.06--Cooperation with Utilities (including Railroads):

Add the following after the last paragraph:

"Special Requirements Regarding Work in AMTRAK territory:

Description:
This section covers authority, definitions, regulatory requirements, traffic regulation and coordination of the Contractor's work schedule with the operation of train service, construction equipment and safety requirements for working within railroad right-of-way, and provisions for storage of materials and equipment and worker safety rules. Subsequent to the Engineer's Pre-Construction Meeting and prior to commencement to Contract activities, the Engineer will hold a Working on the Railroad Meeting to emphasis these Specifications.

SECTION 1.06 – CONTROL OF MATERIALS

1.06.01--Source of Supply and Quality:

Delete the last paragraph: "When one manufacturer's product . . . and Materials Certificate."

1.06.08--Warranties, Guarantees and Instruction Sheets:

Delete the entire Article.

SECTION 1.08 – PROSECUTION AND PROGRESS

1.08.01--Transfer of Work or Contract:

In the first sentence of the first paragraph which reads: "The Contractor shall perform . . . total Contract value.", change "50%" to "40 %."

Add the following after the last paragraph:

The Contractor shall pay the subcontractor for work performed within thirty (30) days after the Contractor receives payment for the work performed by the subcontractor. Also, any retained monies on a subcontractor's work shall be paid to the subcontractor within thirty (30) days after satisfactory completion of all the subcontractor's work.

For the purpose of this Item, satisfactory completion shall have been accomplished when:

(1) The subcontractor has fulfilled the contract requirements of both the Department and the subcontract for the subcontracted work, including the completion of any specified material and equipment testing requirement or plant establishment period and the submission of all submittals (i.e.: certified payrolls, material samples and certifications, required state and federal submissions, etc.) required by the specifications and the Department, and
(2) The work done by the subcontractor has been inspected and approved by the Department and the final quantities of the subcontractor's work have been determined and agreed upon.

If the Contractor determines that a subcontractor's work is not complete, the Contractor shall notify the subcontractor and the Engineer, in writing, of the reasons why the subcontractor's work is not complete. This written notification shall be provided to the subcontractor and the Engineer within twenty-one (21) days of the subcontractor's request for release of retainage.

The Engineer will institute administrative procedures to expedite the determination of final quantities for the subcontractor's satisfactorily completed work.

The inspection and approval of a subcontractor's work does not eliminate the Contractor's responsibilities for all the work as defined in Article 1.07.12, "Contractor's Responsibility for Work."

The inspection and approval of the subcontractor's work does not release the subcontractor from its responsibility for maintenance and other periods of subcontractor responsibility specified for the subcontractor's items of work. Failure of a subcontractor to meet its maintenance, warranty and/or defective work responsibilities may result in a finding that the subcontractor is non-responsible on future subcontract assignments.

For any dispute regarding prompt payment or release of retainage, the alternate dispute resolution provisions of this article shall apply.

The above requirements are also applicable to all sub-tier subcontractors and the above provisions shall be made a part of all subcontract agreements.

Failure of the Contractor to comply with the provisions of this section may result in a finding that the Contractor is non-responsible on future projects.

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 allowed to perform any work that will interfere with existing traffic operations on all project roadways as follows:

KIRKHAM STREET, BRANFORD

The Contractor will not be allowed to perform any work that will interfere with one lane of through traffic in each direction on:

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

* * * * * *

CONSTRUCTION STAKING

For roadways where the existing pavement markings are to be re-established in their original locations, the Contractor shall establish control points from the existing pavement markings in accordance with Section 9.80 Construction Staking. This work will be paid for under Item No. 0980001A “Construction Staking”.

* * * * * *

STAGE CONSTRUCTION

Platform Construction Staging

The construction of the south platform in Branford and north platform in Guilford shall be staged in such a manner that access to the existing platforms will be maintained throughout construction. During construction operations, the Contractor shall maintain access for vehicles to pick up and drop off passengers at the existing platforms. In addition, the Contractor shall maintain a safe and appropriate pedestrian access to the platform from the parking lots by means of cones, barrels and construction barricades with appropriate signage.

OTHER LIMITATIONS

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

If there is more than one alternating one-way traffic operation at one time, then there shall be at least one mile between signing patterns.

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

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 through March 31 of each year. 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.

1.08.08 - Extension of Time:

> *Delete the last paragraph,* "If an approved extension of time…. the following April 1".

Article 1.08.09 - Failure to Complete Work on Time:

Delete the second paragraph, "If the last day...the project is substantially completed" *and replace it with* "Liquidated damages as specified in the Contract shall be assessed against the Contractor per calendar day from that day until the date on which the project is substantially completed.".

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

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

The Contractor's responsibility for non-administrative Project work will be considered terminated when the final inspection has been held, any required additional work and final cleaning-up have been completed, all final operation and maintenance manuals have been submitted, and all of the Contractor's equipment and construction signs have been removed from

the Project site. When these requirements have been met to the satisfaction of the Engineer, the Commissioner will accept the work by certifying in writing to the Contractor, that the non-administrative Project work has been satisfactorily completed.

SECTION 1.20 – GENERAL CLAUSES FOR FACILITIES CONSTRUCTION

1.20-1.00 – General:

Delete the second sentence in the first paragraph and replace with the following:

The Department has determined that this Project is Facilities Construction, and therefore Section 1.20 applies.

Delete Article 1.20-1.03.01 and replace it with the following:

1.20-1.03.01—Consideration of Bids: The apparent low bidder shall submit to the Manager of Contracts a Schedule of Values within 14 days after bid opening. Any other Contractor that the Department may subsequently designate as the apparent lowest bidder shall make the aforesaid submission within 14 days from the date on which the Department notifies said Contractor that it has become the apparent lowest bidder. If, however, the Department deems it necessary for such a subsequently designated Contractor to make said submission within a shorter period of time, the Contractor shall make the submission within the time designated by the Department.

The total in the Schedule of Values shall equal the bid dollar amount for the Major Lump Sum Item (MLSI).

The Schedule of Values shall be divided into "Line Items" listed separately for each CSI Section of the Special Provisions. Additional line items for "General Conditions," "Mobilization," and "Insurance/Bonding" may be incorporated into the Schedule of Values; however, the sum of these items may not exceed 50% of the value of the MLSI.

Where requested by the Department, the Contractor shall breakdown the line items further into more specific line items.

In the event that this Contract is terminated or a portion of this Contract is deleted for any reason or in any way allowable by law under this Contract after the apparent low bidder has been awarded the Contract, the Schedule of Values will <u>not</u> be used for estimating payment due the Contractor for work completed prior to such termination of the Contract or deletion of work thereunder. In the case of Contract termination, payment shall be made in accordance with Article 1.05.14.

1.20-1.05.25--Schedules and Reports:

Delete the entire Article.

"1.20-1.09.06—Partial Payments:

With each payment request under the MLSI, the Contractor shall submit AIA Form G702 (Application and Certificate of Payment) and Form G703 (Continuation Sheet). The Contractor is not required to obtain the Architect's signature on Form G702. Once approved by the Engineer, the Forms G702 and G703 become the basis of payment under the MLSI."

SECTION 4.06 - BITUMINOUS CONCRETE

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

4.06.01—Description
4.06.02—Materials
4.06.03—Construction Methods
4.06.04—Method of Measurement
4.06.05—Basis of Payment

4.06.01—Description: Where reference is made to bituminous concrete, it shall also refer to hot-mix asphalt (HMA) mixtures using the Marshall or Superpave mix-design method.

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

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

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

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

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

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

Hot Mix Asphalt (HMA): A bituminous concrete mixture.

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

Marshall: A HMA mixture design designated as "Bituminous Concrete Class ( )".

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

Superpave: A HMA mixture design designated as "HMA S*". Where "S" indicates Superpave and * indicates the sieve related to the nominal maximum aggregate size of the mix. For example Superpave 0.50 inch is now designated as HMA S0.5.

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

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

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

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

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

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

4.06.03—Construction Methods:

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

Delivery tickets must include the following information:

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

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

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

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

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

The State reserves the right to check the gross and tare weight of any delivery truck. A variation of 0.4 percent or less in the gross or tare weight shown on the delivery ticket and the certified scale weight shall be considered evidence that the weight shown on the delivery ticket is correct. If the gross or tare weight varies from that shown on the delivery ticket by more than 0.4 percent, the Engineer will recalculate the net weight. The Contractor shall take action to correct discrepancy to the satisfaction of the Engineer.

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

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

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

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

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

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

Rollers: All rollers shall be self-propelled and designed for compaction of bituminous concrete. Rollers types shall include steel-wheeled, pneumatic or a combination there of and may be capable of operating in a static or dynamic mode. Rollers that operate in a dynamic mode shall have drums that use a vibratory or oscillatory system or combination of. The vibratory system achieves compaction through vertical amplitude forces. Rollers with this system shall be equipped with indicators that provide the operator with amplitude, frequency and speed settings/readouts to measure the impacts per foot during the compaction process. The oscillatory system achieves compaction through horizontal shear forces. Rollers with this system shall be equipped with frequency indicators. Rollers can operate in the dynamic mode using the oscillatory system on concrete structures such as bridges and catch basins if at the lowest frequency setting.

Pneumatic tire rollers shall be self-propelled and equipped with wide-tread compaction tires capable of exerting an average contact pressure from 60 to 90 pounds per square inch uniformly over the surface, adjusting ballast and tire inflation pressure as required. The Contractor shall furnish evidence regarding tire size; pressure and loading to confirm that the proper contact pressure is being developed and that the loading and contact pressure are uniform for all wheels.

Lighting: For paving operations, which will be performed during hours of darkness, the paving equipment shall be equipped with lighting fixtures as described below, or with approved lighting

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

Table 4.06-1: Paver Lighting

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

Table 4.06-2: Roller Lighting

Fixture*	Quantity	Remarks
Type B (wide)	2	Aim 50 feet in front of and behind roller
Type B (narrow)	2	Aim 100 feet in front of and behind roller
OR		
Type C (flood)	2	Aim 50 feet in front of and behind roller
Type C (spot)	2	Aim 100 feet in front of and behind roller

*All fixtures shall be mounted above the roller.

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

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

Type C: The power beam holder shall have ribbed die cast aluminum housing and a clear tempered-glass lens to enclose the fixture. There shall be an arm fully adjustable for aiming, with a male-threaded mount with serrated teeth and lock nuts. There shall be a

120-volt heatproof socket with extended fixture wiring for an "Extended Mogul End Prong" lamp base. The fixture shall have gaskets, and shall be UL listed as suitable for wet locations. The lamps shall be 1000-watt quartz PAR64, both Q1000PAR64MFL (flood) and Q1000PARNSP (spot) will be required.

Material Transfer Vehicle (MTV): A MTV shall be used when placing a HMA surface course that is a minimum of 5,000 feet in length and on a roadway that has an overall width of 28 feet or more. A surface course is defined as the total thickness of the same HMA mix that extends up to and includes the final wearing surface whether it is placed in a single or multiple lifts, and regardless of any time delays between lifts.

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

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

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

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

- The final lift of HMA shall not be placed during the Extended Season.
- HMA mixes shall not be placed when the air or base temperature is below 40°F.

Additional Requirements for Extended Season:

- The minimum mixture temperature for all HMA mixtures when discharged into the paver or transfer vehicle hopper shall be 290°F. The temperature will be taken from the initial discharge of mixture from the truck. If found to be below the minimum requirement, the truck will not be allowed to unload remaining mixture.
- The Contractor shall use a minimum of 3 rollers with operators for paving lengths greater than 1000 feet. Two rollers must be capable of operating in the dynamic mode.
- The Contractor's Quality Control Plan shall include a section on Extended Season paving and address paver speed, roller patterns and balancing mixture delivery and placement operations to meet specification requirements.

5. Superpave Test Section: The Engineer may require the Contractor to place a test section whenever the requirements of this specification or Section M.04 are not met.
The Contractor shall submit the quantity of mixture to be placed and the location of the test section for review and acceptance by the Engineer. The equipment used in the construction of a passing test section shall be used throughout production.

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

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

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

a) Posted speed limit is greater than 35 MPH: 30 feet per inch of vertical change (thickness)

b) Posted speed limit is 35 MPH or less: 15 feet per inch of vertical change (thickness).

c) Bridge Overpass and underpass transition length will be 75 feet either
   (1) Before and after the bridge expansion joint, or
   (2) Before or after the parapet face of the overpass.

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

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

a) Posted speed limit is greater than 35 MPH
   (1) Leading Transitions = 15 feet per inch of vertical change (thickness)
   (2) Trailing Transitions = 6 feet per inch of vertical change (thickness)

b) Posted speed limit is 35 MPH or less
   (1) Leading and Trailing = 4 feet per inch of vertical change (thickness)

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

7. Spreading and Finishing of Mixture: Prior to the placement of the bituminous concrete, the underlying base course shall be brought to the plan grade and cross section within the allowable tolerance. Immediately before placing the mixture, the area to be surfaced shall be cleaned by sweeping or by other means acceptable to the Engineer. The HMA mixture shall not be placed whenever the surface is wet or frozen. The temperature of the mix at time of placement must be between 265°F and 325°F. The Engineer will verify the mix temperature by means of a probe or infrared type of thermometer. Rejection of mixture based on temperature will only be allowed if verified by means of a probe type thermometer.

Placement: The HMA mixture shall be placed and compacted to provide a smooth, dense surface with a uniform texture and no segregation at the specified thickness and dimensions indicated in the plans and specifications. The maximum paver speed during placement shall not exceed 40 ft/min unless authorized by the Engineer.

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

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

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

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

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

a) Thickness- Where the total thickness of the lift of mixture exceeds that shown on the plans beyond the tolerances shown in Table 4.06-3, the longitudinal limits of such variation

including locations and intervals of the measurements will be documented by the Engineer for use in calculating a HMA adjustment in Article 4.06.04.

TABLE 4.06-3 Thickness Tolerances

Mixture Designation	Lift Tolerance
Class 4 and HMA S1	+/- ⅜ inch
Class 1, 2 and 12 and HMA S0.25, S0.375, S0.5	+/- ¼ inch

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

b) Area- Where the width of the lift exceeds that shown on the plans by more than the specified thickness of each lift, the longitudinal limits of such variation including locations and intervals of the measurements will be documented by the Engineer for use in calculating a HMA adjustment in Article 4.06.04.

c) Delivered Weight of Mixture - When the delivery ticket shows that the truck exceeds the allowable gross weight for the vehicle type the quantity of tons representing the overweight amount will be documented by the Engineer for use in calculating a HMA adjustment in Article 4.06.04.

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

Tack Coat Application: A thin uniform coating of tack coat shall be applied to the pavement immediately before overlaying and be allowed sufficient time to break (set). All surfaces in contact with the HMA that have been in place longer than 3 calendar days shall have an application of tack coat. The tack coat shall be applied by a non-gravity pressurized spray system that results in uniform overlapping coverage at an application rate of 0.03 to 0.05 gallons per square yard for a non-milled surface and an application rate of 0.05 to 0.07 gallons per square yard for a milled surface. For areas where both milled and un-milled surfaces occur, the tack coat shall be an application rate of 0.03 to 0.05 gallons per square yard. The Engineer must approve the equipment and the method of measurement prior to use. The material for tack coat shall not be heated in excess of 160°F and shall not be further diluted.

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

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

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

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

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

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

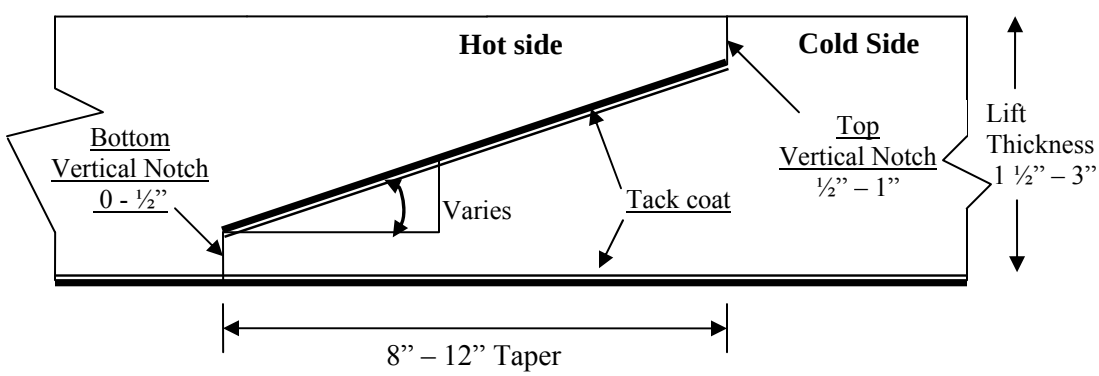
a) Smoothness- Each lift of the surface course shall not vary more than ¼ inch from a Contractor-supplied 10 foot straightedge. For all other lifts of HMA, the tolerance shall be ⅜ inch. Such tolerance will apply to all paved areas.

b) Uniformity- The paved surface shall not exhibit segregation, rutting, cracking, disintegration, flushing or vary in composition as determined by the Engineer.

8. HMA Longitudinal Joint Construction Methods: Unless noted on the plans or the contract documents or directed by the Engineer, the Contractor shall use Method I- Notched Wedge Joint (see figure 4.06-1) when constructing longitudinal joints where lift thicknesses are between 1½ and 3 inches, except for HMA S1 and Class 4 mixes. Method II Butt Joint (see figure 4.06-2) shall be used for lifts less than 1½ inches or greater than 3 inches and HMA S1 and Class 4 mixes. During placement of multiple lifts of HMA, the longitudinal joint shall be constructed in such a manner that it is located at least 6 inches from the joint in the lift immediately below. The joint in the final lift shall be at the centerline or at lane lines.

Method I - Notched Wedge Joint:

Figure 4.06-1



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

The taper portion of the joint must be placed over the longitudinal joint in the lift immediately below. The top vertical notch must be located at the centerline or lane line in the final lift. The requirement for paving full width "curb to curb" as described in Method II will be waived in those areas where the notched wedge joint is utilized.

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

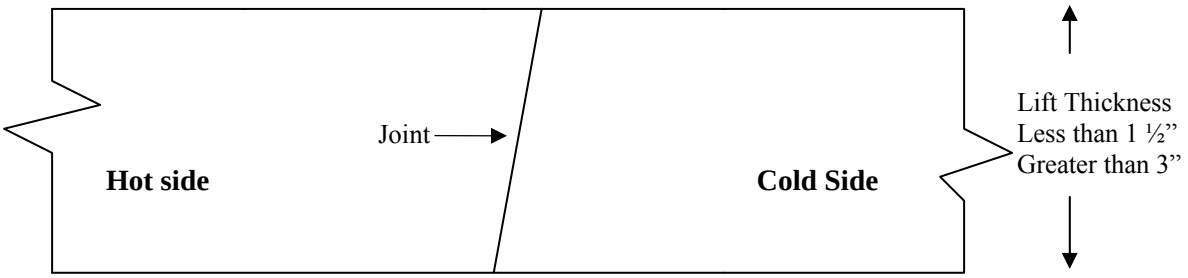
The existing pavement surface under the wedge joint must have an application of tack coat material. Prior to placing completing pass (hot side), an application of tack coat must be applied to the tapered section.

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.

<u>Method II - Butt Joint</u>:

Figure 4.06-2

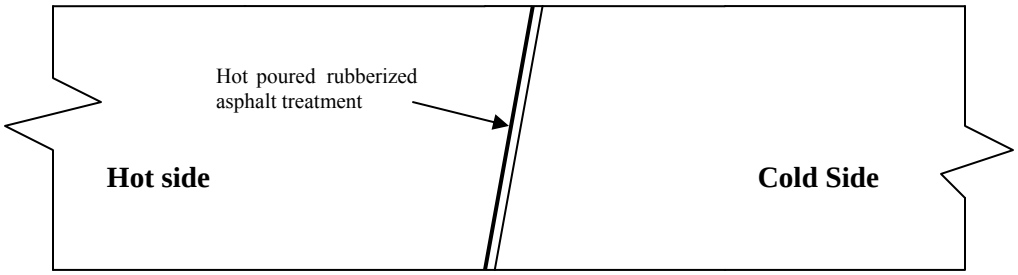


When adjoining HMA passes are placed, the Contractor shall utilize equipment that creates a near vertical edge (refer to figure). The completing pass (hot side) shall have sufficient mixture so that the compacted thickness is not less than the previous pass (cold side). The end gate on the paver should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

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

<u>Method III- Butt Joint with Hot Poured Rubberized Asphalt Treatment</u>: When required by the contract or allowed by the Engineer, Method III (see figure 4.06-3) may be used.

Figure 4.06-3



All of the requirements of Method II must be met with Method III. In addition, the longitudinal vertical edge must be treated with a joint seal material meeting the requirements of Section M.04 prior to placing a completing pass. The joint seal material shall be applied in accordance with the manufacturer's recommendation so as to provide a uniform coverage and avoid excess bleeding onto the newly placed pavement.

9. Contractor Quality Control (QC) Requirements for HMA Placement: A Quality Control Plan (QCP) shall be required for any project that has a total of 2500 tons or more of HMA. Quality Control is defined as all those planned and specified actions or operations necessary to produce bituminous concrete that will meet contract specification requirements. The Contractor shall be responsible for quality control 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.

<u>Quality Control Plan</u>: Prior to placement and production, the Contractor shall submit a QCP to the Engineer for approval. The QCP shall include separate sections; HMA Plant Production and HMA Placement. The sections 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 HMA production and placement process, to determine when immediate changes to the processes are needed, and to implement the required changes. The QCP must address the actions, inspection, 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 and bring it back into control.

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 Quality Control Manager shall be directly responsible to the Contractor and shall have the authority to make decisions where the quality of the work or product is concerned. All sampling, inspection and test reports shall be reviewed and signed by the Quality Control Manager prior to submittal to the Engineer.

Approval of the QCP will be based on the inclusion of all of the required information. Approval of the QCP does not imply any warranty by the Engineer that adherence to the plan will result in production of HMA that complies with these specifications. It shall remain the responsibility of the Contractor to demonstrate such compliance. The Contractor may propose in writing a supplement to the QCP as work progresses and must propose a supplement whenever there are changes in production or placement of HMA or to quality control procedures or personnel. HMA production and placement may be suspended by the Engineer until the revisions to the QCP have been put into effect.

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

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

a) Control Charts: The Contractor shall develop and maintain control charts and shall be distributed as directed by the Engineer. The control charts shall identify the project, test number, test parameter, applicable upper and lower specification limits, and test data. The control charts shall be used as part of the quality control system to document variability of the HMA production and placement process. The control charts shall be kept current. The control charts shall be updated each day of HMA production, and up-to-date copies shall be distributed prior to the beginning of the next day's production of HMA.

b) Records of Inspection and Testing: For each day of HMA production and placement, the Contractor shall document all test results and inspections on forms approved by the Engineer. The document shall be certified by the Quality Control Manager or his representative that the information in the document is accurate, and that all work complies with the requirements of the contract.

The Contractor shall submit sampling, testing and inspection documents to the Engineer within 24 hours or by noon of the next day's HMA production. If the document is incomplete or in error, a copy of the document will be returned to the Contractor with the deficiencies noted by the Engineer. The Contractor shall correct the deficiencies and return the updated document to the Engineer by the start of the following working day. When errors or omissions in the sampling, inspection or testing documents repeatedly occur, the Contractor shall correct the procedures by which the documents are produced.

If control charts, sampling, testing and inspection documents are not distributed or provided as required within the time specified the Engineer may require work to be suspended until the missing documents have been provided.

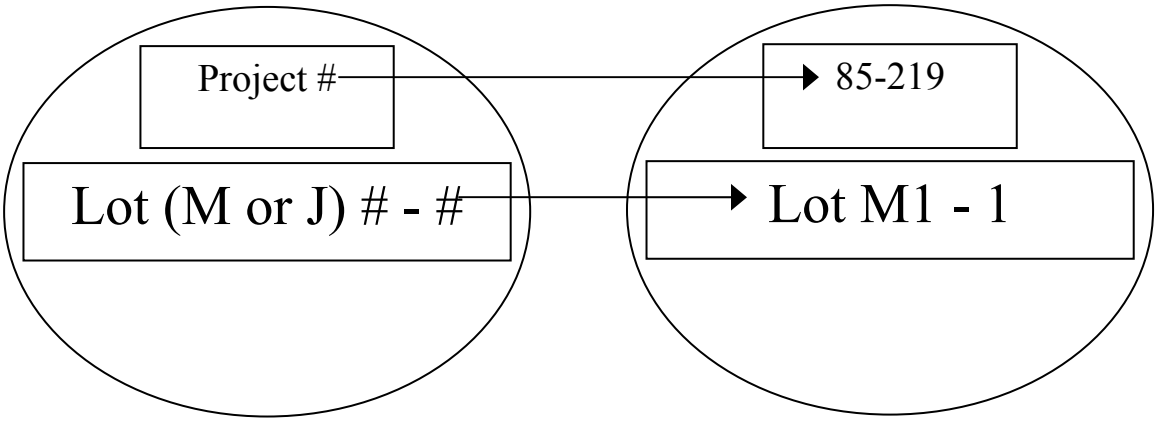
The contractor may obtain two cores per year, per mix, per project to assist with density quality control activities, provided this is detailed in the QCP.

Additional requirements for HMA plant production are defined in Section M.04.

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

The Contractor shall extract cores (6 inch diameter-wet sawed) from sampling locations determined by the Engineer. The Engineer will witness the extraction and labeling of cores. The cores shall be labeled by the Contractor with the project number, lot number, and sub-lot number on the top surface of the core. When labeling the core lot number, include whether the core is from a mat lot or joint lot by using an "M" for a mat core and "J" for a joint core. For example, a core from the first sub-lot of the first mat lot shall be labeled with "Lot M1 – 1". The first number refers to the lot and the second number refers to the sub-lot. Refer to Figure 4.06-4. The side of the cores shall be labeled with the vendor number and date placed. The Contractor shall deliver the cores to the Department's Central Testing Lab in a safe manner to ensure no damage occurs to the cores. The Contractor shall use a container approved by the Engineer. In general the container shall consist of an attached lid container made out of plastic capable of being locked shut and tamper proof. The Contractor shall use foam, bubble wrap, or another suitable material to prevent the cores from being damaged during transportation. Once the cores and any needed paperwork are in the container the Engineer will secure the lid using a security seal. The Central Lab will break the security seal and take possession of the cores upon receipt.

Figure 4.06-4



Frequency of sampling is in accordance with the following tables:

TABLE 4.06-4 - TESTING REQUIREMENT FOR BRIDGE DENSITY LOT

Length of Each Structure (Feet)	MAT – No. of Cores per Pass	JOINT - No. of cores per Joint
Less than 1000	1	2
1000 or greater	1 per 1000 feet or portions thereof	1 per 1000 feet or portions thereof

TABLE 4.06-5 – TESTING REQUIREMENT FOR NON-BRIDGE DENSITY LOT

Required Paver Passes for Full Width	No. of Mat Cores	No. of Joint Cores	Maximum Lot Length (Feet)
1(1)	4	0	10000
2(1)	4	4	5000
3(1)	4	4	2500
4(1)	4	4	2500
5(1)	4	4	1250
6(1)	4	4	1250

Note (1): The number of "Required Paver Passes for Full Width" shall be used to determine the "Maximum Lot Length".

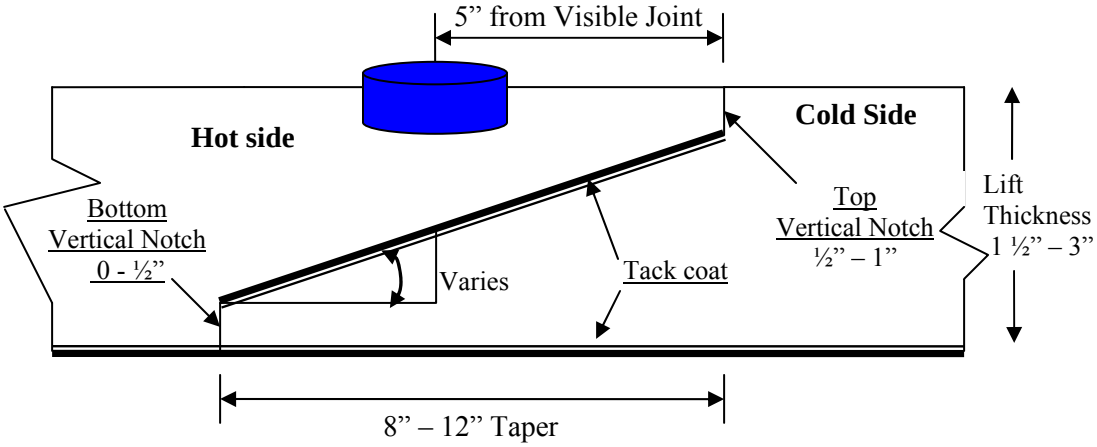
A density lot will be complete when the full designed paving width of the established lot length has been completed and shall include all longitudinal joints that exist between the curb lines regardless of date(s) paved. Prior to paving, the total length of the project to be paved shall be split up into equal lot sizes for testing purposes. Each lot should not exceed the lengths shown in table 4.06-5. One adjustment will apply for each lot. The tons shall be determined using the yield calculation in Article 4.06.04. The last lot shall be the difference between the total payable tons for the project and the sum of the previous lots.

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

A mat core shall not be taken any closer than one foot from the edge of a paver pass. If a random number locates a core less than one foot from any edge, locate the core so that the sample is one foot from the edge.

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

Figure 4.06-5



Cores may be obtained daily or weekly. All cores must be cut within 5 calendar days of placement. Any core that is damaged or obviously defective while being obtained will be replaced with a new core from a location within 2 feet measured in a longitudinal direction.

Core holes shall be filled immediately upon core extraction by removing any free water, applying tack coat to the cut surface, filling with same HMA mixture, and compacting with hand compactor or other mechanical means to the maximum compaction possible. The HMA mixture shall be compacted to ⅛ inch above the finished pavement prior to opening the roadway to traffic.

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

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

HMA Plant Material Acceptance: The Contractor shall provide the required acceptance sampling, testing and inspection during all phases of the work in accordance with Section M.04.

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

12. Density Dispute Resolution Process: The Contractor and Engineer will work in partnership to avoid potential conflicts and to resolve any differences that may arise during quality control or acceptance testing for density. Both parties will review their sampling and testing procedures and results and share their findings. If the Contractor disputes the Engineer's test results, the Contractor must submit in writing a request to initiate the Dispute Resolution Process within 10 calendar days of the notification of the test results. No request for dispute resolution will be allowed unless the Contractor provides quality control results supporting its position. Should the dispute not be resolved through evaluation of existing testing data or procedures, the Engineer

may authorize the Contractor to obtain a maximum of four additional representative core samples per disputed lot. The core samples must be extracted no later than 30 calendar days from the date of Engineer's authorization. Core sample locations shall be established using ASTM D 3665 or a statistically based procedure of random sampling approved by the Engineer. Core samples shall be extracted and filled using the procedure outlined in Article 4.06.03. The results from the dispute resolution cores shall be added to the results from the acceptance cores and averaged for determining the final HMA density.

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

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

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

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

14. Protection of the Work: The Contractor shall protect all sections of the newly finished pavement from damage that may occur as a result of the Contractor's operations for the duration of the Project. Prior to the Engineer's authorization to open the pavement to traffic, the Contractor is responsible to protect the pavement from damage.

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

4.06.04—Method of Measurement:

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

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

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

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

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

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

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

Where: L = Length (ft)
(t) = Actual thickness (inches)
W_{adj} = (Designed width (ft) + tolerance /12) - Measured Width)

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

Tons Adjusted for Thickness (T_T) = A x t_{adj} x 0.0575 = (-) Tons

Where: A = Area = {[L x (Designed width + tolerance (lift thickness)/12)] / 9}
t_{adj} = Adjusted thickness = [(Dt + tolerance) - Actual thickness]
Dt = Designed thickness (inches)

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

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

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

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

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

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

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

TABLE 4.06-6
TOLERANCES FOR CONSECUTIVE TESTS (MARSHALL)

Classes	Criteria	% Tolerances (+/-)
-	Binder	0.4
1, 2, 4, 5, 5A & 5B	#200	2.0
1, 2, 4	#50	4
1, 2, 5, 5A & 5B	#30	5
1, 2, 4, 5, 5A & 5B	#8	6
1, 2, 4, 5, 5A & 5B	#4	7
1, 2, 4, 5, 5A & 5B	⅜ & ½ inch	8

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

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

<u>Percent Adjustment for Air Voids</u> = $AdjAV_t = [AdjAV_1 + AdjAV_2 + AdjAV_i + \ldots + AdjAV_n)] /n$

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
n = number of air void tests in a production lot

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

Adjustment Value ($AdjAV_i$) (%)	**HMA S0.25, S0.375, S0.5, S1 Air Voids (AV)**
+2.5	3.5 - 4.5
0.0	3.0 - 3.4 or 4.6 - 5.0
- 5.0	2.7 - 2.9 or 5.1 - 5.3
- 10.0	2.3 – 2.6 or 5.4 – 5.7
-20.0	$\leq$ 2.2 or $\geq$ 5.8

Percent Adjustment for Liquid 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 4.06-8

Adjustment Value ($AdjAV_i$) (%)	**HMA S0.25, S0.375, S0.5, S1 Pb (refer to Table M.04.03-5)**
0.0	Equal to or above the min. liquid content
- 10.0	Below the min. liquid content

e) Density Adjustment: The quantity of bituminous concrete measured for payment for a specified lift of pavement 1½ inches or greater may be adjusted for density. Separate density adjustments will be made for each lot and will not be combined to establish one density adjustment.

Tons Adjusted for Density (T_D) = $[\{(PA_M \times .40) + (PA_J \times .60)\} / 100]$ X Density Lot Tons

Where: T_D = Total tons adjusted for density for each lot
PA_M = Mat density percent adjustment from Table 4.06-9
PA_J = Joint density percent adjustment from Table 4.06-10

TABLE 4.06-9
ADJUSTMENT VALUES FOR PAVEMENT MAT DENSITY

Average Core Result Percent Density	Percent Adjustment for non-bridge lots	Percent Adjustment for bridge lots
97.1 – 100	-2.5	- 2.5
94.5 – 97.0	+2.5	+2.5
92.0 – 94.4	0.0	0.0
91.0 – 91.9	-2.5	- 10.0
89.1 – 90.9	-15.0	- 30.0
87.0 – 89.0	-30.0	- 50.0
86.9 or less	Remove and Replace	Remove and Replace

TABLE 4.06-10
ADJUSTMENT VALUES FOR PAVEMENT JOINT DENSITY

Average Core Result Percent Density	Percent Adjustment for non-bridge lots	Percent Adjustment for bridge lots
97.1 – 100	-2.5	- 2.5
94.5 – 97.0	+2.5	+2.5
91.0 – 94.4	0.0	0.0
90.0 – 90.9	-7.5	- 7.5
89.0 – 89.9	-15.0	-15.0
87.0 – 88.9	-30.0	- 50.0
86.9 or less	Remove and Replace	Remove and Replace

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

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

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

5. Material for Tack Coat: The quantity of tack coat will be measured for payment by the number of gallons furnished and applied on the Project and approved by the Engineer.

Method of Measurement:

a. Container Method- Material furnished in a container will be measured to the nearest ½ gallon. The volume will be determined by either measuring the volume in the original container by a method approved by the Engineer or using a separate graduated container capable of measuring the volume to the nearest ½ gallon. The container in which the

material is furnished must include the description of material, including lot number or batch number and manufacturer or product source.

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

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

4.06.05—Basis of Payment:

1. Bituminous Concrete Class ( ), HMA S*: The furnishing and placing of bituminous concrete will be paid for at the Contract unit price per ton for "Bituminous Concrete, Class ( )" or "HMA S* ( )."

- All costs associated with providing illumination of the work area are included in the general cost of the work.
- All costs associated with constructing longitudinal joints are included in the general cost of the work.
- All costs associated with obtaining cores for core correlation and dispute resolution are included in the general cost of the work.

2. **HMA Adjustment Costs**: The "HMA Adjustment Costs" will be calculated using the formulas shown below if all of the measured adjustments in Article 4.06.04 do not equal zero. A payment will be made for a positive adjustment. A deduction from monies due the Contractor will be made for a negative adjustment.

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

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

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

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

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

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

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

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

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

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

Pay Item*	Pay Unit*
Bituminous Concrete, Class ( )	ton
HMA S*	ton
HMA Adjustment Cost	est.
Material for Tack Coat	gal.
Material Transfer Vehicle	ton

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

SECTION 6.03 - STRUCTURAL STEEL

Delete Sub article 6.03.03-19 - Bolted Connections and replace with the following:

19 - Connections Using High-Strength Bolts:

19 (a) General:

This Subarticle covers the assembly of structural joints using ASTM A325 or ASTM A490 high-strength bolts installed so as to develop the minimum required bolt tension specified in Table A.

19 (b) Bolted Parts:

All material within the grip of the bolt shall be steel, there shall be no compressible material, such as gaskets or insulation, within the grip. Bolted steel shall fit solidly together after the bolts are tensioned. The slope of the surfaces of parts in contact with the bolt head or nut shall not exceed 1:20 with respect to a plane normal to the bolt axis. The length of the bolts shall be such that the end of the bolt will be flush with or outside of the face of the nut when properly installed.

19 (c) Surface Conditions:

At the time of assembly, all joint surfaces, including surfaces adjacent to the bolt head and nut, shall be free of scale, except tight mill scale, and shall be free of dirt or other foreign material. Burrs that would prevent solid seating of the connected parts in the snug tight condition shall be removed.

Paint is permitted on the faying surface, including slip critical joints, when shown on the plans. The faying surfaces of slip-critical connections shall meet the requirements of the following paragraphs, as applicable:

(1) In joints specified to have un-coated faying surfaces, any paint, including any inadvertent over spray, shall be excluded from areas closer than one bolt diameter, but not less than one inch, from the edge of any hole and all areas within the bolt pattern.

(2) Joints specified to have painted faying surfaces shall be blast cleaned and coated in accordance with Article 6.03.03 - Construction Methods.

(3) Joints with coated faying surfaces shall not be assembled before the coating has cured for the minimum time used in the qualifying test.

(4) Faying surfaces specified to be galvanized shall be hot-dip galvanized in accordance with ASTM A123, and shall subsequently be roughened by means of hand wire brushing. Power wire brushing is not permitted.

19 (d) Installation:

(1) General: A "fastener assembly" is defined as a bolt, a nut, and a washer. Only complete fastener assemblies of appropriately assigned lot numbers shall be installed. Fastener assemblies shall be stored in an area protected from dirt and moisture. Only as many fastener assemblies as are anticipated to be installed and tensioned during a work shift shall be taken from protected storage. Fastener assemblies not used shall be returned to protected storage at the end of the shift. Fastener assemblies shall not be cleaned of lubricant that is required to be present in as-delivered condition. Fastener assemblies which accumulate rust or dirt resulting from site conditions shall be cleaned, relubricated and tested for rotational-capaTown prior to installation. All galvanized nuts shall be lubricated with a lubricant containing a visible dye. Plain bolts must be oily to touch when delivered and installed. Lubricant shall be removed prior to painting.

A bolt tension measuring device (a Skidmore-Wilhelm calibrator or other acceptable bolt tension indicating device) shall be provided by the Contractor at all locations where high-strength fasteners are being installed and tensioned. The tension measuring device shall be used to perform the rotational-capaTown test and to confirm (1) the suitability of the fastener assembly to satisfy the requirements of Table A, including lubrication if required, (2) calibration of the wrenches, if applicable, and (3) the understanding and proper use by the bolting crew of the method of tensioning to be used.

To perform the calibrated wrench verification test for short grip bolts, direct tension indicators (DTI) with solid plates may be used in lieu of a tension measuring device. The DTI lot shall be first verified with a longer grip bolt in the tension measuring device. The frequency of confirmation testing, the number of tests to be performed and the test procedure shall be as specified in Subarticles 19(e) through 19(g), as applicable. The accuracy of the tension measuring device shall be confirmed by an approved testing agency at least annually.

Complete fastener assemblies with washers of size and quality specified, located as required below, shall be installed in properly aligned holes then tensioned and inspected by any of the methods described in Subarticles 19(e) through 19(g) to at least the minimum tension specified in Table A. Tensioning may be done by turning the bolt while the nut is prevented from rotating when it is impractical to turn the nut. Impact wrenches, if used, shall be of adequate capaTown and sufficiently supplied with air to perform the required tensioning of each bolt in approximately 10 seconds.

Bolts shall be installed in all holes of the connection and brought to a snug condition. Snug is defined as having all the plies of the joint in firm contact. Bolt torquing to develop a snug condition shall progress systematically from the most rigid part of the connection to the free edges. The bolts of the connection shall then be retorqued in a similar manner as necessary until the connection is snug.

Nuts shall be located, whenever practical, on the side of the connection which will not be visible from the traveled way.

ASTM A490 fasteners and galvanized ASTM A325 fasteners shall not be reused. Other ASTM A325 bolts may be reused if approved by the Engineer. Touching up or retorquing previously tensioned bolts which may have been loosened by the tensioning of adjacent bolts shall not be considered as reuse provided the retorquing (snugging up) continues from the initial position and does not require greater rotation, including the tolerance, than that required by Table B.

(2) Rotational-CapaTown Tests: Rotational-capaTown tests are required and shall be performed at the location where the fasteners are installed and tensioned for all fastener assemblies. The following shall apply:

(a) Except as modified herein, the rotational capaTown test shall be performed in accordance with the requirements of ASTM A325.

(b) Each combination of bolt production lot, nut lot and washer lot shall be tested as an assembly.

(c) A rotational-capaTown lot number shall have been assigned to each combination of lots tested.

(d) The minimum frequency of testing shall be two assemblies per rotational-capaTown lot.

(e) For bolts that are long enough to fit in a Skidmore-Wilhelm Calibrator, the bolt, nut and washer assembly shall be assembled in a Skidmore-Wilhelm Calibrator or an acceptable equivalent device.

(f) Bolts that are too short to test in a Skidmore-Wilhelm Calibrator may be tested in a steel joint. The tension requirement of Section (g) need not apply. The maximum torque requirement, torque $\leq$ 0.25 PD, shall be computed using a value of P equal to the turn test tension (1.15 times the fastener tension in Table A).

(g) The tension reached at the rotation below (turn test tension) shall be equal to or greater than 1.15 times the required fastener tension (installation tension) shown in Table A.

(h) The minimum rotation, from an initial tension of 10% of the "Minimum Required Tension" listed in Table A, shall be two times the required number of turns indicated in Table B in a Skidmore-Wilhelm Calibrator or an equivalent device without stripping or failure.

(i) After the required installation tension listed above has been exceeded, one reading of tension and torque shall be taken and recorded. The torque value shall conform to the following:

Torque $\leq$ 0.25 PD

Where: Torque = measured torque (foot-pounds)
P = measured bolt tension (pounds)
D = bolt diameter (feet).

(3) Washer Requirements: All bolts shall have a hardened washer under the turned element (nut or bolt head), irrespective of the tension inspection method.

Where the outer face of the bolted parts has a slope greater than 1:20 with respect to a plane normal to the bolt axis, a hardened beveled washer shall be used to compensate for the lack of parallelism. Hardened beveled washers for American Standard Beams and Channels shall be square or rectangular, taper in thickness and conform to the requirements of ASTM F436.

Where necessary, washers may be clipped on one side to a point not closer than 7/8 of the bolt diameter from the center of the washer. Circular and beveled washers, when used adjacent to direct tension indicator washers shall not be clipped. Direct tension indicator washers shall not be clipped.

Additionally, hardened washers shall be placed in connections as follows:

- Hardened washers shall be used under both the head and the nut when ASTM A490 bolts are to be installed in material having a specified yield point less than 40 ksi.

- Where ASTM A325 bolts of any diameter or ASTM A490 bolts equal to or less than one inch in diameter are to be installed in oversize or short-slotted holes in an outer ply, a hardened washer conforming to ASTM F436 shall be used.

- When ASTM A490 bolts over one inch in diameter are to be installed in an oversize or short-slotted hole in an outer ply, hardened washers conforming to ASTM F436 except with 5/l6-inch minimum thickness shall be used under both the head and the nut in lieu of standard thickness hardened washers. Multiple hardened washers with combined thickness equal to or greater than 5/16-inch do not satisfy this requirement.

- Where ASTM A325 bolts of any diameter or ASTM A490 bolts equal to or less than one inch in diameter are to be installed in a long slotted hole in an outer ply, a plate washer or continuous bar of at least 5/16-inch thickness with standard holes shall be provided. These washers or bars shall have a size sufficient to completely cover the slot after installation and shall be of structural grade material, but need not be hardened, except as follows. When ASTM A490 bolts over one inch in diameter are to be used in long slotted holes in external plies, a single hardened washer conforming to ASTM F436 but with 5/16-inch minimum thickness shall be used in lieu of washers or bars of structural grade material. Multiple hardened washers with combined thickness equal to or greater than 5/16-inch do not satisfy this requirement.

19 (e) Turn-of-Nut Inspection Method:

Verification testing using a representative sample of not less than three complete fastener assemblies of each diameter, length and grade to be used in the work shall be performed at the start of work in a device capable of indicating bolt tension. This verification test shall demonstrate that the method used to develop bolt tensions necessary to snug the condition and controlling the turns subsequently applied by the bolting crew develops a tension not less than five percent greater than the tension required by Table A. Periodic retesting shall be performed when ordered by the Engineer.

After snugging the connection, the applicable amount of rotation specified in Table B shall be achieved. During the torquing operation there shall be no rotation of the part not turned by the wrench. Torquing shall progress systematically from the most rigid part of the joint to its free edges.

19 (f) Calibrated Wrench Inspection Method:

Calibrated wrench inspection may be used only when wrenched are calibrated on a daily basis. Standard torques determined from tables or from formulas which are assumed to relate torque to tension shall not be acceptable.

When calibrated wrenches are used for installation, they shall be set to deliver a torque which has been calibrated to produce a tension not less than 5 percent in excess of the minimum tension specified in Table A. The installation procedures shall be calibrated by verification testing at least once each working day for each bolt diameter, length and grade using fastener assemblies that are being installed in the work. This verification testing shall be accomplished in a device capable of indicating actual bolt tension by tensioning three complete fastener assemblies of each diameter, length and grade from those being installed with a hardened washer under the element turned.

Wrenches shall be recalibrated when significant difference is noted in the surface condition of the bolts, threads, nuts or washers. It shall be verified during actual installation in the assembled steel work that the wrench adjustment selected by the calibration does not produce a nut or bolt head rotation from snug greater than that permitted in Table B. If manual torque wrenches are used, nuts shall be turned in the tensioning direction when torque is measured.

When calibrated wrenches are used to install and tension bolts in a connection, bolts shall be installed with hardened washers under the element turned to tension the bolts. Once the connection has been snugged, the bolts shall be torqued using the calibrated wrench. Torquing shall progress systematically from the most rigid part of the joint to its free edges. The wrench shall be returned to "touch up" previously torqued bolts which may have been relaxed as a result of the subsequent torquing of adjacent bolts until all bolts are torqued to the prescribed amount.

19 (g) Direct Tension Indicator Inspection Method:

When Direct Tension Indicators (DTI) meeting the requirements of Subarticle M.06.02-5.1 is to be used with high-strength bolts to indicate bolt tension, they shall be subjected to the verification testing described in Subarticle 19(g)(1) and installed in accordance with the method specified in Subarticle 19(g)(2). Unless otherwise approved by the Engineer, the DTI shall be installed under the head of the bolt and the fastener assembly torqued by turning the nut. The manufacturer's

recommendations shall be followed for the proper orientation of the DTI and additional washers, if any, required for the correct use of the DTI.

(1) Verification - Verification testing shall be performed in a calibrated bolt tension measuring device. A special flat insert shall be used in place of the normal bolt head holding insert. Three verification tests are required for each combination of fastener rotational-capaTown lot, DTI lot, and DTI position relative to the turned element (bolt head or nut) to be used on the project. The fastener shall be torqued by turning the element not against the DTI. The element (bolt head or nut) against the DTI shall be prevented from rotating. The purpose of the verification testing is to ensure that the fastener will be at or above the desired installation tension when half or more of the spaces in the DTI have a gap less than 0.005 inches and that the fastener will not undergo excessive plastic deformation at the minimum gap allowed on the project.

The verification tests shall be conducted in two stages. The bolt, nut and DTI assembly shall be installed in a manner so that at least three and preferably not more than five threads are located between the bearing face of the nut and the bolt head. The bolt shall be tensioned first to the load equal to that listed in Table C under "Verification Tension" for the grade and diameter of bolt. If an impact wrench is used, the tension developed shall be no more than two thirds the required tension. Subsequently a manual wrench shall be used to attain the required tension. Determine and record the number of refusals of a 0.005 inch tapered feeler gage in the spaces between the protrusions. The number of refusals shall not exceed the number listed under "Maximum Verification Refusals" in Table C for the grade and diameter of bolt used. The maximum number of refusals for coated DTIs (galvanized, painted or epoxy coated), when used under the turned element shall be no more than the number of spaces on the DTI less one. The DTI lot is rejected if the number of refusals exceeds the values in the table or, for coated DTIs if the gage is refused in all spaces.

After the number of refusals is recorded at the verification load, the turned element shall be further torqued until the 0.005 inch feeler gage is refused at all the spaces and a visible gap exists in at least one space. The load at this condition shall be recorded and the bolt removed from the tension measuring device. The nut must be able to be turned down the bolt by hand for the complete thread length of the bolt excluding thread runout. If the nut cannot be rundown for this thread length, the DTI lot shall be rejected unless the load recorded is less than 95% of the average load measured in the rotational capaTown test for the fastener lot as specified in Subarticle 19(d)(2)(g).

If the bolt is too short to be tested in the calibration device, the DTI lot shall be verified on a long bolt in a calibrator to determine the number of refusals at the "Verification Tension" listed in Table C. The number of refusals shall not exceed the values listed under "Maximum Verification Refusals" in Table C. Another DTI from the same lot shall then be assembled with the short bolt in a convenient hole in the work. The bolt shall be tensioned until the 0.005 inch feeler gage is refused in all spaces and a visible gap exists in at least one space. The fastener shall then be disassembled. Subsequently, the nut shall be able to be rundown by hand for the complete thread length of the bolt excluding thread runout. The DTI lot shall be rejected if the nut cannot be rundown for this thread length.

(2) Installation - Installation of fasteners using DTIs shall be performed in two stages. The element against the DTI shall be held against rotation during each stage of the installation. The connection shall be first snugged with bolts installed in all the holes of the connection and tensioned sufficiently to bring all the plies of the connection into firm contact. The number of spaces in which a 0.005 inch feeler gage is refused in the DTI after snugging shall not exceed those listed under "Maximum Verification Refusals" in Table C. If the number exceeds the values in the table, the fastener assembly shall be removed and another DTI installed followed by retensioning to snug the connection.

The bolts shall be further tensioned until the number of refusals of the 0.005 inch feeler gage is equal to or greater than the number listed under "Minimum Installation Refusals" in Table C. If the fastener is tensioned so that no visible gap in any space remains, the bolt and DTI shall be removed, and replaced by a new properly tensioned bolt and DTI.

19 (h) Inspection:

(1) The Contractor shall provide all the material, equipment, tools and labor necessary for the inspection, including access, of the bolted parts and fasteners both before and after the fasteners are installed and tensioned.

The Engineer shall determine that the requirements of Subarticles 19(h)(2) and 19(h)(3), following, are met in the work.

(2) Before the installation of fasteners in the work, the Engineer shall check the marking, surface condition and storage of fastener assemblies and the faying surfaces of joints for compliance with the requirements of Subarticles M.06.02-5, 19(a) and 19(d)(1). He shall observe calibration and/or testing procedures required in Subarticles 19(e) through 19(g) as applicable, to confirm that the selected procedure is properly used and that, when so used with the fastener assemblies supplied, the tensions specified in Table A are provided. He shall monitor the installation of fasteners in the work to assure that the selected procedure, as demonstrated in the initial testing to provide the specified tension, is routinely properly applied.

(3) Either the Engineer or the Contractor, in the presence of the Engineer at the Engineer's option, shall inspect the tensioned bolts using an inspection torque wrench, unless alternate fasteners or direct tension indicator devices are used, allowing verification by other methods. Inspection tests should be within 24 hours of bolt tensioning to prevent possible loss of lubrication or corrosion influence on tensioning torque.

Three bolts of the same grade, size, and condition as those under inspection shall be placed individually in a device calibrated to measure bolt tension. This calibration operation shall be done at least once each inspection day. There shall be a washer under the part turned in torquing each bolt. In the calibrated device, each bolt shall be tightened by any convenient means to the specified tension. The inspecting wrench shall then be applied to the tensioned bolt to determine the torque required to turn the nut or head five degrees in the tightening direction. The average of the torque required for all three bolts shall be taken as the job-inspection torque.

Ten percent (at least two) of the tensioned bolts on the structure represented by the test bolts shall be selected at random in each connection. The job-inspection torque shall then be applied to each with the inspecting wrench turned in the tightening direction. If this torque turns no bolt head or nut, the bolts in the connection shall be considered to be properly tensioned. But if the torque turns one or more bolt heads or nuts, the job-inspection torque shall then be applied to all bolts in the connection. Any bolt whose head or nut turns at this stage shall be retorqued and reinspected. The Contractor may, however, retension all the bolts in the connection and resubmit it for inspection, so long as bolts are not over tensioned or damaged by this action.

TABLE A
Minimum Bolt Tension in kips*

Bolt Size (Inches)	ASTM A325	ASTM A490
5/8	19	24
¾	28	35
7/8	39	49
1	51	64
11/8	56	80
1¼	71	102
13/8	85	121
1½	103	148

* Equal to 70% of specified minimum tensile strength of bolts (as specified in ASTM Specifications for tests of full-size A325 and A490 bolts with UNC threads, loaded in axial tension) rounded to the nearest kip.

TABLE C

Bolt Dia. (in.)	Verification Tension		Maximum Verification Refusals		DTI Spaces		Minimum Installation Refusals	
	A325	A490	325	490	325	490	325	490
5/8	20	25	1	2	4	5	2	3
¾	29	37	2	2	5	6	3	3
7/8	41	51	2	2	5	6	3	3
1	54	67	2	3	6	7	3	4
1 1/8	59	84	2	3	6	7	3	4
1¼	75	107	3	3	7	8	4	4
1 3/8	89	127	3	3	7	8	4	4
1½	108	155	3	4	8	9	4	5

TABLE B
Nut Rotation from the Snug Condition
Geometry[a,b] of Outer Faces of Bolted Parts

Bolt Length (measured from underside of head to end of bolt)	Both Faces Normal to Bolt Axis	One Face Normal to Bolt Axis and Other Face Sloped Not More Than 1:20, Bevel Washer Not Used	Both Faces Sloped Not More Than 1:20 From Normal to Bolt Axis, Bevel Washer Not Used
Up to and including 4 diameters	1/3 turn	1/2 turn	2/3 turn
Over 4 diameters but not exceeding 8 diameters	1/2 turn	2/3 turn	5/6 turn
Over 8 diameters but not exceeding 12 diameters	2/3 turn	5/6 turn	1 turn

(a) Nut rotation, as used in Table B, shall be taken as relative to the bolt, regardless of the element (nut or bolt) being turned. For bolts installed by 1/2 turn and less, the tolerance should be plus or minus 30 degrees; for bolts installed by 2/3 turn and more, the tolerance should be plus or minus 45 degrees.

To determine the nut rotation for installation and inspection of the fasteners, the nut and the end of the bolt or the head of the bolt and the adjacent steel shall be match marked.

(b) The values, given in Table B, shall be applicable only to connections in which all material within grip of the bolt is steel.

(c) No research work has been performed by the Research Council Riveted and Bolted Structural Joints to establish the turn-of-nut procedure when bolt lengths exceed 12 diameters. For situations in which the bolt length, measured from the underside of the head to the end of the bolt, exceeds 12 diameters, the required rotation shall be determined by actual tests in a suitable tension device simulating the actual conditions.

SECTION M.06 – METALS

Work under this item shall conform to the requirements of Section M.06 amended as follows:

Subarticle M.06.02-5 - High Strength Bolts: Delete the entire subarticle and replace it with the following:

5 - High Strength Bolts:

High strength bolts, including suitable nuts and hardened washers, shall conform to the requirements of the appropriate ASTM specifications as amended and revised herein.

5 (a) Bolts, Nuts, Washers and Load Indicator Devices:

High strength bolts shall conform to ASTM A325M or ASTM A490M as shown on the plans. When high-strength bolts are used with coated steel, the bolts shall be mechanically galvanized. When high-strength bolts are used with uncoated weathering grades of steel, the bolts shall be Type 3.

Nuts for ASTM A325M bolts shall conform to ASTM A563M, Property Class 8S, 8S3, 10S or 10S3. Where galvanized high-strength bolts are used, the nuts shall be galvanized, Property Class 10S. Where Type 3 high-strength bolts are used, the nuts shall be Property Class 8S3 or 10S3.

Nuts for ASTM A490M bolts shall conform to the requirements of ASTM A563M, Property Class 10S or 10S3. Where Type 3 high-strength bolts are used, the nuts shall be Property Class 10S3.

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 conform to ASTM F436M. 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 conform to ASTM F959M. Where galvanized high-strength bolts are used, the washers shall be galvanized in accordance with ASTM B695, Class 50. Where Type 3 high-strength bolts are used, the washers shall be galvanized in accordance with ASTM B695, Class 50 and coated with epoxy.

5 (b) Identifying Marks:

ASTM A325M for bolts and the specifications reference 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. Head markings must identify the grade by the symbol "A325M", the manufacturer and the type, if Type 3. Nut markings must identify the property class, the manufacturer and if Type 3, the type. Markings on direct tension indicators must identify the manufacturer and type "8.8". Other washer markings must identify the manufacturer and if Type 3, the type.

ASTM A490M for bolts and the specifications reference 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. Head markings must identify the grade by the symbol "A490M", the manufacturer and the type, if Type 2 or 3. Nut markings must identify the property class, the manufacturer and if Type 3, the type. Markings on direct tension indicators must identify the manufacturer and type "10.9". Other washer markings must identify the manufacturer and if Type 3, the type.

5 (c) Dimensions:

Bolt dimensions shall conform to the requirements for Metric Heavy Hexagon Structural Bolts and for Metric Heavy Semi-Finished Hexagon Nuts given in ANSI Standard B18.2.3.7M and B18.2.4.6M, respectively.

5 (d) Galvanized High Strength Bolts:

Galvanized bolts shall conform to ASTM A325M, Type 1 and shall be mechanically galvanized in accordance with ASTM B695, Class 50. 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 A490M bolts shall not be galvanized.

5 (e) Test Requirements:

The hardness of A325M bolts shall be as follows:

Brinell - Min. 248; Max. 311
Rockwell C - Min. 24; Max. 33

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 8.3 of ASTM A325M. Galvanized bolts shall be wedge tested after galvanizing. Proof load tests of ASTM A563M 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 job site. The testing procedure is described in the special provision "Section 6.03 - Structural Steel".

Bolts, nuts and washers from each rotational-capacity lot shall be shipped in the same container. If there is only one production lot number for each size of nut and washer, the nuts and washers may be shipped in separate containers. Each container shall be permanently marked with the rotational-capacity lot number such that identification will be possible at any stage prior to installation. Assemblies of bolts, nuts and washers shall be installed from the same rotational-capacity lot.

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.

5 (f) Certified Test Reports and Materials Certificates

The Contractor shall submit notarized copies of Certified Test Reports and Materials Certificates in conformance with Article 1.06.07 for bolts, nuts and washers. The Certified Test Reports and Materials Certificates shall include the following:

a. Mill test reports shall indicate the place where the material was melted and manufactured.

b. 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.

c. The test report for galvanized components shall indicate the thickness of the galvanizing.

SECTION 9.49 – FURNISHING, PLANTING AND MULCHING TREES, SHRUBS, VINES AND GROUND COVER PLANTS

Amend this section as follows:

Article 9.49.01 – Description: *Add the following:*

Work under these items shall also include furnishing, planting, and mulching trees, shrubs and herbaceous stock of the type and size indicated in the planting schedule and planting plan.

Article 9.49.05 – Basis of Payment: *Add the following:*

No compensation shall be paid for replacement plants required within one year of planting, as determined by the Engineer after inspection of the first year of growth and survival.

SECTION 12.00 – GENERAL CLAUSES FOR HIGHWAY SIGNING

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

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

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

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

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

DATA LABELS

NON REFLECTIVE, WEATHERPROOF FILM
BLACK COPY, YELLOW BACKGROUND

CONN DOT
SIGN FACE DATA LABEL

Fabricator: (Insert NAME or State)
Sheeting Manufacturer - Type
(Insert NAME - TYPE)

Date Fabricated - Month / Year

J	F	M	A	M	J	J	A	S	O	N	D
11	12	13	14	15	16	17	18	19	20	21	22

CONN DOT
SIGN FACE DATA LABEL

Installed By
Project No: (Insert 000-0000 or State)
Permit No: (Insert D_-000000)

Date Installed - Month / Year

J	F	M	A	M	J	J	A	S	O	N	D
11	12	13	14	15	16	17	18	19	20	21	22

Data Labels To Be 5 Inch By 3 inch Each, With Face Designs As Shown Above.
All Copy Ink Must Be Durable And Not Fade, Discolor or Smudge.
All Variable Legends To Be Included At Label Fabrication.
Only One "Installed By" Permit or Project Number, Should Be Provided
Sign Fabrication and / or Installation by State Forces, Insert "State"
The Month And Year Of Fabrication And Installation;
May Be Punched Or Marked Out.

The Back Of The Data Label Must Contain A Precoated
Pressure-Sensitive Adhesive Covered By A Removable Liner.
At Application, The Liner Must Be Removable Without Soaking In
Water Or Other Solvents.
The Adhesive Must Form A Durable Bond To Surfaces That Are
Smooth, Clean, Corrosion-Free and Weather Resistant.

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

SECTION 12.08 - SIGN FACE-SHEET ALUMINUM

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

General: Delete all references to parapet mounted sign supports.

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

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

SECTION M.04 - BITUMINOUS CONCRETE

M.04.01—Bituminous Concrete Materials and Facilities
M.04.02—Mix Design and Job Mix Formula (JMF)
M.04.03—Production Quality Control (QC) Testing and Control of Mixture

M.04.01—Bituminous Concrete Materials and Facilities: Each source of material, and facility used to produce and test bituminous concrete (HMA) must be qualified on an annual basis by the Engineer. The basis of approval for plant machinery, material processing & controls, and field laboratory requirements are available from the Engineer. Test Procedures and Specifications referenced herein are in accordance with the latest AASHTO and ASTM Standard Test Procedures and Specifications. Such references when noted with an (M) have been modified by the Engineer and are detailed in Table M.04.03-6.

The Contractor shall submit to the Engineer all sources of coarse aggregate, fine aggregate, mineral filler and PG binder. The Contractor shall submit a Material Safety Data Sheet (MSDS) for each grade of binder to be used on the Project. The Contractor shall not change material sources without prior approval of the Engineer.

An adequate quantity of each size aggregate, mineral filler and bitumen shall be maintained at the HMA plant site at all times while the plant is in operation to ensure that the plant can consistently produce bituminous concrete mixtures that meet the job mix formula (JMF) as specified in Article M.04.02. The quantity of such material shall be reviewed by the Engineer on an individual plant basis and is dependent upon the plant's daily production capacity, but shall never be less than one day's production capacity. Less than one day's production capacity may be cause for the job mix formula to be rejected.

1. Coarse Aggregate:

a. Requirements: The coarse aggregate shall consist of clean, hard, tough, durable fragments of crushed stone or crushed gravel of uniform quality. Aggregates from multiple sources of supply must not be mixed or stored in the same stockpile.

b. Basis of Approval: The request for approval of the source of supply shall include a washed sieve analysis in accordance with AASHTO T 27. The Gsa, Gsb, and Pw_a shall be determined in accordance with AASHTO T 85. The coarse aggregate must not contain more than 1% crusher dust, sand, soft disintegrated pieces, mud, dirt, organic and other injurious materials. When tested for abrasion using AASHTO T 96, the aggregate loss must not exceed 40%. When tested for soundness using AASHTO T 104 with a magnesium sulfate solution, the coarse aggregate must not have a loss exceeding 10% at the end of 5 cycles.

For HMA mixtures, materials shall also meet the coarse aggregate angularity criteria as specified in Tables M.04.02-2 thru M.04.02-4 for blended aggregates retained on the #4 sieve when tested according to ASTM D 5821. The amount of aggregate particles of the

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

2. Fine Aggregate:

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

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

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

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

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

If Fine aggregate is tested by the CTDOT twice and does not meet above criteria.			
8	Pit/source Petrographic Analysis	C 295 (ASTM)	• Required to be performed by the Contractor at no expense to the Department. • Report assignable cause(s), corrective action taken to mitigate source and written request for resample. • If fine aggregate fails upon retest, Contractor may be permitted to request trial use on roadway for evaluation using the subject fine aggregate in HMA, to be monitored for no more than 48 months. • Evaluation location(s); mix size & level; terms and costs related to this application; determination of performance, and approval will be established at the sole discretion of the Engineer.

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

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

The Contractor will be notified by the Engineer if any qualified source of supply fails any portion of Table M.04.01-1. One retest will be allowed for the Contractor to make corrections and/or changes to the process. If, upon retest, the material fails again, the use of the material will not be permitted without additional testing.

The Contractor may solicit additional testing by a third party acceptable to the Engineer to perform a Petrographic analysis (ASTM C 295), at its expense. The Contractor shall submit the results of the analysis with recommended changes to the manufacturing process to the Engineer. The Contractor shall submit fine aggregate samples for testing by the Engineer after the recommended changes have been made.

Upon review of the Petrographic analysis report and identified items that were corrected, the source may be re-sampled and tested by the Engineer.

c. The Contractor may request that the use of such material not meeting the requirements be considered on select project(s) for certain applications. HMA pavement incorporating such material will be monitored and evaluated for a period not to exceed 48 months, at the direction of the Department and at the expense of the Contractor. Terms of any evaluation and suitable application will be predetermined by the Engineer.

If the Engineer determines, upon evaluation, that the fine aggregate performance is adequate and not harmful to the pavement's serviceability, the Department may approve the material for use in HMA mixtures in similar applications.

3. Mineral Filler:

a. Requirements: Mineral filler shall consist of finely divided mineral matter such as rock dust, including limestone dust, slag dust, hydrated lime, hydraulic cement, or other accepted mineral matter. At the time of use it shall be freely flowing and devoid of agglomerations. Mineral Filler shall be introduced and controlled at all times during production in a manner acceptable to the Engineer.

b. Basis of Approval: The request for approval of the source of supply shall include the location, manufacturing process, handling and storage methods for the material. Mineral filler shall conform to the requirements of AASHTO M-17

4. Liquid Bituminous Materials:

a. Performance grade (PG) binder Requirements:

i. Binders shall contain uniformly mixed and blended liquid bituminous materials that are free of contaminants such as fuel oils and other solvents. Such binders shall be properly heated and stored to prevent damage or separation. A PG binder shall be classified by the supplier as a "Neat" binder for each lot and be so labeled on each bill of lading. Neat PG binders shall be asphalts free from modification with: fillers, extenders, reinforcing agents, adhesion promoters, thermoplastic polymers, acid modification and other additives, and shall indicate such information on each bill of lading and certified test report.

ii. The blending at mixing plants of PG binder from different suppliers is strictly prohibited. Contractors who blend PG binders will be classified as a supplier and will be required to certify the binder in accordance with AASHTO R-26(M). The asphalt binder shall be Performance Grade 64-22 Neat asphalt. The binder shall meet the requirements of AASHTO M-320(M) and AASHTO R-29(M). The Contractor shall submit a Certified Test Report and bill of lading representing each delivery in

accordance with AASHTO R-26(M). The Certified Test Report must also indicate the binder specific gravity at 77°F; rotational viscosity at 275°F and 329°F and the mixing and compaction viscosity-temperature chart for each shipment.

iii. The Contractor shall submit the name(s) of personnel responsible for receipt, inspection, and record keeping of PG binder materials. Contractor plant personnel shall document specific storage tank(s) where binder will be transferred and stored until used, and provide binder samples to the Engineer upon request. The person(s) shall assure that each shipment (tanker truck) is accompanied by a statement certifying that the transport vehicle was inspected before loading and was found acceptable for the material shipped and that the binder will be free of contamination from any residual material, along with two (2) copies of the bill of lading.

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

b. Cut-backs (medium cure type)

i. Requirements: The liquid petroleum materials shall be produced by fluxing an asphalt base with appropriate petroleum distillates to produce the grade specified.

ii. Basis of Approval: The request for approval of the source of supply shall be submitted at least seven days prior to its use listing the location where the materials will be produced, and manufacturing, processing, handling and storage methods. The Contractor shall submit a Certified Test Report in accordance with Section 1.06 and a Material Safety Data Sheet (MSDS) for the grade to be used on the Project. The liquid asphalt shall be MC-250 conforming to AASHTO M-82.

c. Emulsions

i. Requirements: The emulsified asphalt shall be homogeneous and not be used if exposed to freezing temperatures.

ii. Basis of Approval**:** The request for approval of the source of supply must include the location where the materials will be produced, and manufacturing, processing, handling and storage methods.

1. Emulsified asphalts shall conform to the requirements of AASHTO M-140. Materials used for tack coat shall not be diluted and meet grade RS-1. When ambient temperatures are 80˚F and rising, grade SS-1 or SS-lh may be substituted if accepted by the Engineer. Each shipment shall be accompanied with a Certified Test Report listing Saybolt viscosity, residue by evaporation, penetration of residue, and weight per gallon.

2. Cationic emulsified asphalt shall conform to the requirements of AASHTO M-208(M). Materials used for tack coat shall not be diluted and meet grade CRS-1. The settlement and demulsibility test will not be performed unless deemed necessary by the Engineer. When ambient temperatures are 80˚F and rising, grade CSS-1 or CSS-lh may be substituted if accepted by the Engineer. Each shipment shall be accompanied with a Certified Test Report listing Saybolt viscosity, residue by evaporation, penetration of residue, and weight per gallon.

5. Reclaimed Asphalt Pavement (RAP):

a. Requirements: RAP shall consist of asphalt pavement constructed with asphalt and aggregate reclaimed by cold milling or other removal techniques approved by the Engineer. For bituminous mixtures containing RAP, the Contractor shall submit a JMF in accordance with Article M.04.02 to the Engineer for review.

b. Basis of Approval: The RAP material will be accepted on the basis of one of the following criteria:

i. When the source of all RAP material is from pavements previously constructed on Department projects, the Contractor shall provide a materials certificate listing the detailed locations and lengths of those pavements and that the RAP is only from those locations listed.

ii. When the RAP material source or quality is not known, the Contractor shall test the material and provide the following information along with a request for approval to the Engineer at least 30 calendar days prior to the start of the paving operation. The request shall include a material certificate stating that the RAP consists of aggregates that meet the specification requirements of subarticles M.04.01-1 through 3 and that the binder in the RAP is substantially free of solvents, tars and other contaminants. The Contractor is prohibited from using unapproved material on Department projects and shall take necessary action to prevent contamination of approved RAP stockpiles. Stockpiles of unapproved material shall remain separate from all other RAP materials at all times. The request for approval shall include the following:

1. A 50-pound sample of the RAP to be incorporated into the recycled mixture.
2. A 25-pound sample of the extracted aggregate from the RAP.
3. After recovery of binder from the RAP by AASHTO T 170(M), the viscosity test results shall be reported when tested at 140°F by AASHTO T 202 or T 316.
4. A statement that RAP material has been crushed to 100% passing the ½ inch sieve and remains free from contaminants such as joint compound, wood, plastic, and metals.

6. Crushed Recycled Container Glass (CRCG):

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

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

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

7. Joint Seal Material:

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

8. Plant production requirements

a. Storage Silos:

i. The Contractor may use silos for short-term storage of Superpave mixtures with prior notification and approval of the Engineer. A silo must have heated cones and an unheated silo cylinder if it does not contain a separate internal heating system. Prior approval must be obtained for storage times greater than those indicated. When multiple silos are filled, the Contractor shall discharge one silo at a time. Simultaneous discharge of multiple silos is not permitted.

Type of silo cylinder	Maximum storage time for all classes (hr)
Open Surge	4
Unheated – Non-insulated	8
Unheated – Insulated	18
Heated – No inert gas	To be determined by the Engineer

ii. For all classes of mixture sampled from hauling vehicles at the plant after storage in silos (virgin or mixture containing RAP) except 5, 5A, and 5B, the binder properties of the recovered asphalt shall meet the PG binder grade specified when recovered by AASHTO T 170(M) and tested in accordance with AASHTO R-29 and M-320(M).

iii. If mixture coming out of a silo continuously does not meet the requirements of M.04.03, or the binder does not meet the PG requirements, the Engineer shall deem that silo unacceptable for use.

b. Aggregates: The Contractor shall ensure that aggregate stockpiles are managed to provide uniform gradation and particle shape, prevent segregation and cross contamination in a manner acceptable to the Engineer. For drum plants only, the Contractor shall determine the percent moisture content a minimum of twice daily, prior to production and half way through production. The Contractor shall perform cold feed gradation analysis (AASHTO T 27(M) & T 11) for each component aggregate to ensure values remain

within the tolerances stated in Table M.04.02 when compared to the latest JMF for that class.

c. Mixture: The dry and wet mix times shall be sufficient to provide proper coating (minimum 95% as determined by AASHTO T 195(M)) of all particles with bitumen and produce a uniform mixture. The Contractor shall make necessary adjustments to ensure bituminous concrete mixtures are free from moisture throughout. The Contractor shall make necessary adjustments to ensure all types of bituminous concrete mixtures contain no more than 0.5% moisture throughout when tested in accordance with AASHTO T 329.

d. RAP: The Contractor shall indicate the percent of RAP, the moisture content (as a minimum, determined twice daily – prior to production and halfway through production), and the net dry weight of RAP added to the mixture on each truck ticket. For each day of production, the production shall conform to the job mix formula and RAP percentage and no change shall be made without the prior approval of the Engineer.

e. 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 truck ticket, as specified herein. Tolerance controls shall be automatically or manually adjustable to provide proportions within these tolerances for any batch size. The automatic proportioning system shall be capable of consistently delivering mixtures within these limits for the full range of batch sizes.

An asterisk (*) shall be automatically printed next to any individual batch weight(s) exceeding these tolerances. 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.

Each Aggregate Component:	±1.0 % total target batch weight
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

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

f. Field Laboratory:
The Contractor shall furnish the Engineer an acceptable field laboratory, to test bituminous mixtures during production and the Engineer shall have priority to use it for testing. The HMA plant production field laboratory shall have a minimum of 300 square feet, have a potable water source and drainage in accordance with the CT Department of Public Health Drinking Water Division, be equipped with all necessary testing equipment as well as with a PC, printer, and telephone with a dedicated hard-wired phone line. In addition, the PC shall have a high speed internet connection with a minimum upstream of 384 Kbps and a functioning web browser with unrestricted access to https://ctmail.ct.gov. This equipment shall be maintained in clean and good working order at all times and be made available for use by the Engineer.

The laboratory shall be equipped with a suitable heating system capable of maintaining a minimum temperature of 65°F. It shall be clean and free of all materials and equipment not associated with the laboratory. Windows shall be installed to provide sufficient light and ventilation. During summer months, the laboratory temperature shall not exceed ambient temperature. Light fixtures and outlets shall be installed at convenient locations, and a telephone shall be within audible range of the testing area. The laboratory shall be equipped with an adequate workbench that has a suitable length, width, and sampling tables, and be approved by the Engineer.

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

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

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

1. Marshall Method - Class 1, 2, 3, 4, 5, 5A, 5B and 12:

a. Requirements: When specified, the Marshall method shall be employed to develop a bituminous concrete mix design that includes a JMF consisting of target values for gradation and bitumen content for each class of bituminous concrete designated for the project in accordance with the latest Asphalt Institute's MS-2 manual. Each class of bituminous concrete must meet the requirements as shown in Table M.04.02-1.

b. Basis of Approval: The Contractor shall submit to the Engineer a request for approval of the JMF annually in accordance with one of the methods described herein. Prior to the start of any paving operations, the JMF and production percentage of bitumen must be accepted by the Engineer, and the Contractor must demonstrate the ability to meet the accepted JMF and production percentage of bitumen for each class of mixture. Additionally, the fraction of material retained between any two consecutive sieves shall not be less than 4%.

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

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

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

c. Marshall mixture (virgin): For bituminous concrete mixtures that contain no recycled material, the limits prescribed in Table M.04.02-1 govern. The Contractor shall submit to the Engineer for approval, a JMF with the individual fractions of the aggregate expressed as percentages of the total weight of the mix and the source(s) of all materials. The JMF shall indicate two bitumen contents; the JMF target percentage and a production percentage (actual amount added to mix) of bitumen for each mix class by total weight. For surface course Class 1, a 0.45 power gradation chart shall also be submitted on which is plotted the percentage passing each sieve. The JMF shall also indicate the target temperature of completed mixture as it is dumped from the mixer and tested in accordance with Article M.04.03.

d. Marshall mixtures with RAP: In addition to subarticles M.04.02 – 1a through c, RAP in bituminous concrete shall comply with requirements stated in Article M.04.01, and as stated herein. Upon approval of the Engineer, a maximum of 15% RAP may be used with no binder grade modification. RAP material shall not be used with any other recycling option.
The Contractor may increase the RAP percentage in 5% increments up to a maximum of 30% provided a new JMF is accepted by the Engineer. The following information shall be included in the JMF submittal:
- Gradation and asphalt content of the RAP.
- Percentage of RAP to be used.
- Virgin aggregate source(s).

- Total binder content based on total mixture weight.
- Production pull percentage of added virgin binder based on total mixture weight.
- Gradation of combined bituminous concrete mixture (including RAP).
- Grade of virgin added, if greater than 15% of total mix weight.

e. Marshall mixture with CRCG: In addition to subarticle M.04.02 – 1a through c, for bituminous concrete that contains CRCG, the Contractor shall submit a materials certificate to the Engineer stating that the mixture and its components comply with requirements stated in subarticle M.04.01 - (6). Additionally, 1% hydrated lime, or other accepted non-stripping agent, shall be added to all mixtures containing CRCG. CRCG material shall not be used with any other recycling option.

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

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

i. Class 5A mixture shall have 3/8 to ½ inch polypropylene fibers that have been approved by the Engineer added at a rate of 6 pounds per ton of mixture.

ii. Class 5B mixture shall have ¼ inch polyester fibers that have been approved by the Engineer added at the rate of 2 1/2 pounds per ton of mixture.

iii. Class 5 mixture shall not contain fibers.

b. Basis of Approval: The aggregates, fibers and binder (MC-250) shall meet the requirements as specified in subarticles M.04.01-1 through 4 and in Table M.04.02-1. The use of recycled material is not permitted with these classes of bituminous concrete. Mixtures not conforming to the binder content as shown in Table M.04.02-1 shall be subject to rejection. There is a two test minimum per day of production. Mixtures not conforming to the gradation as shown in Table M.04.02-1 shall be subject to payment adjustment as specified in Section 4.06.

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

Notes: (a) 75 blow (Marshall Criteria). (b) 3-6% when used for a roadway wearing surface. (c) For divided highways with 4 or more lanes, a stability of 1500 lbs is required. (d) Contains an accepted non-stripping compound. (e) To help prevent stripping, the mixed material will be stockpiled on a paved surface and at a height not greater than 4 feet during the first 48 hours. (f) As determined by AASHTO T 245(M). (g) The percent passing the #200 sieve shall not exceed the percentage of bituminous asphalt binder determined by AASHTO T 164(M) or AASHTO T 308(M). (h) Mixture with 5% or more aggregate retained on ¾" sieve. (i) Mixtures finer than condition (h) above. (j) Class 5 mixture shall contain no fibers. Class 5A mixture shall have 3/8 to ½ inch polypropylene fibers that have been previously accepted by the Engineer added at a minimum rate of 6 pounds per ton of mixture. Class 5B mixture shall have ¼ inch polyester fibers that have been previously accepted by the Engineer added at the minimum rate of 2 1/2 pounds per ton of mixture

CLASS	1	2	3	4	12	5 (e)(j)	5A (e)(j)	5B (e)(j)	JMF % Tol. (±)
Grade of PG Binder content %	PG 64-22 5.0 – 6.5	PG 64-22 5.0 – 8.0	PG 64-22 6.5 - 9.0	PG 64-22 4.0 - 6.0	PG 64-22 7.5 - 10.0	MC-250 (d) 6.0 - 7.5	MC-250 (d) 6.0 - 7.5	MC-250 (d) 6.0 - 7.5	0.4
Sieve Size	Percent Passing (%)								
# 200	3.0 – 8.0 (g)	3.0 – 8.0 (g)	3.0 – 8.0 (g)	0.0 – 5.0 (g)	3.0 – 10.0 (g)	0.0 - 2.5	0 .0- 2.5	0.0 - 2.5	2.0
# 50	6 – 26	8 – 26	10 - 30	5 - 18	10 - 40				4
# 30	10 - 32	16 - 36	20 - 40		20 - 60	2 - 15	2 – 15	2 - 15	5
# 8	28 - 50	40 - 64	40 - 70	20 - 40	60 - 95	10 - 45	10 – 45	10 - 45	6
# 4	40 - 65	55 - 80	65 - 87	30 - 55	80 - 95	40 - 100	40 – 100	40 - 100	7
¼"									
3/8 "	60 - 82	90 - 100	95 - 100	42 - 66	98 - 100	100	100	100	8
½ "	70 - 100	100	100		100				8
¾"	90 - 100			60 - 80					8
1"	100								
2"				100					
Additionally, the fraction of material retained between any two consecutive sieves shall not be less than 4%									
Mixture Temperature									
Binder	325°F maximum					140-185° F			
Aggregate	280-350° F					100-175° F			
Mixtures	265-325° F				275-325°F	120-175° F			25 °F
Mixture Properties									
VOIDS - %	3.0 – 6.0 (a)	2.0 – 5.0 (b)	0 – 4.0		0 - 5.0 (a)				
Stability (f) lbs. min.	1200 (c)	1000	1000		1000				
FLOW (f) in.	.08 - .15	.08 - .15	.08 - .18		.08 - .15				
VMA % - min.	15(h) :16 (i)								

GENERAL

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

a. Requirements: The Contractor or its representative shall design and submit Superpave mix designs annually for approval. The design laboratory developing the mixes shall be approved by the Engineer. The mix design shall contain the nominal maximum aggregate size and include a JMF consisting of target values for gradation and bitumen content for each HMA mix type designated for the project, as specified in Tables M.04.02-2 thru Table M.04.02-5 and in accordance with the latest requirements of AASHTO M 323(M) and AASHTO R 35(M).

The contractor shall provide a certified test report with supporting documentation from an accredited AASHTO Materials Reference Laboratory (AMRL) with the use of NETTCP Certified Technicians for aggregate consensus properties for each type & level, as specified in Table M.04.02-3. In addition the Gsa, Gsb, Pw_a shall also be provided for each component aggregate. New mixes shall be tested in accordance with AASHTO T 283(M) *Standard Method of Test for Resistance of Compacted Hot Mix Asphalt (HMA) to Moisture-Induced Damage.* The AASHTO T 283(M) test results and specimens shall be submitted by the Contractor for review. The tensile strength ratio must be greater than 80 percent, and the specimen shall not show more than minimal evidence of stripping as determined by the Engineer. The mix design shall conform to all criteria applicable to the selected traffic level equivalent single-axle loads (ESAL) as specified in this contract. Each HMA mix type must meet the requirements shown in Tables M.04.02-2 thru Table M.04.02-5.

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

Superpave Mixture (virgin): For HMA mixtures that contain no recycled material, the limits prescribed in Tables M.04.02-2 thru Table M.04.02-5 apply. The Contractor shall submit a JMF, on a form provided by the Engineer, with the individual fractions of the aggregate expressed as percentages of the total weight of the mix and the source(s) of all materials to the Engineer for approval. The JMF shall indicate the corrected target binder content and applicable binder correction factor (ignition oven or extractor) for each mix type by total weight of mix. The mineral filler (dust) shall be defined as that portion of blended mix that passes the #200 sieve by weight when tested in accordance with AASHTO T 30(M). The dust-to-effective asphalt (D/Pbe) ratio shall be between 0.6 and 1.2 by weight. The dry/wet mix times and hot bin proportions (batch plants only) for each type shall be included in the JMF.

The percentage of aggregate passing each sieve shall be plotted on a 0.45 power gradation chart and shall be submitted for all HMA mixtures. This chart shall delineate the percentage of material passing each test sieve size as defined by the JMF. The percentage of aggregate passing each standard sieve shall fall within the specified control

points, but outside the restricted zone limits as shown in Tables M.04.02-2 thru Table M.04.02-5. Mixes with documented performance history which pass through the restricted zone may be permitted for use as long as all other physical and volumetric criteria meets specifications as specified in Tables M.04.02-2 thru Table M.04.02-5 and with prior approval from the Engineer. A change in the JMF requires that a new chart be submitted.

Superpave Mixtures with RAP: In addition to subarticles M.04.02 – 3 a through c, for HMA that contains RAP, the Contractor shall submit a materials certificate to the Engineer stating that the RAP complies with requirements stated in Article M.04.01. Upon approval of the Engineer, the use of RAP will be allowed with the following conditions:

- RAP amounts up to 15% may be used with no binder grade modification.

- RAP amounts up to 20% may be used provided a new JMF is approved by the Engineer. The JMF submittal shall include the grade of virgin binder added and test results that show the combined binder (recovered binder from the RAP and virgin binder at the mix design proportions) meets the requirements of the specified binder grade.

The RAP shall be crushed after milling or other removal method so that 100 % passes the 0.5 inch sieve. Also, under no circumstances shall the top-size aggregate in the RAP exceed the nominal maximum aggregate size allowed by the job mix formula for that mix. The Contractor shall assure that the RAP is free from contaminating substances such as joint seal compound. The aggregate type used, either gravel, trap rock or a blend of the two, shall be maintained and consistent throughout the entire roadway. The final Superpave mixture shall conform to specifications as amended herein. RAP material shall not be used with any other recycling option.

b. Basis of Approval: On an annual basis the Contractor shall submit to the Engineer a request for approval of the HMA mixture, the mix design, and JMF in accordance with one of the methods described herein. Prior to the start of any paving operations, the JMF must be approved by the Engineer, and the Contractor must demonstrate the ability to meet the accepted JMF and production percentage of bitumen for each type of mixture. HMA mixture supplied to the project without an approved mix design, JMF and approved facility will be rejected. The JMF shall also indicate the target temperature of completed mixture as it is dumped from the mixer and tested in accordance with Article M.04.03. Additionally, the fraction of material retained between any two consecutive sieves shall not be less than 4%.

HMA Plant Trials: Upon submittal and approval of the mix design by the Engineer, the Contractor shall test and evaluate plant-produced mixture (PPT) in accordance with these specifications when required.

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

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

The Contractor shall not change any component source of supply including consensus properties after a JMF has been accepted. Before a new source of materials is used, a revised JMF shall be submitted to the Engineer for approval. Any approved JMF applies only to the plant for which it was submitted. Only one mix with one JMF will be approved for production at any one time. Switching between approved JMF mixes with different component percentages or sources of supply is prohibited.

The following information must be included in the mix design submittal:

a. Gradation, specific gravities and asphalt content of the RAP,
b. Material Certificate stating that all RAP inventory conforms to all material specifications,
c. Percentage of RAP to be used.

Superpave mixture with CRCG: In addition to subarticles M.04.02 – 3 a through c, for HMA mixtures that contain CRCG, the Contractor shall submit a materials certificate to the Engineer stating that the CRCG complies with requirements stated in Article M.04.01, as applicable. Additionally, 1% hydrated lime, or other accepted non-stripping agent, shall be added to all mixtures containing CRCG. CRCG material shall not be used with any other recycling option.

c. Mix Status: Each Plant will have each type of HMA mixture evaluated based on previous years production compliance, for the next construction paving season, as determined by the Engineer. Based on the rating a type receives it will determine whether the mixture can be produced without the prior completion of a PPT. Ratings will be provided to each HMA producer annually at the beginning of the paving season.

1) Rating Procedure: Ratings for each type are as follows:

"A" – Approved:
Rating assigned to a mixture type from a producer with a current rating of 70% or better based on specification compliance based on binder content (Pb), air voids (Va), maximum theoretical gravity (G_{mm}), and Voids in Mineral Aggregate (VMA).

"PPT" – Pre-Production Trial:
Rating assigned to a type of mixture when there is no production history from the previous year, has a change in one or more aggregate components from the JMF on record, a change in RAP percentage, or is a new JMF not previously on record.

HMA mixtures rated with a "PPT" cannot be shipped or used on Department projects. A passing "PPT" test shall be performed with NETTCP certified personnel on that type of mixture by the HMA producer and meet all specifications (Table M.04.02-2 thru Table M.04.02-5) before production shipment may be resumed. At no time shall mixture rated "PPT" be shipped to Department projects.

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

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

Option B: When the Contractor or their representative performs a "PPT" test without being witnessed by an inspector, the Contractor shall submit the test results and a split sample including 2 gyratory molds, 5,000 grams of boxed HMA for binder and gradation determination, and 5,000 grams of cooled loose HMA for Gmm determination for verification testing and approval. Passing verifications will designate the HMA type to be on an "A" status. Failing verifications will require the contractor to submit additional trials.

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

When Option (A) is used and the "PPT" test meets all specifications, the "PPT" test is considered a passing test and the rating for that mix is changed to "A". When the "PPT" test is not witnessed, the "PPT" Option (B) procedure must be followed and the mixtures along with the test results delivered to the Materials Testing Lab. The test results must meet the "B" tolerances established by the Engineer.

"U" – No Acceptable Mix Design on File:

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

TABLE M.04.02– 2: SUPERPAVE MASTER RANGE FOR MIXTURE DESIGN CRITERIA

Notes: (1) Minimum Pb as specified in Table M.04.02-5. (2) Voids in Mineral Aggregates shall be computed as specified herein. (3) Control point range is also defined as the master range for that mix. (4) Dust is considered to be the percent of materials passing the #200 sieve.

	S0.25				**S0.375**				**S0.5**				**S1**			
Sieve	CONTROL POINTS (3)		*RESTRICTED ZONE*		CONTROL POINTS(3)		*RESTRICTED ZONE*		CONTROL POINTS(3)		*RESTRICTED ZONE*		CONTROL POINTS(3)		*RESTRICTED ZONE*	
inches	Min (%)	Max (%)	*Max (%)*	*Min (%)*	Min (%)	Max (%)	*Min (%)*	*Max (%)*	Min (%)	Max (%)	*Min (%)*	*Max (%)*	Min (%)	Max (%)	*Min (%)*	*Max (%)*
2.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1.5	-	-	-	-	-	-	-	-	-	-	-	-	100	-	-	-
1.0	-	-	-	-	-	-	-	-	-	-	-	-	90	100	-	-
3/4	-	-	-	-	-	-	-	-	100	-	-	-	-	90	-	-
1/2	100	-	-	-	100	-	-	-	90	100	-	-	-	-	-	-
3/8	97	100	-	-	90	100	-	-	-	90	-	-	-	-	-	-
#4	-	90	-	-	-	90	-	-	-	-	-	-	-	-	*39.5*	*39.5*
#8	32	67	*47.2*	*47.2*	32	67	*47.2*	*47.2*	28	58	*39.1*	*39.1*	19	45	*26.8*	*30.8*
#16	-	-	*31.6*	*37.6*	-	-	*31.6*	*37.6*	-	-	*25.6*	*31.6*	-	-	*18.1*	*24.1*
#30	-	-	*23.5*	*27.5*	-	-	*23.5*	*27.5*	-	-	*19.1*	*23.1*	-	-	*13.6*	*17.6*
#50	-	-	*18.7*	*18.7*	-	-	*18.7*	*18.7*	-	-	*15.5*	*15.5*	-	-	*11.4*	*11.4*
#100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
#200	2.0	10.0	-	-	2.0	10.0	-	-	2.0	10.0	-	-	1.0	7.0	-	-
Pb (1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VMA (2) (%)	16.0 ± 1				16.0 ± 1				15.0 ± 1				13.0 ± 1			
VA (%)	4.0 ± 1				4.0 ± 1				4.0 ± 1				4.0 ± 1			
Gse	JMF value				JMF value				JMF value				JMF value			
Gmm	JMF ± 0.030				JMF ± 0.030				JMF ± 0.030				JMF ± 0.030			
Dust/Pbe(4)	0.6 – 1.2				0.6 – 1.2				0.6 – 1.2				0.6 – 1.2			
Agg. Temp	280 – 350F				280 – 350F				280 – 350F				280 – 350F			
Mix Temp	265 – 325 F				265 – 325 F				265 – 325 F				265 – 325 F			

TABLE M.04.02–3
SUPERPAVE MASTER RANGE FOR CONSENSUS PROPERTIES OF COMBINED AGGREGATE STRUCTURES

Notes: (1) If less than 25 % of a given layer is within 4 inches of the anticipated top surface, the layer may be considered to be below 4 inches for mixture design purposes.

Traffic Level	Design ESALs (80 kN)	Coarse Aggregate Angularity (1) ASTM D 5821	Fine Aggregate Angularity (7) AASHTO T 304	Flat or Elongated Particles ASTM D 4791	Sand Equivalent AASHTO T 176
-----	(million)			>#4	-----
1*	< 0.3	55/- -	40	10	40
2	0.3 to < 3.0	75/- -	40	10	40
3	≥ 3.0	95/90	45	10	45
	Design ESALs are the anticipated project traffic level expected on the design lane, projected over a 20 year period, regardless of the actual expected design life of the roadway.	Criteria presented as minimum values. 95/90 denotes that a minimum of 95% of the coarse aggregate, by mass, shall have one fractured face and that a minimum of 90% shall have two fractured faces.	Criteria presented as minimum percent air voids in loosely compacted fine aggregate passing the #8 sieve.	Criteria presented as maximum Percent by mass of flat or elongated particles of materials retained on the #4 sieve, determined at 3:1 ratio.	Criteria presented as minimum values for fine aggregate passing the #8 sieve.

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

TABLE M.04.02– 4: SUPERPAVE MASTER RANGE FOR TRAFFIC LEVELS AND DESIGN VOLUMETRIC PROPERTIES.

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

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

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

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

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

M.04.03—Production Quality Control (QC) Testing, Approval and Control of Mixture: The Contractor shall submit a Quality Control plan for HMA production specifically for the plant producing the HMA mixture in accordance with subarticle 4.06.03-9 for review and approval of the Engineer. The plan must also include a list of sampling & testing methods and frequencies used during production, and the names of all Quality Control plant personnel and their duties. In addition;

i. All plant personnel involved with sampling and testing for Quality Control purposes must have a current certification as an NETTCP HMA Plant Technician or Interim HMA Plant Technician and be in good standing. Technicians found by the Engineer to be non-compliant with NETTCP and Department policies may be suspended by the Engineer from participating in the production of mixtures for Department projects until their actions can be reviewed by NETTCP.

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

In addition, based on the mix design method the following also applies.

1. **Materials Sampling & Testing Methods for Marshall Mixes:** The Contractor shall furnish the Engineer a field laboratory accepted by the Engineer to test bituminous mixtures during production. Material samples will be obtained from the hauling vehicles by the Engineer at the plant during each day's production as indicated in the Department's "Schedule of

Minimum Requirements for Sampling Materials for Test." The following test procedures will be used:

AASHTO T 30(M)	Mechanical Analysis of Extracted Aggregate
AASHTO T 40(M)	Sampling Bituminous Materials
AASHTO T 164(M)/ AASHTO T 308(M)	Quantitative Extraction/Ignition Oven of Bitumen from Bituminous Paving Mixtures
AASHTO T 245(M)	Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus
AASHTO T 209(M)	Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures
AASHTO T 269(M)	Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures
AASHTO T 329	Moisture Content of Hot-Mix Asphalt (HMA) by Oven Method

a. Cessation of Supply: Marshall Mix Production shall cease for the Project from any plant that consistently fails to produce mixture that meets the JMF and volumetric properties. The criteria for ceasing the supply of a class of mixture from any plant are as follows:

   i. Off-Test Status: The results of AASHTO T 164(M) and T 30(M) will be used to determine if the mixture is within the tolerances shown in Table M.04.02-1. The Contractor will be notified that a plant is "off test" for a class of mixture when the test results indicate that any single value for bitumen content or gradation are not within the tolerances shown in Table M.04.02-1 for that class of mixture.
   ii. When multiple plants and silos are located at one site, mixture supplied to one project is considered as coming from one source for the purpose of applying the "off test" adjusted payment.
   iii. If a test indicates that the bitumen content or gradation are outside the tolerances, the Contractor may make a single JMF change on classes 1, 2, 3, 4 and 12 as allowed by the Engineer prior to any additional testing. A JMF change shall include the date and name of the Engineer that allowed it. Consecutive test results outside the requirements of Table M.04.02-1 JMF tolerances may result in rejection of the mixture.
   iv. The Engineer may cease supply of mixture from the plant when the test results from three non-consecutive samples of a class of mixture are not within the JMF tolerances or the test results from two non-consecutive samples not within the master range indicated in Table M.04.02-1 during any one production period, due to inconsistent production.
   v. Any modification to the JMF shall not exceed 50% of the JMF tolerances indicated in Table M.04.02-1 for any given component of the mixture without approval of the Engineer. When such an adjustment is made to the bitumen, the corresponding production percentage of bitumen shall be revised accordingly.

b. Adjustments for Off test Mixture under Cessation of Supply: The HMA plant shall cease supplying to the project:
   i. When the test results from three consecutive samples are "off test" and not within the JMF tolerances or,

   ii. The test results from two consecutive samples are "off test" and not within the ranges indicated in Table M.04.02 – 1 or,

   iii. When the percent of material passing the minus #200 sieve material exceeds the percent of extracted bitumen content for three consecutive samples during any production period of the values stated in Table M.04.02-1:
      a. The quantity of mixtures shipped to the project determined to be "off test" and outside the tolerances will be tabulated by the Engineer and will be adjusted in accordance with Section 4.06.
      b. Following cessation, a trial production period will be required at the plant for that class of mixture. Use of that class of mixture from that plant will be prohibited on the Project until the plant has demonstrated the ability to consistently produce acceptable mixture.
      c. When the Engineer has accepted the mixtures from the trial production period, the use of that mixture on the Project may resume.

2. Material Sampling & Testing Methods for Superpave Mixes:

a. Samples of mixtures will be obtained from the hauling vehicles at the plant during each day's production, as indicated in Table M.04.03– 1. The Contractor shall perform necessary moisture susceptibility testing annually or when material component sources change, and for all levels of HMA S0.5 plant produced mixtures, as specified in the latest version of AASHTO T 283(M). The AASHTO T 283(M) test results and specimens shall be submitted by the Contractor for approval. The tensile strength ratio must be greater than 80 percent, and the specimen shall not show more than minimal evidence of stripping as determined by the Engineer. This shall be completed within 30 days of beginning of production. Superpave mixtures that require anti-strip additives (either liquid or mineral) shall continue to meet all requirements specified herein for binder and HMA. The Contractor shall submit the name, manufacturer, percent used, and MSDS sheet for the anti-strip additive (if applicable) to the Engineer. In addition;

   i. The Contractor shall maintain all testing equipment within a field laboratory in good working order.
   ii. The Contractor shall not modify or use the equipment within the field laboratory without the consent of the Engineer. Any such action by the Contractor may be cause for the Engineer to re-inspect equipment, check calibrations, which could delay production at that facility until such checks are completed.
   iii. The Contractor shall take immediate action to replace, repair, and/or recalibrate any piece of equipment that is deemed by the Engineer to be out of calibration, malfunctioning, or not in operation. If an acceptance test was performed using such

equipment, split test samples may be retrieved for verification at the discretion of the Engineer.

iv. Production without the use of required testing equipment will be permitted for only 1 hour. Additional production beyond the first hour may be considered by the Engineer. If permitted to continue production, box samples will be taken, tested, and incorporated as stated in Article M.04.03 and subarticle 4.06.04-1b. No production shall be permitted beyond that day until the subject equipment is repaired or replaced to the satisfaction of the Engineer.

v. Compaction of samples shall be accomplished utilizing an accepted Superpave Gyratory Compactor (SGC), supplied by the Contractor. The SGC shall be located at the HMA plant supplying mixture to the project.

vi. The Engineer is responsible for determining the acceptance of HMA and will perform verification testing on QC production samples in accordance with the Department's QA Program for Materials..

b. Additional QC plan Requirements for Plants producing Superpave Mix Design mixture:

i. The Contractor shall perform all listed component aggregates and Superpave mixture Quality Control testing in accordance with the test procedures and schedule listed in Table M.04.03-1, as a minimum, any day that Superpave mixtures are produced.

ii. The Contractor shall propose a QC test frequency for AASHTO T 27(M) on the cold feed material and AASHTO T 308 for RAP binder content.

iii. All process control (PC) test data shall be kept on file for the duration of the project for review by the Engineer.

c. Determination of Off-Test status:

i. Off Test Status: Superpave mixes shall be considered *"off test"* when any Control Point Sieve, VA, VMA, and Gmm values are outside of the limits specified in Table M.04.03-3 and the computed binder content (Pb) established by AASHTO T308(M) or as documented on the vehicle delivery ticket is below the minimum binder content stated in subarticle M.04.03-5. Note that further testing of samples or portions of samples not initially tested for this purpose cannot be used to change the status.

ii. Any time the HMA mixture is considered Off-test:

1. The Contractor shall notify the Engineer (and project staff) when the plant is *"off test"* for a type of mixture. When multiple plants and silos are located at one site, mixture supplied to one project is considered as coming from one source for the purpose of applying the *"off test"* determination.

2. The Contractor must take immediate actions to correct the deficiency, minimize *"off test"* production to the project, and obtain an additional Process Control (PC) test after any corrective action to verify production is in conformance to the

specifications. A PC test will not be used for acceptance and is solely for the use of the Contractor in its quality control process.

d. Test Section:
The test section, as specified in Section 4.06, shall be considered acceptable if payment for HMA mixture tested at the plant is no less than 100% and the field density meets the specified requirements.

Table M.04.03– 1: Contractor Quality Control Testing Procedures & Minimum Frequency of Test

Protocol	Reference	Description	Frequency (min)
1	AASHTO T 27	Sieve Analysis of Fine and Coarse Aggregate	Determined by Contractor
2	AASHTO T 329	Moisture content of RAP (before start and halfway thru production - when used)	2/day
3	AASHTO T 255(M)	Moisture content of each cold feed aggregate (before start and halfway thru production - drum plants only)	2/day
4	AASHTO T 308(M)	Binder content of RAP by Ignition Oven method (before start of production when used)	Determined by Contractor
5	AASHTO T 168(M)	Sampling of HMA	See Note (3)
6	AASHTO T 308(M)	Binder content by Ignition Oven method (adjusted for aggregate correction factor)	See Note (3) & Note (4)
7	AASHTO T 30(M)	Gradation of extracted aggregate for HMA mixture	See Note (3)
8	AASHTO T 312(M)	(1)Superpave Gyratory molds compacted to N_{des}	See Note (3)
9	AASHTO T 166(M)	(2)Bulk specific gravity of HMA	See Note (3)
10	AASHTO R 35(M)	(2)Air voids, VMA	See Note (3)
11	AASHTO T 209(M)	Maximum specific gravity of HMA (average of two tests)	See Note (3)
12	AASHTO T 329	Moisture content of Production HMA	See Note (3)

Notes: **(1)** One set equals two six-inch molds. Molds to be compacted to N_{max} for PPTs and N_{des} for production testing
(2) Average value of one set of six-inch molds.
(3) Test frequency shall be based on HMA quantity produced per day. Table M.04.03-2 denotes the number of tests required for daily QC by the Contractor.
(4) The aggregate correction factor will be determined by the Engineer.

Table M.04.03 – 2: Contractor Acceptance Testing Required Based on Daily Production per Type/Level/Plant(1)

Daily quantity produced in tons	Minimum number of tests required(2)
0 to 150	No testing required (if mix already accepted) (3)
151 to 600	1 test
601 to 1,200	2 tests
1,201 to 1,800	3 tests
1,801 and greater (4)	4 tests

Notes:

(1) For the purpose of the Contractor complying with the number of tests stated in Table M.04.03-2, tons of the same type/level per plant shall be combined from multiple state projects. A minimum of one (1) acceptance test shall be performed for every four days of production for every same type/level mix (days of production may or may not be consecutive days). An acceptance test shall not be performed within 150 tons of production from a previous acceptance test unless approved by the Engineer.

(2) All testing shall be selected using stratified – random sampling of total estimated daily tons in accordance with ASTM D 3665, except that the first test shall be randomly taken from the first round of trucks, the first 151 tons sublot, or as otherwise ordered by the Engineer. QC samples shall be saved and stored at the HMA facility for 7 days for Engineer retrieval, after which they may be disposed of.

(3) When directed by the Engineer, a minimum of 1 test is required for bridge and critical areas.

(4) An additional random test shall be taken by the Contractor for each additional 600 tons.

e. Cessation of Supply for Superpave mixtures with no payment adjustment: Production of HMA shall cease for the Project from any plant that consistently fails to produce mixture that meets the JMF and volumetric properties. The quantity of Superpave mixtures shipped to the project that is "off-test" will not be adjusted for deficient mixtures.

An HMA production plant will be required to cease supplying mixtures to the project when:

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

2. HMA mixture is "off test" on two (2) consecutive tests for the Control Point sieves in one day's production.

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

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

An HMA production plant will be required to cease supplying mixtures to the project when:

1. The binder content (Pb) is below the requirements of Table M.04.03-5 on the ignition oven test result after two (2) consecutive tests, regardless of date of production.
2. Following cessation, the Contractor shall immediately make necessary material or HMA plant corrections and run a Pre-Production Trial (PPT) for that type of mixture. Use of that type of mixture from that plant will be prohibited to the Project until the plant has demonstrated the ability to consistently produce acceptable mixture. When the Contractor has a passing test and has received approval from the Engineer, the use of that mixture to the Project shall resume.

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

a. JMF changes to the G_{mm} or mix Absorption Correction Factor (A_{cf}) are only permitted prior to or after a production shift for all HMA types of mixtures and only when they:
   i. Are requested in writing and pre-approved by the Engineer;
   ii. Are based on a minimum of a two test trend;
   iii. Are documented with a promptly submitted revised JMF on form provided by the Engineer.
   iv. A revised JMF submittal shall include the date and name of the Engineer that allowed it.

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

Notes: (1) 300°F minimum after October 15. (2) Minimum Pb as specified in Table M.04.03-5 (3) Control point range is also defined as the master range for that mix. (4) JMF tolerances shall be defined as the limits for production compliance. VA & Pb payment is subject to adjustments, as defined in sub-article 4.06.04 - 2.

	S0.25		**S0.375**		**S0.5**		**S1**		**Tolerances**
Sieve	CONTROL POINTS (4)		CONTROL POINTS (4)		CONTROL POINTS (4)		CONTROL POINTS (4)		**JMF Limits** (4)
inches	Min (%)	Max (%)	Min (%)	Max (%)	Min (%)	Max (%)	Min (%)	Max (%)	±Tol
2.0	-	-	-	-	-	-	-	-	
1.5	-	-	-	-	-	-	100	-	
1.0	-	-	-	-	-	-	90	100	
3/4	-	-	-	-	100	-	-	90	
1/2	100	-	100	-	90	100	-	-	
3/8	97	100	90	100	-	90	-	-	
#4	-	90	-	90	-	-	-	-	
#8	32	67	32	67	28	58	19	45	
#16	-	-	-	-	-	-	-	-	
#200	2.0	10.0	2.0	10.0	2.0	10.0	1.0	7.0	
Pb(2)	-	-	-	-	-	-	-	-	note (2)
VMA (%)	16.0		16.0		15.0		13.0		1.0
VA (%)	4.0		4.0		4.0		4.0		1.0
Gmm	JMF value		JMF value		JMF value		JMF value		0.030
Agg. Temp	280 – 350F		280 – 350F		280 – 350F		280 – 350F		
Mix Temp	265 – 325 F (1)		265 – 325 F (1)		265 – 325 F (1)		265 – 325 F (1)		

TABLE M.04.03– 4: SUPERPAVE MASTER RANGE FOR TRAFFIC LEVELS AND DESIGN VOLUMETRIC PROPERTIES.

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

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

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

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

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

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

AASHTO Standard Specification	
Reference	**Modification**
AASHTO M 320	1. Mass change for PG 64-22 shall be a maximum loss of 0.5% when tested in accordance with AASHTO T 240. 2. The two bottles used for the mass change determination may be re-heated and used for further testing.
AASHTO Standard Methods of Test	
Reference	**Modification**
AASHTO T 27	Section 7.7 Samples are not washed
AASHTO T 30	Section 6.2 thru 6.5 Samples are not routinely washed
AASHTO M-156 /ASTM D 995	Section 8.7.3 *Accuracy: Batch Plants* The automation proportioning system shall be capable of consistently delivering mixtures within the full range of batch sizes within the following tolerances: *Total Batch Weight Of Paving Mix. %* *Batch aggregate component* ± 1.0% Note: AASHTO T 40 is modified as follows: Section 9.1.1 Sampling valve is located on bottom third of storage tank.
AASHTO T 164	Method A **APPARATUS:** Section 6. ConnDOT in addition to AASHTO apparatus includes infrared lamp and substitutes graduated cylinder with a 1000 ml flask. Section 7. Reagent. Must be Conn D.O.T. approved ******* Article 9.2.1 all classes of HMA except Class 4 are scooped from the sample container. Section 10.1 and 10.2 Moisture content is periodically determined on production samples as plant conditions require. Section 12.1 See Section 10 Section 12.5 Filter paper is dried and weighed in field using heat lamp or oven when an ash test is performed. Article 12.6.1 Extract is collected if an ash test is to be performed Article 12.6.2 Performed on selected samples only

	Article 12.6.3 A three test running average is used to correct for total binder in HMA.
AASHTO T 168	Samples are taken at one point in the pile. All types of bituminous concrete except Class 4 are scooped from the sample container instead of remixing and quartering. (Method verified by laboratory study). Samples from a hauling vehicle are taken from only one point instead of three as specified. Selection of Samples: Sampling is equally important as the testing, and the sampler shall use every precaution to obtain samples that are truly representative of the bituminous mixture. Box Samples: In order to enhance the rate of processing samples taken in the field by construction or maintenance personnel the samples will be tested in the order received and data processed to be determine conformance to material specifications and to prioritize inspections by laboratory personnel.
AASHTO T 170	Recovery of Asphalt from Solution by Abson Method Delete the referenced section and replace with the language shown: 5.0 Apparatus 5.1 Centrifuge- batch unit capable of exerting a minimum centrifugal force of 770 times gravity or a continuous unit capable of exerting a minimum force of 3000 times gravity. 5.2. Centrifuge tubes- a 250mL wide mouth bottles 5.3.1. Extraction Flasks- a 500mL three angle necks and joints flask with 24/40 side necks. 5.3.2. Glass Tubing- Heat resistant glass tubing, having 10mm inside diameter and a gooseneck shaped delivery tube, for connecting the flask to the condenser. 5.3.3. Inlet Aeration Tube- 180mm in length having a 6mm outside diameter with a 10-mm bulb carrying six staggered holes approximately 1.5 mm in diameter. 5.3.4. Electric Heating Mantle- Variable transformer to fit a 500 mL flask. 5.3.5 Water-jacketed Condenser- Allihn type, with 200 mm minimum jacket length. 5.3.6. Thermometer- an ASTM low distillation thermometer having a range of –2 to 300°C (30 to 580°F), respectively, and conforming to the requirements in ASTM specification E 1 5.3.7. Gas Flow Meter- A type capable of indicating a gas flow of up to 1000 mL per minute. 5.3.8. Corks- No. 20 5.3.9. Flexible Elastomeric Tubing 5.3.10. Separatory Funnel-500 ml capacity or larger 6.0. Reagents and Materials 6.1. Carbon Dioxide Gas- A pressurized tank, with pressure-reducing valve. The solvent for extracting the asphalt from the mixtures should be reagent grade

	trichloroethylene or methylene chloride. Other solvents may affect the bitumen to change its properties significantly from that as it exists in the mixture. 8. Sample 8.1. The sample shall consist of the solution from previous extraction of a sample of sufficient mass to result in approximately 105 to 110 g of recovered bitumen. 9. Procedure 9.1. The entire procedure, form the start of the extraction to the final recovery, must be completed within 8 hours. 9.2 Centrifuge the solution from the previous extraction for a minimum of 30 minutes at 770 times gravity (approx. 2700rpm) in 250 mL wide mouth bottles. Assemble the apparatus as shown in Figure 1 with the separatory funnel in the thermometer hole in the cork. Lower the aeration tube so that the bulb is in contact with the bottom of the flask. Fill the separatory funnel with the centrifuged solution and open the stopcock to fill the flask approximately one-half full of solvent mixture. Apply low heat to the flask and start distillation. Introduce carbon dioxide gas at a low rate (approx. 100mL/minute) to provide agitation and prevent foaming. Adjust the funnel stopcock to introduce fresh solvent at a rate that will keep the flask approximately one half full during distillation, adding additional solvent mixture to the funnel into all solvent has been introduced into the distillation flask. When the temperature reaches 157 to 160°C (315 to 320°F), increase the carbon dioxide gas flow to approximately 900mL/minute. Maintain this gas flow rate for 20 minutes while also maintaining the temperature of the residue in the flask at 160 to 166°C (320 to 330°F).
AASHTO T 195	Section 4.3 only one truck load of mixture is sampled. Samples are taken from opposite sides of the load.
AASHTO T 209	Article 9.5.1 Bowl is suspended 2 minutes prior to reading rather than 10 minutes. This makes no significant difference in results. Section 7.2 The average of two bowls is used proportionally in order to satisfy minimum mass requirements. 8.3 Omit Pycnometer method.
AASHTO T 245	Article 3.3.2 A compacting temperature of 140 to 146°C (284 to 295°F) is used Article 3.5.2 Seventy-five (75) blows per side are used on Classes 1 and 12, per ConnDOT design requirements Section 3.1 for production testing: one specimen is molded for each extraction test for production over 275 metric tons/day (300 tons/day). Other mixtures: two specimens per extraction test.

AASHTO T 283	This protocol shall be performed at the HMA plant in accordance with section 7 on HMA S0.5 (all design levels) by the Contractor or their representative at a time designated by the Division Chief. TSR testing is required on all classes and design levels during the design phase and on all HMA S0.5 design levels during the production phase.
AASHTO T 308	In addition to the standard testing procedure, the Department has adopted a procedure that addresses a correction factor that is calculated using the composite aggregate percentages (**C**omposite **A**ggregate **C**orrection **F**actor **M**ethod **(CACF)**). The aggregate is burned in compliance with the standard AASHTO procedure Method A exclusively. All modifications are listed for this method only. A2.2 Omit A2.3 Omit A2.4 Omit. Replace with: Determine an aggregate gradation for each aggregate component "blank" in accordance with T30. A2.5 Omit. Replace with: The individual aggregate samples are to be dried in an oven at a maximum temperature of 148 ± 5ºC (300 ± 9º F) to a constant weight. RAP samples are to be oven dried at a maximum temperature of 110 ± 5ºC (230 ± 9º F) to a constant weight. RAP samples will be burned for total binder content only and not to arrive at a correction factor for a mixture. A2.6 Omit. A2.7 Omit A2.8 Omit A2.8.1 Omit Note 2 A2.9 Omit. Replace with: Perform a gradation analysis on the residual aggregate in accordance with T30 and compare it to the gradation performed prior to burning. A2.9.1 Omit A2.9.2 Omit The correction factors for each size aggregate are provided by the Contractor to the Engineer prior to the Annual Plant Inspection. The Composite Aggregate Correction Factor (CACF) for any mixture may be calculated by summing the result of the correction factor for each individual aggregate multiplied by the percentage of that aggregate in the overall mixture. (Note: All correction factors must be re-calculated every time the percentage of any aggregate changes within the mixture.) In addition to the standard testing procedure, the Department has adopted a procedure that addresses the time involved between sampling the hot mix asphalt specimen and the beginning of the test. 6.3 Omit. Replace with: The test specimen must be ready to be placed in an approved ignition furnace for testing within ten minutes of being obtained from the hauling vehicle and the test shall start immediately after.

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

	(*derived from formula X1.2 APPENDIX X1 of AASHTO R 35)* for each class of material, in accordance with *Formula 5.16.1B.* *Formula 5.16.1B.* Determining the Density Factor *(D_f)* of mix design HMA: $$D_f = \left(\frac{Gse - Gsb}{Gsa - Gsb}\right)$$ Where: D_f = Density Factor or multiplier determined by AASHTO R-35(M) Gse = Effective Specific Gravity determined by AASHTO M-323 at plant Gsa = Apparent Specific Gravity determined by AASHTO T 84/85 of mix design Gsb = Bulk Specific Gravity determined by AASHTO T 84/85 of mix design
AASHTO R 26	Quality Control Plans must be formatted in accordance with AASHTO R 26, certifying suppliers of performance-graded asphalt binders, Section 9.0, Suppliers Quality Control Plan, and "NEAUPG Model PGAB QC Plan." 1. The Department requires that all laboratory technician(s) responsible for testing PG-binders be certified or Interim Qualified by the New England Transportation Technician Certification Program (NETTCP) as a PG Asphalt Binder Lab Technician. 2. Sampling of asphalt binders should be done under the supervision of qualified technician. NECTP "Manual of Practice," Chapter 2 Page 2-4 (Key Issues 1-8). 3. A copy of the Manual of Practice for testing asphalt binders in accordance with the Superpave PG Grading system shall be in the testing laboratory. 4. All laboratories testing binders for the Department are required to be accredited by the AASHTO Materials Reference Laboratory (AMRL). 5. Sources interested in being approved to supply PG-binders to the Department by use of an "in-line blending system," must record properties of blended material, and additives used. 6. Each source of supply of PG-binder must indicate that the binders contain no additives used to modify or enhance their performance properties. Binders that are manufactured using additives, modifiers, extenders etc., shall disclose the type of additive, percentage and any handling specifications/limitations required. Suppliers shall provide AASHTO M-320 Table 2 testing at a minimum of once per month on one sample of material. Each supplier shall rotate the PG grade each month (including PMA), so that data can be collected for all the grades produced.

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 **14** (%) 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

GENERAL

Mar.01

EXHIBIT II

DEPARTMENT OF TRANSPORTATION
CONTRACT DIVISION
2800 BERLIN TURNPIKE
NEWINGTON, CT 06111

CERTIFICATION OF WORK TO BE SUBCONTRACTED
NOMINATED SMALL CONTRACTOR/*MINORITY BUSINESS ENTERPRISE

* Delete if not applicable

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_____

EXHIBIT III

Mar.01

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 #0000985A – TRACK MONITORING

Description:

Track Monitoring – Railroad Tracks: The Contractor shall monitor track horizontal and vertical movement in allowance with the Special Provision "Track Monitoring":

Survey work shall be performed by a Registered Land Surveyor in the State of Connecticut. Survey crew should be trained under AMTRAK's Railroad's Safety Contractor/Leasee Employee Training program and maintain certification for the duration of the work.

Railroad traffic shall be maintained at all times with safety and continuity, and Contractors shall conduct their operations in compliance with all rules, regulations, and requirements of Railroad (including these Specifications) with respect to any work performed on, over, under, within or adjacent to Railroad's property. Contractors shall be responsible for acquainting themselves with such rules, regulations and requirements. Any violation of Railroads safety rules, regulations, or requirements shall be grounds for the immediate suspension of the Contractor work, and the re-training of all personnel, at the Contractor's expense.

Scope: If any work that could potentially affect the stability of the track is occurring within 50 feet of a track, or within the influence line of a track, then monitoring points shall be established along the track. The influence line descends from a point one foot horizontally away from the outside end of the tie bottom one unit vertically for every unit and a half horizontally.

Safety: All work close enough to foul a track must only be performed under the direction of qualified railroad personnel. People performing track monitoring are classified as Roadway Workers and must be trained in Roadway Worker Protection.

Points: Each location shall include a point on the top of rail marked with paint or crayon on the field side of the rail and used for vertical measurements, and a point on the tie for horizontal measurements. In wood ties, the point shall be marked with a PK nail or similar surveyor's marker; on concrete or steel ties the point shall be marked with paint.

Point Locations: Reference points shall be established along the track beginning at the point where the work is closest to the track. Points shall continue to be placed at intervals of 50 feet along the track to the point where the work ends or does not meet the conditions outlined above, and then at 50 feet, 100 feet, and 200 feet away from the end point(s). Where more than one track may be affected, points shall be established on each track that could be affected.

Measurement Accuracy: Monitoring points shall be established to within 0.001 feet, and monitoring shall be done to 0.01 feet.

Monitoring: Monitoring shall be performed at the beginning and end of every shift of work. Points shall be measured, the measurements recorded, and the numbers compared with previous measurements. All points shall be measured each time monitoring occurs, except for the points 200 feet away from the end of work; these points shall only be measured if any of the other measurements exceeds an allowable deviation.

Allowable deviations: If track is found to have moved either vertically or horizontally by more than one half of the Amtrak Maintenance limits as specified in Amtrak's MW-1000 for the particular class of track involved, then all work shall cease immediately and the contractor shall immediately notify the designated Amtrak Project Engineer. Work may not resume until the designated Amtrak Project Engineer has inspected the site and approved.

Track Maintenance: Deficiencies in track surface and alignment caused by construction activities shall be corrected solely by Amtrak forces at project expense.

TRACK CLASS	MAX. PASSENGER SPEED (MPH)	CROSS LEVEL (INCHES) The Difference in Cross Level Between Any Two Points Less Than		DEVIATION FROM PROFILE 31' CHORD INCHES		DEVIATION FROM HORIZONITAL ALIGNMENT INCHES	DEVIATION FROM HORIZONITAL ALIGNMENT INCHES
		10'	62'	31' CHORD	62' CHORD	31' CHORD	62' CHORD
MAINTENANCE LIMITS							
1	15	1	2 1/4	2 5/8	2 1/4	N/A	3 3/4
2	30	1	1 5/8	2 1/4	2	N/A	2 1/4
3	60	1	1	1 1/2	1 5/8	N/A	1 1/4
4	80	1	1	1 1/8	1 1/2	N/A	1
5	90	1	1	3/4	1	N/A	1/2
6	110	3/4	1	3/4	3/4	3/8	1/2
7	125	3/4	1	3/4	3/4	3/8	3/8
8	160	3/4	1	1/2	3/4	3/8	3/8
9	200	3/4	1	3/8	1/2	3/8	3/8
1/2 MAINTENANCE LIMITS							
1	15	1/2	1 1/8	1 5/16	1 1/8	N/A	1 7/8
2	30	1/2	13/16	1 1/8	1	N/A	1 1/8
3	60	1/2	1/2	3/4	13/16	N/A	5/8
4	80	1/2	1/2	9/16	3/4	N/A	1/2
5	90	1/2	1/2	3/8	1/2	N/A	1/4
6	110	3/8	1/2	3/8	3/8	3/16	1/4
7	125	3/8	1/2	3/8	3/8	3/16	3/16
8	160	3/8	1/2	1/4	3/8	3/16	3/16
9	200	3/8	1/2	3/16	1/4	3/16	3/16

Materials: As determined by Contractor and approved by the Engineer.

Construction Methods: The Contractor shall submit a detailed method of track monitoring to the Engineer for review prior to performing work. Monitoring will continue until the contractor's work within the limits defined in the Special Provisions is complete.

Method of Measurement: Lump Sum.

Basis of Payment:

This item will be paid for lump sum basis for "Track Monitoring".

The above

Pay Item	Pay Unit
Track Monitoring	l.s.

ITEM #0062680A – TACTILE WARNING STRIP

Description: This item shall include furnishing and installing Tactile Warning Strips in the locations and to the dimensions and details shown on the plans or as ordered by the Engineer.

Materials: Tactile Warning Strips shall be made from prefabricated detectable warning surface tiles as manufactured from Engineered Plastics Inc. 300 International Drive, Suite 100 Williamsville, NY 14221, telephone number (800) 682-2525 or the approved equal from ADA Fabricators, INC. P.O Box 179 North Billerica, MA 01862 telephone number (978) 262-9900. The tile shall conform to the dimensions shown on the plans and have a brick red homogeneous color throughout in compliance with Federal Standard 595A Color #22144 or approved equal.

Construction Methods: The Tactile Warning Strip for new construction shall be set directly in poured concrete according to the plans and the manufacturer's specifications or as directed by the Engineer. The contractor shall place two 25 pound concrete blocks or sandbags on each tile to prevent the tile from floating after installation in wet concrete.

Method of Measurement: This work shall be measured by the actual number of linear feet of Tactile Warning Strip completed and accepted.

Basis of Payment: This work will be paid for at the contract unit price per linear foot for "Tactile Warning Strip" which price shall include all equipment, tools, labor and materials incidental to the installation.

Pay Item	Pay Unit
Tactile Warning Strip	l.f.

ITEM #0063521A – RAIL FACILITY UPGRADE SITE NO. 1

Description: Under this item, the Contractor shall complete all work depicted on the Contract Plans and described in the CSI-formatted Specifications that make up this Major Lump Sum Item (MLSI). Refer to Form 816 Article 1.20-1.02.04 for additional information in this regard.

Any work incidental to another bid item which is not specifically described or included in the bid item, but which is required for performance and completion of the work required under the Contract, shall be considered to be included under this item.

Materials: All materials shall be as required by the Contract Plans and as described in the CSI-formatted Specifications that make up this MLSI.

Construction Methods: All methods of construction shall conform to the requirements as stipulated in the CSI-formatted Specifications that make up this MLSI.

Method of Measurement: This item will be paid for at the contract lump sum price for "**Rail Facility Upgrade Site No. 1"** complete.

Basis of Payment: This item will be paid for at the contract lump sum price for "**Rail Facility Upgrade Site No. 1**", which price shall include all administrative and procedural requirements, material, equipment, labor, and work incidental thereto.

PAY ITEM	PAY UNIT
Rail Facility Upgrade Site No. 1	LS

ITEM #0063522A – RAIL FACILITY UPGRADE SITE NO. 2

Description: Under this item, the Contractor shall complete all work depicted on the Contract Plans and described in the CSI formatted Specifications that make up this Major Lump Sum Item (MLSI).

Any work incidental to another bid item which is not specifically described or included in the bid item, but which is required for performance and completion of the work required under the Contract, shall be considered to be included under this item.

Materials: All materials shall be as required by the Contract Plans and as described in the CSI formatted Specifications that make up this MLSI.

Construction Methods: All methods of construction shall conform to the requirements as stipulated in the CSI formatted Specifications that make up this MLSI.

Method of Measurement: This item will be paid for at the contract lump sum price for "Rail Facility Upgrade Site No. 2" complete.

Basis of Payment: This item will be paid for at the contract lump sum price for "Rail Facility Upgrade Site No. 2", which price shall include all administrative and procedural requirements, material, equipment, labor, and work incidental thereto.

PAY ITEM	PAY UNIT
Rail Facility Upgrade Site No. 2	LS

ITEM #0100500A – CONSTRUCTION COMMUNICATION EQUIPMENT

Description:

Under this item, the Contractor shall provide:

1. Communication equipment for use by the inspection personnel. This item shall include all necessary equipment, accessories, material and labor to put the system into operation. Provisions shall also be made to maintain all provided communication equipment and any additional communication equipment assigned to the project, as directed by the Engineer.
2. A toll-free, reservation-less telephone conference call account for the use of the Engineer.

Materials:

The equipment for this item shall conform to the following: A hand held cellular phone capable of communicating digitally between units with two-way radio feature. This item shall include all necessary equipment, accessories (including but not limited to car charger and holster), materials, labor and maintenance to make the system operational. In addition, the phones shall have voice mail, caller ID and call waiting.

Construction Methods:

1. Communication Equipment: The Contractor shall submit three (3) proposals for both the communication equipment described herein and forward to the Engineer for approval. The Department will provide the Contractor with the estimated quantity of phones required for inspection personnel.

   The three proposals may be for either rental or purchase of equipment that is new or of like-new condition and meeting the specification requirements. Also, the three proposals must indicate the minimum and maximum number of phones that will be allotted. The Engineer will have ten (10) days from receipt of the proposals to inform the Contractor of its selection. Once approved, the contractor shall order the equipment, and have it installed and operating within fifteen (15) working days.

   The Contractor will furnish to the State, a copy of the monthly call record for each phone when submitting the billing invoices for the communication equipment.

   All equipment and associated materials will remain the property of the Contractor upon completion of the project unless otherwise specified by the Engineer in writing.

2. Telephone Conference Call Account: The Contractor shall submit three (3) proposals for the telephone conference call account described herein and forward to the Engineer for approval.

   The Engineer will have ten (10) days from receipt of the proposals to inform the Contractor of its selection. Once approved, the contractor shall activate the account within five (5) working days.

   Once activated, the Engineer will act as the "moderator" and control all associated PIN numbers.

   The Contractor will furnish to the State, a copy of the detailed monthly account history when submitting the billing invoices for the telephone conference call account.

Method of Measurement: The item, Construction Communication Equipment, will be measured for payment based on actual detailed monthly invoices.

Basis of Payment: The sum of money shown on the Estimate and in the itemized proposal as "Estimated Cost" for this work will be considered the bid price even though payment will be made as described below. The estimated cost figure is not to be altered in any manner by the bidder. Should the bidder alter the amount shown, the altered figures will be disregarded and the original price will be used to determine the total amount for the contract.

The item, "Construction Communication Equipment", will be paid for at the actual detailed monthly account history for services approved by the Engineer, plus a 5% markup.

Payment will include all materials, equipment, labor and maintenance associated with this item.

Pay Item	Pay Unit
Construction Communication Equipment	EST.

ITEM #0100500A

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 Concerns (AOECs). Work under this Item consists of the development and implementation of a written site-specific Health and Safety Plan (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 AOECs, 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 AOECs 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 include copies of the Contractor-designated Health and Safety Officer's (HSO) training certificates as well as a demonstration of the required experience, as indicated in Section 5-HASP Provisions (b) (iii) of this Item.

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

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

5-HASP Provisions:

(a) General Requirements: The Contractor shall prepare a HASP covering all Project site work regulated by 29 CFR 1910.120(b)/1926.65(b) to be performed by the Contractor and all subcontractors under this Contract. The HASP shall establish in detail, the protocols necessary for the recognition, evaluation, and control of all hazards associated with each task performed under this Contract. The HASP shall address site-specific

safety and health hazards of each phase of site operation and include the requirements and procedures for employee protection. The level of detail provided in the HASP shall be tailored to the type of work, complexity of operations to be performed, and hazards anticipated. Details about some activities may not be available when the initial HASP is prepared and submitted. Therefore, the HASP shall address, in as much detail as possible, all anticipated tasks, their related hazards and anticipated control measures.

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

(b) Elements:

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

(ii) Safety and Health Risk Analysis/Activity Hazard Analysis: The HASP shall address the safety and health hazards on this site for every operation to be performed. The Contractor shall review existing records and data to identify potential chemical and physical hazards associated with the site and shall evaluate their impact on field operations. Sources, concentrations (if known), potential exposure pathways, and other factors as noted in CFR 1910.120/126.65, paragraph (c)(7) employed to assess risk shall be described. The Contractor shall develop and justify action levels for implementation of engineering controls and PPE 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 (<u>including current 8-hour refresher training</u>); 8-hour HAZWOPER supervisory training; a minimum of one (1) 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 (1) 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 PPE to insure that workers are not exposed to levels greater than the action level for identified hazards for each operation stated for each work zone. The level of protection shall be specific for each operation and shall be in compliance with all requirements of 29 CFR 1910 and 29 CFR 1926. The Contractor shall provide, maintain, and properly dispose of all PPE.

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

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

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

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

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

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

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

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

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

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

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

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

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

6-HASP Implementation: The Contractor shall implement and maintain the HASP throughout the performance of work. In areas identified as having a potential risk to worker health and safety, and in any other areas deemed appropriate by the HSO, the Contractor shall be prepared

to immediately implement the appropriate health and safety measures, including but not limited to the use of PPE, and engineering and administrative controls.

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

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

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

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

Method of Measurement:

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

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

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

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

(a) The lump sum development cost will be certified for payment.

(b) The Contractor shall demonstrate to the Engineer monthly that the HASP has been kept current and is being implemented and the monthly cost will be certified for payment.

(c) Any month where the HASP is found not to be current or is not being implemented, the monthly payment for the Environmental Health and Safety Item shall be deferred to the next monthly payment estimate. If the HASP is not current or being implemented for more than thirty (30) 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 #0101111A – SECURING, CONSTRUCTION AND DISMANTLING OF A WASTE STOCKPILE AREA (SITE NO. 1)

Description:

Work under this Item shall consist of the securing, construction and dismantling of the temporary Waste Stockpile Area at the location designated on the Project Plans and in accordance with the Contract. All controlled and hazardous materials excavated during construction activities shall be stockpiled in the WSA. The WSA shown on the Plans is to be used exclusively for temporary stockpiling of excavated materials from within Project AOEC(s) and Hazardous AOEC(s) for determination of disposal classification.

Materials:

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

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

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

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

Bedding sand shall conform to Section 6.51.02 of the Specifications.

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

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

Bituminous Concrete shall conform to Section 4.06 of the Specifications.

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

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

Construction Methods:

The WSA shall be constructed in accordance with the Contract at the location shown on the Project Plans.
Construction of the WSA shall be completed prior to the initiation of construction activities generating Controlled or Hazardous Materials. The Contractor is responsible for the maintenance and protection of all utilities potentially affected during WSA construction. The Contractor shall locate and mark all existing utilities potentially affected prior to initiating WSA construction.

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

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

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

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

The Contractor shall be responsible for the collection and treatment/recycling/disposal of any liquid wastes that may be generated by its decontamination activities in accordance with applicable regulations.

Upon completion of the Project and following removal of all residual Controlled or Hazardous Materials, the Contractor shall dismantle the WSA and return the area to original condition. During dismantling, the Contractor shall remove all materials such as polyethylene sheeting and sand bags. Materials shall be disposed of by the Contractor as solid waste in accordance with the Contract and all Federal, State and local regulations.

Operation and maintenance of the WSA shall be included under Item 101117A "Controlled Material Handling" and/or Item 101109A "Hazardous Materials Excavation".

Method of Measurement:

This work will be measured for payment at the Lump Sum cost for securing, construction, and dismantling of a WSA.

Basis of Payment:

This work will be paid for at the Contract Lump Sum, which shall include all materials, tools, labor, equipment, permits, and work needed to secure, construct, decontaminate and dismantle the WSA, including all clearing, grubbing, grading, clean up, site restoration and seeding.

All materials, labor and equipment associated with compliance with the General Permit for Contaminated Soil and/or Sediment Management (Staging and Transfer) will not be measured separately, but will be considered incidental to the item "Securing, Construction and Dismantling of a Waste Stockpile and Treatment Area".

Pay Item	Pay Unit
Securing, Construction and Dismantling Of a Waste Stockpile and Treatment Area (Site No. 1)	L.S.

ITEM #0101117A – CONTROLLED MATERIALS HANDLING

Description:

Work under this Item is intended to provide specific procedural requirements to be followed by the Contractor for Controlled Materials excavated within any soil Area of Environmental Concern (AOEC), as shown on the Project Plans. This supplements Specifications Section 2.02, 2.03, 2.05, and 2.06 and Contract Special Provisions for excavation wherever contaminated materials are encountered. Work under this Item shall include preparing the Waste Stockpile Area (WSA) in Guilford; transporting and stockpiling materials at the WSA; and covering, securing, and maintaining the stockpiled materials throughout the duration of the Project. All materials, excluding the existing pavement structure (asphalt and subbase), rock, ledge, and concrete excavated within AOECs are to be considered Controlled Materials.

Controlled Materials consisting of non-hazardous levels of regulated substances have been documented to exist within the Project. Such contamination is documented in the reports listed in the "Notice to Contractor – Environmental Investigations". Where contaminated soils are excavated special handling, disposal, and documentation procedures will be required. Controlled Materials excavated within a soil AOEC may be reused as fill/backfill only within the AOEC from which it was excavated. Excess or unsuitable Controlled Material that cannot be reused within its AOEC of origin must be transported to and stockpiled within a temporary stockpile area at a location acceptable to the Engineer, sampled by the Engineer, and transported off-site for disposal, if necessary.

Materials:

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

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

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

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

Sedimentation control system shall conform to Section 2.19.02 of the Specifications.

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

Construction Methods:

A. General

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

Prior to the initiation of construction activities that may generate Controlled Materials, a temporary stockpile location, acceptable to the Engineer, shall be designated by the Contractor. Such temporary stockpile shall take into consideration site operational and space constraints.

Controlled Materials removed from any excavation within an AOEC shall be reused within their AOEC of origin. Controlled Materials that are to be immediately reused within the AOEC of origin shall be temporarily stockpiled adjacent to the excavation for immediate reuse.

Controlled Materials that are to be reused at a later date within the originating AOEC shall be transported and temporarily stockpiled at another location within the Project limits as allowed by the Engineer. Only the volume of Controlled Material that is reasonably estimated to be reused within the originating AOEC shall be temporarily stockpiled in this way. Individual stockpiles of Controlled Materials that are to be reused at a later date shall be covered with polyethylene plastic sheeting at all times, except when the piles are being worked, and shall have proper erosion and sedimentation controls.

For the Guilford SLE Station project only, excess Controlled Material from an AOEC that cannot be reused within the originating AOEC must be transported directly to the WSA, for disposal characterization sampling by the Engineer.

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

B. Transportation and Stockpiling

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

- Transported Controlled Materials are to be covered prior to leaving the point of generation and are to remain covered until the arrival at the temporary stockpile area;

- All vehicles transporting the soil are properly logged to show the vehicle identification, driver's name, time of departure, destination, and approximate volume and content of materials carried;

- All vehicles shall have secure, watertight containers free of defects for material transportation;

- No material shall leave the point of origin until there is adequate lay down area prepared at a temporary stockpile area; and,

- Documentation must be maintained indicating that all applicable laws have been satisfied and that the materials have been successfully transported and received at the temporary stockpile area.

Excavated Controlled Materials shall be staged as directed by the Engineer.

Measures shall be implemented to divert rainfall away from the temporary stockpiles of Controlled Materials.

Plastic polyethylene sheeting shall underlay all excavated Controlled Materials.

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

C. Temporary Waste Stockpile Area Maintenance

The Contractor shall provide all necessary materials, equipment, tools, and labor for anticipated activities at the temporary stockpile area. Such activities include, but are not limited to, handling and management of stockpiles and drummed CPC/PPE; uncovering and recovering stockpiles; maintenance of stockpiles; replacement of damaged components (i.e. sand bags, plastic polyethylene sheeting, hay bales, etc.); and waste inventory record management. The Contractor shall manage all materials at the temporary stockpile area in such a way as to minimize tracking of potential contaminated materials across the site and off-site and minimize dust generation.

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

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

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

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

Upon completion of the Project and following removal of all residual Controlled Materials, the Contractor shall dismantle the temporary stockpile area. During dismantling, the Contractor shall remove all materials such as polyethylene sheeting and sand bags. Materials shall be disposed of by the Contractor as solid waste in accordance with the Contract and all Federal, State, and local regulations.

D. Dewatering

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

E. Decontamination

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

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

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

F. Dust Control

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

1. Employ reasonable fugitive dust suppression techniques.
2. Visually observe the amounts of particulate and/or fugitive dust generated during the handling of Controlled Materials. If the apparent amount of fugitive dust and/or particulate matter is not acceptable to the Engineer, the Engineer may direct the Contractor to implement corrective measures at his discretion, including, but not limited to, the following:

    (a) apply water to pavement surfaces
    (b) apply water to equipment and excavation faces; and
    (c) apply water during excavation, loading, and dumping.

Method of Measurement:

The work of Controlled Material Handling will be measured for payment by the number of cubic yards of Controlled Material excavated within the AOECs and taken to the WSA. Material reused within project limits will not be measured for payment under this Item. This measurement shall be in accordance with and in addition to the quantity measured for payment of the applicable excavation item in Specification Sections 2.02, 2.03, 2.05, 2.06, or the Contract Special Provisions, as applicable. Excess excavations made by the Contractor beyond the payment limits specified in the Contract will not be measured for payment and the Contractor assumes all costs associated with the appropriate handling, management, and disposal of this material.

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

Basis of Payment:

This work shall be paid for at the Contract unit price, which shall include preparation of the WSA; all transportation from the excavation site to the WSA (including any intermediate handling steps); stockpiling Controlled Materials at the WSA; covering, securing, and maintaining the individual stockpiles at the WSA throughout the duration of the Project; dismantling the WSA; clean up; WSA site restoration; and all tools, equipment, material, and labor incidental to this work.

This price shall also include equipment decontamination; the collection of residuals generated during decontamination and placement of such material at the temporary stockpile area and the collection and disposal of liquids generated during equipment decontamination activities.

Handling and disposal of contaminated groundwater will be paid for under Item 0204210A. Payment for dust control activities shall be made under the appropriate Contract items.

Pay Item	Pay Unit
Controlled Materials Handling	C.Y.

ITEM #0201013A – REMOVAL OF EXISTING FENCE

Description: Work under this item shall consist of removing and disposing of existing chain link fence as shown on the plans.

Construction Methods: The Contractor shall remove fence fabric, fence posts, bracing and concrete footings. If concrete footings are removed the footing holes shall be filled with compacted granular fill material.

Method of Measurement: This work will be measured for payment by the number of linear feet of chain link fence removed and accepted, measured from outside to outside of terminal posts. Granular fill material as required for filling post holes shall not be measured for payment but shall be included in the cost of the item "Removal of Existing Fence".

Basis of Payment: This item will be paid for at the contract unit price per linear foot for "Removal of Existing Fence", which price shall include all materials, equipment, tools, excavation, backfill, disposal of surplus material and labor incidental thereto.

ITEM #0201030A – CLEARING AND GRUBBING (SITE NO. 1)

ITEM #0201031A – CLEARING AND GRUBBING (SITE NO. 2)

Work under this item shall conform to the requirements of Section 2.01, amended as follows:

Article 2.01.01 – Description: *Add the following:*

This item shall also include the stockpiling of woody debris from clearing and grubbing operations within the project limits for placement in the Wetland Mitigation Area.

This item shall also include the proper removal and disposal of bulky and solid waste in the vicinity of the wetland mitigation area as depicted on the plans or as directed by the Engineer.

The work under this item shall also include the removal of existing concrete blocks, concrete barriers, metal storage box, concrete posts, bollards, bushes, stumps, fallen timber, logs, roots, refuse, trash and debris, including industrial and household items, and all other miscellaneous items not covered elsewhere in the Specifications.

Add the following Article:

Article 2.01.02 – Materials: Woody debris to be stockpiled for use in the Wetland Mitigation Area shall consist of stumps, attached root crowns, and trunks of trees at least 10 inches in diameter. Trunks must be at least 4 feet but not greater 10 feet in length. As much as possible, these materials shall be in various stages of decomposition. Only natural woody material, free from construction materials or contaminants other than soil or plant material, shall be stockpiled. The woody debris must also be free from invasive plant species including, but not limited to, those identified in the NOTICE TO CONTRACTOR – INVASIVE PLANT SPECIES.

Article 2.01.03 – Construction Methods:
Add the following before the first paragraph:

With the exception of areas within 25 feet of wetlands and watercourses, the limits of clearing and grubbing for the project shall be to 10 feet beyond the excavation or fill line shown on the plans. In areas within 25 feet of wetlands or watercourses, the limits of clearing and grubbing shall be the limit of the sedimentation control system shown on the plans.

The Contractor shall stake out the excavation and fill lines at 65 foot intervals for the purposes of determining limits of clearing and grubbing in the field. Additional stakes will be required for determining clearing and grubbing limits within 25 foot of wetlands or watercourses as described under “Construction Staking”. After construction staking has been completed, the

sedimentation control systems shall be installed as shown on the plans to define in the field the limit of clearing and grubbing adjacent to wetlands and watercourses.

Delete the seventh paragraph, "The Contractor shall dispose of all ... from within the highway limits.", and replace with the following:

The Contractor shall dispose of all cleared trees, stumps, brush and similar cleared matter, except for woody debris described in Article 2.01.02, in a satisfactory manner and shall remove all rubbish and refuse from within the highway limits.

Handle woody debris cleared within the project limits in the following manner:

1. Separate woody debris cleared within the slope limits from other cleared material.
2. Stockpile woody debris in an approved area within the state-owned right-of-way. As space permits, stockpile the material adjacent to Wetland Mitigation Area in a location that will not conflict with proposed re-grading and topsoil stockpiling operations.
3. Dispose of all excess woody debris in a satisfactory manner.

Article 2.01.04 – Method of Measurement:

Add the following:

The work, materials, tools, equipment, labor and hauling incidental to the stockpiling of woody debris will not be measured for payment.

Article 2.01.05 – Basis of Payment:

After the second paragraph, add the following:

All costs incidental to the stockpiling of woody debris, including all work, materials, tools, equipment, labor and hauling, will be included in the lump sum price of "Clearing and Grubbing (Site No. X)."

All costs related to construction staking for the purposes of determining limits of clearing and grubbing shall be included in the lump sum price for “Construction Staking”.

Pay Item	Pay Unit
Clearing and Grubbing (Site No. 1)	L.S.
Clearing and Grubbing (Site No. 2)	L.S.

ITEM #0202315A – DISPOSAL OF CONTROLLED MATERIALS

Description:

Work under this Item shall consist of the loading, transportation, and final off-site disposal/ recycling/treatment of Controlled Materials (excluding dewatering fluids) that have been generated from various excavations within the Areas of Environmental Concern (AOECs), brought to the temporary stockpile area and determined to be contaminated with regulated substances at non-hazardous levels. This contamination is documented in the reports listed in the "Notice to Contractor – Environmental Investigations". The Controlled Materials, after proper characterization by the Engineer, shall be taken from the temporary stockpile area, loaded, transported to and treated/recycled/disposed of at a permitted treatment/recycle/disposal facility listed herein.

The Contractor must use one or more of the following Department-approved treatment/recycle/ disposal facilities for the disposal of non-hazardous materials:

Phoenix Soil, Inc. 130 Freight Street Waterbury, CT 06721 (203) 759-0533; Sue Benoit	Greenwood Street Landfill 30 Nipp Napp Trail Worcester, MA 06107 (508) 755-4604; Scott Sampson
ESMI of New York, LLC 304 Towpath Road Fort Edward, NY 12828 (860) 649-3344; Todd Calder	Ted Ondrick Company, LLC 58 Industrial Road Chicopee, MA 01020 (413) 592-2566; Alan Desrosiers
Waste Management Facility 161 New Lombard Road Chicopee, MA 01020 (603) 330-2149; Emily Brooks	South Hadley Landfill, Inc. 12 Industrial Drive South Hadley, MA 01075 (413) 535-3095; Tom Fields

Construction Methods:

A. Submittals

The apparent low bidder shall submit in writing, within fourteen (14) days after Bid opening, (1) a letter listing the names of the treatment/recycle/disposal facilities (from the list above) which the bidder, if it is awarded the Contract, will use to receive controlled material from this Project, (2) a copy of the attached "Disposal Facility Material Acceptance Certification" form from each facility, which shall be signed by an authorized representative of each treatment/recycle/disposal facility, and (3) a copy of the facility acceptance criteria and facility sampling frequency requirements from each facility.

Any other Contractor which the Department may subsequently designate as the apparent low bidder shall make the aforementioned submissions within fourteen (14) days from the date on which the Department notifies the Contractor that it has become the apparent low bidder. If, however, the Department deems it is necessary for such a subsequent-designated Contractor to make said submissions within a shorter period of time, the Contractor shall make those submissions within the time designated by the Department.

Failure to comply with all of the above requirements may result in the rejection of the bid.

No facility may be substituted for the one(s) designated in the Contractor's submittal without the Engineer's prior approval. If the material cannot be accepted by any of the Contractor's designated facilities, the Department will supply the Contractor with the name(s) of other acceptable facilities.

Disposal Facility Materials Acceptance Certification

Project Number: 310-0057

Project Location: Shore Line East Station, Guilford, CT

Facility Name: _____ Telephone: _____

Facility Address: _____ Fax: _____

_____

_____

The Contractor has supplied the analytical data contained in the report concerning the site investigation performed by the Designer. I have personally reviewed this data and intend to accept the following:

Controlled Materials as described in Item #0202315A Disposal of Controlled Materials for the subject Project at a cost of $_____ per ton for treatment/disposal and an additional $_____ per ton for transportation from the Project to the facility (if applicable).

This intent to accept the material will be subject to and dependent upon the facility's subsequent evaluation of waste characterization determination documentation to be provided to the Contractor by the Engineer.

Authorized Facility
Representative_____/_____
Printed/Typed Name Title

_____/_____
Signature Date

Note: The facility shall attach the acceptance criteria and facility sampling frequency requirements to this document.

DO NOT ALTER FORM IN ANY WAY. FORM MUST BE COMPLETED IN ENTIRETY.

B. Material Disposal

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

The Contractor shall obtain and complete all paperwork necessary to arrange for material disposal (such as disposal facility waste profile sheets). It is solely the Contractor's responsibility to coordinate the disposal of Controlled Materials with his selected treatment/ recycling/disposal facility(s). Upon receipt of the final approval from the facility, the Contractor shall arrange for the loading, transport, and treatment/recycling/disposal of the materials in accordance with all Federal and State regulations. **No claim will be considered based on the failure of the Contractor's selected disposal facility(s) to meet the Contractor's production rate or for the Contractor's failure to select sufficient facilities to meet its production rate.**

Any material processing (removal of woody debris, scrap metal, pressure-treated and untreated wood timber, large stone, concrete, polyethylene sheeting or similar material) required by the Contractor's selected facility will be completed by the Contractor prior to the material leaving the site. It is solely the Contractor's responsibility to meet any such requirements of its facility. Any materials removed shall be disposed of or recycled in a manner acceptable to the Engineer at no additional cost. If creosote treated timbers are removed, they will be disposed of under the item "Disposal of Contaminated Timber Piles", "Disposal of Contaminated Railroad Ties" or in accordance with Article 1.04.05 in the absence of such items.

All manifests or bills of lading utilized to accompany the transportation of the material shall be prepared by the Contractor and signed by an authorized Department representative, as Generator, for each truckload of material that leaves the site. The Contractor shall forward the appropriate original copies of all manifests or bills of lading to the Engineer the same day the material leaves the Project.

A load-specific certificate of treatment/recycling/disposal, signed by the authorized agent representing the disposal facility, shall be obtained by the Contractor and promptly delivered to the Engineer for each load.

C. Material Transportation

In addition to all pertinent Federal, State, and local laws or regulatory agency polices, the Contractor shall adhere to the following precautions during the transport of Controlled Materials off-site:

- Transported Controlled Materials are to be covered sufficiently to preclude the loss of material during transport prior to leaving the site and are to remain covered until the arrival at the selected treatment/recycling/disposal facility.

- All vehicles departing the site are to be properly logged to show the vehicle identification, driver's name, time of departure, destination, and approximate volume, and contents of materials carried.

- No materials shall leave the site unless a treatment/recycling/disposal facility willing to accept all of the material being transported has agreed to accept the type and quantity of waste.

D. Equipment Decontamination

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

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

The Contractor shall use dry decontamination procedures. Residuals from dry decontamination activities shall be collected and managed as Controlled Materials. If the results from dry methods are unsatisfactory to the Engineer, the Contractor shall modify decontamination procedures as required.

The Contractor shall be responsible for the collection and treatment/recycling/disposal of any liquid wastes that may be generated by its decontamination activities in accordance with applicable regulations.

Method of Measurement:

The work of "DISPOSAL OF CONTROLLED MATERIALS" will be measured for payment as the actual net weight in tons of material delivered to the treatment/recycling/disposal facility. Such determinations shall be made by measuring each hauling vehicle on the certified permanent

scales at the treatment/recycling/disposal facility. Total weight will be the summation of weight bills issued by the facility specific to this Project. Excess excavations made by the Contractor beyond the payment limits specified in Specification Sections 2.02, 2.03, 2.05, 2.06, or the Contract Special Provisions (as appropriate) will not be measured for payment and the Contractor assumes responsibility for all costs associated with the appropriate handling, management, and disposal of this material.

The disposal of excavated materials, originally anticipated to be Controlled Materials, but determined by characterization sampling not to contain concentrations of regulated chemicals (non-polluted or "clean" materials) will not be measured for payment under this Item but will be considered as surplus excavated materials and shall be handled in accordance with Article 1.04.05.

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

Any material processing required by the Contractor-selected disposal facility, including the proper disposal of all removed materials other than creosote treated wood, will not be measured for payment.

Basis of Payment:

This work shall be paid for at the Contract unit price, which shall include the loading and transportation of Controlled Materials from the temporary stockpile area to the treatment/recycling/disposal facility; the fees paid to the facility for treatment/recycling/disposal; the preparation of all related paperwork; and all equipment, materials, tools, and labor incidental to this work. **This unit price will be applicable to all of the Contractor-selected disposal facilities and will not change for the duration of the Project.**

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

Pay Item	Pay Unit
Disposal of Controlled Materials	Ton

ITEM #0202640A – 2" GROUNDWATER MONITORING WELL ABANDONMENT

Description:

Work under this Item shall consist of the abandonment of groundwater monitoring wells by a registered well driller at locations shown on the Plans or as directed by the Engineer. The well driller must be registered in the State of Connecticut.

Materials:

The grout used to seal the groundwater monitoring wells shall be a bentonite cement grout complying with RCSA 25-128-36(E). The mix shall be comprised of one (1) ninety-four (94) pound bag of portland cement, an equal volume of dry sand, and five to six gallons of water with ten percent (10%) bentonite added to reduce shrinkage. The Contractor shall not use admixtures to decrease the set time of the grout.

Construction Methods:

The Contractor shall submit the name of the registered driller and a copy of their Certificate of Registration, as indicated in the Connecticut Department of Consumer Protection Regulations Section 25-129, at least fourteen (14) days prior to starting well abandonment work.

Wells shall be abandoned prior to the commencement of any earthwork. The Contractor shall coordinate the work of monitoring well abandonment with the Engineer. No such work shall be performed without the Engineer present to verify abandonment procedures.

Wells shall be abandoned in accordance with the Connecticut Department of Consumer Protection Regulations, particularly Sections 25-128-56 and 25-128-57. In the event of any conflict between the regulations and this specification, the more stringent shall apply.

Well Abandonment Procedure:

1. The well shall be plugged to prevent the entrance of surface water, circulation of water between or among producing zones, or any other process resulting in the contamination or pollution of ground water resources.
2. The well shall be chlorinated prior to abandonment using a chlorine solution with a minimum concentration of 150 ppm of chlorine.
3. The well shall be checked from land surface to the entire depth of the well before it is sealed to ensure against the presence of any obstruction that will interfere with sealing operations.
4. The well bore shall be completely filled and sealed with bentonite cement grout.
5. The grout material shall be placed in such a way to prevent voids in the grout or dilution of the grout.

6. Any test well or bore shall be abandoned in such a manner that it does not become a channel for the vertical movement of water or other substance to the potable ground water resources.
7. Upon completion of abandonment of the well, the top of the casing and grout material shall not be terminated more than four feet below the ground surface of the final grade.

Method of Measurement:

Monitoring well abandonment will be measured for payment by the number of groundwater monitoring wells abandoned at locations shown on the Plans and directed by the Engineer.

Basis of Payment:

This work shall be paid for at the Contract unit price per well abandoned. This unit price shall include all equipment, materials and labor, including the furnishing of specialty services and specialized equipment, backfilling, excavation, and implementation of health and safety provisions incidental to the abandonment of the groundwater monitoring wells.

Pay Item	Pay Unit
2” Groundwater Monitoring Well Abandonment	Ea.

ITEM #0210100A – ANTI-TRACKING PAD

Description: Work under this item shall consist of the installation, maintenance, and removal of anti-tracking pad(s), in accordance with the contract plan details at the plan locations or as ordered by the Engineer. Where anti-tracking pads are to be installed adjacent to paved surfaces with curbing, the work shall include the removal of the curbing and the replacement of the curbing when the pad is removed.

Materials: The crushed stone for this work shall conform to the requirements of Article M.01.01 for No. 3 coarse aggregate. Geotextile shall conform to the requirements of Article M.08.01-26. Materials incidental to and necessary for the installation of the geotextile, such as, but not limited to sewing thread, staples, pins, etc., shall conform to the requirements of the manufacturer of the geotextile.

Materials for the curbing, shall conform to the requirements of Division III, Materials, Section, of the Standard Specifications, for the appropriate curbing type.

Construction Methods: The area(s) on which the anti-tracking pad(s) are to be placed shall be shaped to a reasonably true surface prior to the installation of the geotextile. The geotextile shall be installed at the location(s) and to the dimensions as shown on the plans or as directed by the Engineer. Geotextile shall be installed as recommended by the manufacturer for the specific use. Crushed stone shall be placed over the geotextile to the depth shown on the plans and shall be finished to a smooth uniform surface matching into the surrounding grade.

The Contractor shall add crushed stone and regrade the pad during the construction phase as required to maintain the depth of stone as noted on the plans. Upon completion of work at a site, the anti-tracking pad(s) shall be removed in its entirety and the site restored to its original condition.

Excavated material from the installation of the anti-tracking pad(s) shall be stockpiled by the Contractor and shall be used for the restoration of the site when the pad is removed with the following exception. When pad(s) are required in Areas of Environmental Concern (AOEC), excavated material shall be handled and transported in accordance with the project environmental requirements.

At locations where the anti-tracking pad is adjacent to a paved surface with curbing, the Contractor shall remove the curbing from the pavement in a manner to minimize any damage to the pavement. The anti-tracking pad shall be installed to match the pavement grade.

Upon removal of the pad(s), the Contractor shall construct replacement curbing matching the material, dimensions and details of the existing curbing at the site. Construction of the curbing shall be in general accordance with the Standard Specifications for the appropriate curbing material type (concrete, stone, or bituminous).

Method of Measurement: This work shall be measured by the actual number of square yards of completed and accepted anti-tracking pad(s).

Basis of Payment: This work will be paid for at the contract unit price per square yard for "Anti-Tracking Pad" which price shall include all excavation, backfill, stockpiling of material, handling and transport of excavated material within AOECs, removal of curbing, disposal of surplus material, crushed stone, geotextile, backfill, tack coat, curbing and all equipment, tools, labor and materials incidental to the installation, maintaining and removal of the anti-tracking pad(s) and adjacent curbing.

Pay Item	Pay Unit
Anti-Tracking Pad	s.y.

ITEM #0304002A – PROCESSED AGGREGATE BASE

Description: The base shall consist of a foundation constructed on the prepared subbase or subgrade in accordance with these specifications and in conformity with the lines, grades and compacted thickness as shown on the plans.

Materials: All materials for this work shall conform to the requirements of Subarticles M.05.01-1, M.05.01-2 and M.05.01-3.

Construction Methods: Coarse aggregate shall be either gravel, broken stone or reclaimed miscellaneous aggregate, the latter containing no more than 2 percent by weight of asphalt cement, at the option of the Contractor. However, only one type of coarse aggregate shall be used on the Project unless otherwise permitted by the Engineer.

Prior to placing the processed aggregate base, the prepared subbase or subgrade shall be maintained true to line and grade, at all times, for a minimum distance of 200 feet in advance of the work. In addition, none of the aggregate courses shall be placed more than 500 feet ahead of the compaction and binding operation on that particular course.

The processed aggregate base shall be spread uniformly by a method acceptable to the Engineer. The thickness of each course shall not be more than 4 inches after compaction, unless otherwise permitted by the Engineer.

After the aggregate is spread, it shall be thoroughly compacted and bound by use of equipment specifically manufactured for that purpose. Rollers shall deliver a ground pressure of not less than 300 pounds per lineal inch of contact width and shall weigh not less than 10 tons. Vibratory units shall have static weight of not less than 4 tons. Water may be used during the compaction and binding operation and shall be applied from an approved watering device. The compacting and binding operation shall begin at the outside edges, overlapping the shoulders for a distance of not less than 6 inches and progress towards the middle, parallel with the centerline of the pavement. The work shall cover the entire surface of the course with uniform overlapping of each preceding track or pass. Areas of super-elevation and special cross slope shall be compacted by beginning at the lowest edge and proceeding towards the higher edge, unless otherwise directed by the Engineer. The compacting and binding operation shall be continued until the voids in the aggregates have been reduced to provide a firm and uniform surface satisfactory to the Engineer.

All aggregate shall be completely compacted and bound at the end of each day's work or when traffic is to be permitted to operate on the road.

The thickness shall be as indicated on the plans, or as ordered by the Engineer and within a tolerance of minus three-fourths of an inch (-3/4") to plus one-half inch (+1/2"). Measurements to determine the thickness will be taken by the Engineer at intervals of 500 feet or less, along

lanes, and shall be considered representative of the lane. For the purpose of these measurements, a shoulder will be considered a lane.

If a thickness measurement is taken and found deficient, the Engineer will take such additional measurements as he considers necessary to determine the longitudinal limits of the deficiency. Areas not within allowable tolerances shall be corrected, as ordered by the Engineer.

The dry density of each layer of processed aggregate base after compaction shall not be less than 95 percent of the dry density for that material when tested in accordance with AASHTO T180, Method D. If a layer is formed from reclaimed miscellaneous aggregate containing bituminous concrete, the wet density after compaction on this layer shall not be less than 95 percent of the wet density for that processed aggregate when tested in accordance with AASHTO T180, Method D.

Should the subbase or subgrade material become churned up or mixed with the processed aggregate base, the Contractor shall remove the mixture and repair the area in a manner acceptable to the Engineer.

Any surface irregularities or segregation which develops shall be corrected by loosening material already in place and removing or adding aggregate as required, after which the effected area, including the surrounding surface, shall be compacted and bound until it is brought to a firm and uniform surface satisfactory to the Engineer.

Method of Measurement: Processed Aggregate Base will be measured in place after final grading and compaction.

Basis of Payment: This work will be paid for at the contract unit price per cubic yard for "Processed Aggregate Base", complete in place, which price shall include all materials, tools, equipment and work incidental thereto.

Pay Item	Pay Unit
Processed Aggregate Base	C.Y.

ITEM #0402903A – BRICK PAVING

Description: This item shall consist of providing and installing brick paving in accordance with these specifications and in conformity with the lines, grades as shown on the plans. Brick Paving shall also include the work and materials for preparation of subgrade, paver base, sand bedding and joint sand.

Materials: Brick paving shall be Nicolock Holland Stone or approved equal. The color shall be "Granite City Gray" or otherwise approved equal. Brick pavers shall meet the requirements of ASTM C 936, standard specification for solid concrete interlocking paving units, which requires an average minimum compressive strength of 8,000 psi and a maximum water absorption of 5%. Granular fill base, sand bedding and joint sand shall meet paver manufacturer's specifications.

Construction Methods: Pattern shall conform to Town of Guilford Standard Brick Paver requirements. Preparation of subgrade, paver base, sand bedding and joint sand shall be installed in accordance with manufacturer's specifications and recommendations.

Method of Measurement: Brick Paving will be measured in place after completion.

Basis of Payment: This work will be paid for at the contract unit price per square foot for "Brick Paving", complete in place, which price shall include all materials, tools, granular fill base, bedding sand, joint sand, brick pavers, equipment and work incidental thereto.

Pay Item	Pay Unit
Brick Paving	s.f.

ITEM #0406999A – ASPHALT ADJUSTMENT COST

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

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

The asphalt adjustment cost will be based on the variance in price for the performance-graded binder component of hot mix asphalt (HMA) mixtures completed and accepted in the contract.

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

a) The HMA mixture in which the adjustment is being applied is listed as a contract item with a pay unit of tons or metric tons.

b) The total quantity for all HMA mixtures in a contract or individual purchase order (Department of Administrative Service contract awards) exceeds 1000 tons or more.

c) The difference between the posted *Asphalt Base Price* and *Asphalt Period Price* varies by more than $5.00.

The Connecticut Department of Transportation (ConnDOT) shall post on its website, the average per ton selling price (asphalt price) of the performance-graded binder. The average is based on the high and low selling price published in the most recent available issue of the **Asphalt Weekly Monitor®** furnished by Poten & Partners, Inc. under the "East Coast Market – New England, New Haven, Connecticut area", F.O.B. manufacturer's terminal.

The selling price furnished from the Asphalt Weekly Monitor ® is based on a standard ton (US$/ST). The metric ton price is determined by applying a factor of 1.1023 (US$/ST x 1.1023 = US$/mton). Example: $150.00/ton x 1.1023 = $165.34/mton

Formula: $\text{HMA} \times \frac{\text{PG\%}}{100} \times [(\textit{Period Price} - \textit{Base Price}] = \$ \_\_\_\_$

- HMA: The quantity (tons or metric tons) of accepted HMA mixture measured and accepted for payment.

- *Asphalt Base Price*: The asphalt price that is posted on the ConnDOT website 28 days before the actual bid opening posted.

- *Asphalt Period Price*: The asphalt price that is posted on the ConnDOT website for the period in which the HMA mixture is placed.

- Performance-Graded Binder percentage (PG%) for HMA mixes:

  PG% = 4.5
  - For Superpave 37.5mm (1.5 inch), Superpave 25.0mm (1.0 inch), HMA S1, and Class 4

  PG % = 5.0
  - For Superpave 12.5mm (0.50 inch), HMA S0.5 and Class 1.

  PG % = 6.0
  - For Superpave 0.375 inch (9.5mm), HMA S0.375, Superpave 6.25mm (0.25 inch), HMA S0.25, Superpave 4.75mm (#4) and Class 2.

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

Basis of Payment: The "Asphalt Adjustment Cost" will be calculated using the formula indicated above. A payment will be made for an increase in costs. A deduction from monies due the Contractor will be made for a decrease in costs.

The sum of money shown on the estimate, and in the itemized proposal as "Estimated Cost", for this item will be considered the bid price although payment will be made as described above. The estimated cost figure is not to be altered in any manner by the bidder. If the bidder should alter the amount shown, the altered figure will be disregarded and the original cost figure will be used to determine the amount of the bid for the Contract.

ITEM #0601651A - RETAINING WALL (SITE NO. 1)
ITEM #0601652A - RETAINING WALL (SITE NO. 2)
ITEM #0601653A - RETAINING WALL (SITE NO. 3)

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 Corporation
7 West Main Street
Plainville, CT 06062
(860) 793-0295

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 7.14.03.

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 One Million Dollars ($1,000,000). 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:

- Plan sheets shall be approximately 24" x 36".
- Stamped by a licensed Professional Engineer (Connecticut).
- Full plan view of the wall drawn to scale. The plan view must reflect the horizontal alignment and offset from the horizontal control line to the face of the wall. Beginning and ending stations, all utilities, signs, lights, etc. that affect the construction along with all property lines and easement lines adjacent to the wall shall be shown.

- Full elevation view of the wall drawn to scale. Elevation views should indicate the elevation at the top and bottom of walls, horizontal and vertical break points, and the location of finished grade.

- Typical cross sections drawn to scale including all appurtenances. Detailed cross section should be provided at significant reinforcement transitions such as wall ends.

- Details of all wall components and their connections such as the length, size and type of 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. <u>Design Computations:</u>

- 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 full size (approximately 24" x 36") mylar sheets and five sets of full size blue line copies.

The final submission shall be made within 14 days of acceptance by the 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.

The top of the moment slab shall be designed to match the elevation and grade of the top of subbase as shown on the plans. The top of the moment slab shall be protected with membrane waterproofing woven-glass fabric as shown on the 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. Membrane waterproofing: Membrane waterproofing materials shall conform to the requirements of Article M.12.04 for primer, woven glass fabric saturated with asphalt, seal coat, and for asphalt flashing cement.

h. 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.

Membrane Waterproofing shall be installed on the moment slab in accordance with the requirements of Section 7.03.03.

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 (SITE NO. X)", 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.

ITEM #0603169A – PROGRESS PHOTOGRAPHS

Description:

Under this item, the Contractor shall engage a qualified commercial photographer to take photographs during construction. The photographer shall be a firm or an individual of established reputation that has been regularly engaged as a professional photographer for not less than 3 years.

At the Preconstruction Meeting, submit to the Designer for approval the name of the photographer whom will be responsible for taking the photographs during construction.

Submit photos of each view within seven (7) calendar days of taking photographs. Four (4) photographic sets of photos shall be submitted. ALL photos shall be submitted in IBM-PC compatible digital format on compact disc (CD). Other than the photo thumbnail index required for submission with each CD, no other hardcopy photos shall be required for the project. One (1) set of photos (on CD) of each submittal shall be sent directly to each of the following offices:

1. Manager of State Design, Office of Facilities Design, Connecticut Department of Transportation, 2800 Berlin Turnpike, P.O. Box 317546, Newington, CT 06131-7546, Attention: Mr. Scott A. Hill, Room 3405NW.
2. District 1 Construction, Connecticut Department of Transportation, Project Chief Inspector's Construction Trailer.
3. Bureau of Public Transportation, Office of Transit and Ridesharing, Connecticut Department of Transportation, 2800 Berlin Turnpike, P.O. Box 317546, Newington, CT 06131-7546, Attention: Mr. Michael A. Sanders, Room 1329NW.

Each CD and CD jewel case shall be labeled with the name of the project, State project number, name of the Contractor, date of submission, and name and address of the photographer.

Materials:

Provide digital images in IBM-PC compatible JPEG format, with uncompressed (open) image size equal to or greater than the following dimensions: Pixel Dimensions = 1596 x 2000; Resolution = 200 pixels/inch. JPEG compression for each image shall equal "Quality 7" (High). Images shall be color (RGB mode).

Digital Cameras used for the purpose of creating the above noted image files shall have a minimum sensor size of 3.3 million pixels.

Image files shall be named and a photo thumbnail index created with the following file naming convention: *Project number date of submission_photo number.jpg*

For example: If the first set of photos on CD for project number 0402-0002, is submitted on 12/13/01, the first photo of the submission shall be file named: 04020002_121301_1.jpg and the tenth photo of the set shall be file named: 04020002_121301_10.jpg. In the second set of photos on CD, submitted 1/12/02, the first photo of the set shall be file named: 04020002_011202_1.jpg

A hardcopy "Photo Thumbnail" index shall be provided with each CD submission. The photo thumbnails shall be printed on 8 ½" x 11" "glossy photo quality" ink jet paper with a minimum 720 dot-per-inch ink jet printer. The thumbnail images shall be a minimum 200 x 250 pixels at 200 pixel per inch resolution. The file names shall be located under each image. The thumbnail images shall be arranged so that they can all be contained on a single 8 ½-in by 11-in inkjet print. *For example*, 35 images would be arranged in five (5) columns and seven (7) rows. The CD shall also contain the digital file of the photo thumbnail index in jpeg format. The file shall share the same format as the above noted photo file format but the word "index" shall be placed in the location of the photo number. *For example*: 04020002_121301_index1.jpg

A hardcopy 8 ½" x 11" key plan with an arrow for each photograph taken shall be provided with each CD submission. Each arrow shall be labeled with the corresponding photograph number and shall be oriented to show the point of view of the photograph.

In lieu of using a digital camera to provide the above noted image files, standard 35 mm cameras and 35 mm color negative film may be used to take the images, and the images may then be captured as a digital file through the use of a designated 35mm film scanner. The 35mm scanner must have the following minimum specifications: 2700 dot per inch optical resolution; 3.4 Dmax; 36 bit color depth. The use of flatbed scanners shall not be permitted for this purpose.

Project progress photos shall be submitted as digital files on write-once CD-ROM in a jewel case on a monthly basis. **All subsequent CD submissions shall include the image files of the previous submissions and an updated hardcopy of the photo thumbnail index that contains all current and previous photos.**

Construction Methods:

Where used herein, one set of photographs will be defined as Thirty Five (35) photographs.

Before starting construction, take one set of color photographs of the site and surrounding properties from different points of view as selected by the Engineer. Take photographs to show existing conditions to the property before starting Work. Take photographs of existing buildings either on or adjoining the property in sufficient detail to record accurately the physical conditions at the start of construction.

Take one set of color photographs at no greater than monthly intervals, coinciding as closely as possible with the completion of a major construction phase. The photographer shall select the vantage points for each shot each month to best show the status of construction and progress since the last photographs were taken. Prior to taking any photographs, review the proposed

vantage points for each shot with the Engineer. Photographs are for a record of the progress of work. Therefore, they shall be taken at a maximum interval of one month, whether or not they show any completion of work performed during the preceding month.

Take one set of color photographs upon notification by the Engineer of Final Inspection of the Project. Prior to taking any photographs, review the proposed vantage points for each shot with the Engineer. Take photographs from opposing views of the site in an effort to display various characteristics of the new construction.

Method of Measurement:

This work will be measured for payment by the number of photographic sets submitted to the Engineer. "Each" photographic set shall be defined as Thirty Five (35) photographs. For purposes of bidding, the pay unit for a photographic set shall be "Each."

Basis of Payment:

This work will be paid for at the Contract unit price each for "Progress Photographs" which price shall include all material, equipment, and labor incidental thereto. Where any submission's image files do not conform to the requirements herein, the Contractor shall not receive any payment for the item.

Pay Item	Pay Unit
Progress Photographs	ea.

ITEM #0603169A

ITEM #0702026A – MICROPILES

ITEM #0702027A – VERIFICATION TEST FOR MICROPILES

ITEM #0702028A – PROOF TEST FOR MICROPILES

ITEM #0702029A – MICROPILE LENGTH ADJUSTMENT

Description: This work shall consist of constructing micropiles as shown on the contract plans and approved working drawings and as specified herein. The Contractor is responsible for furnishing all design, materials, products, accessories, tools, equipment, services, transportation, labor and supervision, and manufacturing techniques required for design, installation and testing of micropiles and micropile top attachments for this project.

The Contractor shall select the micropile type, size, pile top attachment, installation means and methods, estimate the ground-grout bond value and determine the required grout bond length and final micropile diameter. The Contractor shall design and install micropile that will develop the load capacities indicated on the plans. The micropile load capacities shall be confirmed by verification and proof load testing as required and must meet the test acceptance criteria specified herein.

Materials: Furnish materials new and without defects. Materials for micropiles shall consist of the following:

Admixtures for Grout: Admixtures shall conform to Article M.03.01 of the Form 816. Accelerators are not permitted. Expansive admixtures and admixtures containing chlorides are not permitted.

Cement: All cement shall be Portland cement conforming to ASTM C 150/AASHTO M85, Types II, III or V.

Centralizers and Spacers: Centralizers and spacers shall be fabricated from schedule 40 PVC pipe or tube, steel, or material non-detrimental to the reinforcing steel. Wood shall not be used. Centralizers and spacers shall be securely attached to the reinforcement; sized to position the reinforcement within ½ inch of plan location from center of pile; sized to allow grout tremie pipe insertion to the bottom of the drillhole; and sized to allow grout to freely flow up the drillhole and casing and between adjacent reinforcing bars.

Grout: Neat cement or fine aggregate/cement mixture. The designer is responsible for indicating the 3 day and 28 day compressive strengths. The grout shall conform to the specification AASHTO T106/ASTM C109 and to any minimum and/or maximum properties shown on the plans. The grout shall conform to Article M.03.01 of the Form 816.

Permanent Casing Pipe: Permanent steel casing/pipe shall conform to required minimum and/or maximum properties shown on the plans. The permanent steel casing/pipe shall be

designed to withstand the design service loadings shown on the plans and the proof/verification tests loading described in this specification. The steel casing/pipe shall conform to one or more of the following specifications ASTM 252, ASTM 106, or API (N-80). The designer will be responsible for indicating the applicable material specification(s) and any welding or fabrication conditions that apply.

Reinforcing Bars: Reinforcing steel shall be deformed bars in accordance with ASTM A615/AASHTO M31. The grade, thickness and number of bars shall be indicated by the designer and shall conform to any minimum and/or maximum properties shown on the plans. Continuous spiral deformations (i.e. continuous threadbars) shall be used. Bar tendon couplers, if required, shall develop the ultimate tensile strength of the bars without evidence of any failure.

Construction Methods:

1 - Contractor's Experience Requirements:

The micropile Contractor shall be experienced in the construction and load testing of micropiles and have successfully constructed at least 5 projects in the last 5 years involving construction totaling at least 100 micropiles of similar capacity to those required in these plans and specifications.

The Contractor shall have previous micropile drilling and grouting experience in soil/rock similar to project conditions. The Contractor shall submit construction details, structural details and load test results for at least three previous successful micropile load tests from different projects of similar scope to this project.

The Contractor shall assign a professional engineer, licensed in the State of Connecticut, to supervise the work. This engineer shall have experience on at least 10 projects of similar scope to this project completed over the past 5 years. The Contractor shall not use manufacturers' representatives to satisfy the supervising engineer requirements of this section. The contractor may use a single independent consultant for this purpose, provided the consultant has specific experience as listed above, and operates their business specifically for the purpose of transferring technology and skills in micropiling to contractors. The on-site foremen and drill rig operators shall also have experience on at least 10 projects over the past 5 years installing micropiles of equal or greater capacity than required in these plans and specifications.

The Contractor shall assign a professional engineer, licensed in the State of Connecticut, to design the micropiles. This engineer shall have experience in the design of at least 3 successfully completed micropile projects over the past 5 years, with micropiles of similar capacity to those required in these plans and specifications. This engineer shall also be responsible for design, supervision and reporting of the verification and proof test(s).

At least 45 calendar days before the planned start of micropile construction, the Contractor shall submit 5 copies of the completed project reference list and a personnel list. The project reference list shall include a brief project description with the owner's name and current phone number and load test reports. The personnel list shall identify the supervising project engineer, drill rig operators, and on-site foremen to be assigned to the project. The personnel list shall contain a

summary of each individual's experience and be complete enough for the Engineer to determine whether each individual satisfies the required qualifications.

Work shall not start, nor materials ordered, until the Engineer's written approval of the Contractor's experience qualification is given. The Engineer may suspend work if the Contractor uses non-approved personnel. If work is suspended, the Contractor shall be fully liable for all resulting cost and no adjustment in contract time will result from the suspension.

2-Micropile Design Requirements and Submittals

The micropiles shall be designed to meet the specific loading conditions, as shown on the plans and approved working drawings. Design the micropiles and pile top to footing connections using the Service Load Design (SLD) procedures contained in the FHWA "Micropile Design and Construction Guidelines Manual", Report No. FHWA-SA-97-070 and the "Connecticut Department of Transportation Bridge Design Manual".

The required geotechnical safety factors/strengths factors (for SLD Design) shall be 2.0, unless specified otherwise. Estimated applied foundation loading, easements, rights-of-way and other applicable design criteria will be as shown on the plans or specified herein. Structural design of any individual micropile structure elements not covered in the FHWA manual shall be by the SLD method in conformance with appropriate articles of the most current Edition of the AASHTO Standard Specification for Highway Bridges, including current interim specifications.

Steel pipe used for micropile permanent casing shall incorporate an additional 1/16" thickness for sacrificial steel corrosion protection.

Where required as shown on the plans, corrosion protection of the internal steel reinforcing bars, consisting of either encapsulation, epoxy coating, or grout, shall be provided in accordance with the Material portion of this specification. Where the permanent casing is used for a portion of the micropile, encapsulation shall extend at least 5ft into the casing.

The Contractor shall prepare and submit to the Engineer working drawings. Working drawings shall be submitted in accordance with Article 1.05 of the Form 816. The working drawings shall include all information required for the design, plans, construction and quality control of the piling. This information should include the following, but not necessarily be limited to;

1. Design Computations

    a. A written summary report which describes the overall micropile design.
    b. Applicable code requirements and design references.
    c. Micropile structure critical design cross-section(s) geometry including soil/rock strata and piezometric levels and location, magnitude and direction of applied loadings, including slope or external surcharge loads.
    d. Design criteria including, soil/rock shear strengths (friction angle and cohesion), unit weights, and grout-to-ground bond values and micropile drillhole diameter assumptions for each soil/rock strata.

e. Safety factors/strength factors used in the design of the ground-grout bond values, surcharges, soil/rock and material unit weights, steel, grout and concrete materials.

f. Design calculation sheets with the project number, micropile structure location, designation, date of preparation, initials of designer and checker, and page number at the top of each page. Provide an index page with the design calculations.

g. Design notes including an explanation of any symbols and computer program used in the design.

h. Pile to footing connection calculations.

2. Plans

a. A plan view of the micropile structures identifying;

i. A reference baseline and elevation datum.

ii. The offset from the construction centerline or baseline to the face of the micropile structure at all changes in horizontal alignment.

iii. Beginning and end of micropile structure stations.

iv. Right-of-way and permanent or temporary construction easement limits, location of all known active and abandoned utilities, adjacent structures or other potential interference. The centerline of any drainage structure or drainage pipe behind, passing through or passing under the micropile structure.

v. Subsurface exploration locations shown on the plan view of the proposed micropile structure alignment with appropriate reference baselines to fix the locations of the exploration relative to the micropile structure.

b. An elevation view of the micropile structure(s) identifying;

i. Elevation view showing micropile locations and elevations; vertical and horizontal spacing; batter and alignment and the location of drainage elements (if applicable).

ii. Existing and finish grade profiles both behind and in front of the micropile structure.

c. Design parameters and applicable codes.

d. General notes for constructing the micropile structure including construction sequencing or other special construction requirements.

e. Horizontal and vertical curve data affecting the micropile structure and micropile structure control points. Match lines or other details to relate micropile structure stationing to centerline stationing.

f. A listing of the summary of quantities on the elevation drawing of each micropile structure showing pay item estimated quantities.

g. Micropile typical sections including micropile spacing and inclination; minimum

drillhole diameter; pipe casing and reinforcing bar size and details; splice type and locations; centralizers and spacers; grout bond zone and casing plunge length (if used); corrosion protection details; and connection details to the substructure footing, anchorage, plates, etc.

h. A typical detail of verification and production proof test micropiles defining the micropile length, minimum drillhole diameter, inclination, and load test bonded and unbonded test lengths.

i. Details, dimensions and schedules for all micropiles, casing and reinforcing steel, including reinforcing bar bending details.

j. Details for constructing micropile structures around drainage facilities (if applicable).

3. Construction Procedures

a. Detailed step-by-step description of the proposed micropile construction procedure, including personnel, testing and equipment to assure quality control. This step-by-step procedure shall be shown in sufficient detail to allow the Engineer to monitor the construction and quality of the micropiles.

b. Proposed start date and time schedule and micropile installation schedule providing the following:

i. Micropile number.

ii. Micropile design load.

iii. Type and size of rebar.

iv. Minimum total bond length.

v. Total micropile length.

vi. Micropile top footing attachment.

c. If welding of casing is proposed, submit the welding procedure. All welding shall be done in accordance with the current AWS Structural Welding Code.

d. Information on space requirements for installation equipment that verify the proposed equipment can perform at the site.

e. Plan describing how surface water, drill flush, and excess waste grout will be controlled and disposed.

f. Certified mill test reports for the reinforcing steel and for permanent casing. The ultimate strength, yield strength, elongation, and material properties composition shall be included. For API N-80 pipe casing, coupon test results may be submitted in lieu of mill certification.

g. Proposed Grouting Plan. The grouting plan shall include complete descriptions, and details for the following:

i. Grout mix design and type of materials to be used in the grout including certified test data and trial batch reports. The Contractor shall also provide specific gravity of the wet mix design.

ii. Methods and equipment for accurately monitoring and recording the grout depth and grout volume as the grout is being placed.

iii. Estimated curing time for grout to achieve specified strength. Previous test results for the proposed grout mix completed within one year of the start of grouting may be submitted for initial verification and acceptance and start of production work. During production, grout shall be tested in accordance with Article M.03.01 of the Form 816.

iv. Procedure and equipment for Contractor monitoring of grout quality. At a minimum, the Contractor shall be required to use a Baroid Mud Balance (per API RP-13B-1) to check the specific gravity of the mixed grout prior to placement of the grout into each drilled micropile.

4. Detailed plans for the proposed micropile load testing method. This shall include all drawings, details, and structural design calculations necessary to clearly describe the proposed test method, reaction load system capacity and equipment setup, types and accuracy of apparatus to be used for applying and measuring the test loads and pile top movements in accordance with this specification.

5. Calibration reports and data for each test jack, pressure gauge and master pressure gauge and electronic load cell to be used. The calibration tests shall have been performed by an independent testing laboratory, and tests shall have been performed within 90 calendar days of the date submitted. Testing shall not commence until the Engineer has reviewed and accepted the jack, pressure gauge, master pressure gauge and electronic load cell calibration data.

Work shall not begin until the construction submittals have been received, reviewed, and accepted in writing by the Engineer. Any submittals that are found to be unacceptable by the engineer shall be revised, resubmitted and accepted prior to commencing work.

3 - Pre-construction Meeting.

A pre-construction meeting will be scheduled by the Engineer and held prior to the start of micropile construction. The design Engineer, supervising Engineer, prime Contractor, and micropile specialty Contractor, shall attend the meeting. Attendance is mandatory. The pre-construction meeting will be conducted to clarify the construction requirements for the work, to coordinate the construction schedule and activities, and to identify contractual relationships and delineation of responsibilities amongst the prime Contractor and the various Subcontractors – specifically those pertaining to excavation for micropile structures, installation of temporary sheeting, anticipated subsurface conditions, micropile installation and testing, micropile structure survey control and site drainage control.

4 - Site Drainage Control.

The Contractor shall control and properly dispose of drill flush and construction related waste, including excess grout, in accordance with Section 1.10 of the Form 816, any related specifications within the contract documents and all applicable codes and regulations. Drill flush shall be conveyed by pipe, hose or conduit a minimum 20ft away from the location where the micropile is being drilled and away from any adjacent structure or facility. Provide positive control and discharge of all surface water that will affect construction of the micropile installation. Maintain all pipes or conduits used to control surface water during construction. Repair damage caused by surface water at no additional cost. Upon substantial completion of the work, remove surface water control pipes or conduits from the site. Alternatively, with the approval of the Engineer, pipes or conduits that are left in place may be fully grouted and abandoned or left in a way that protects the structure and all adjacent facilities from migration of fines through the pipe or conduit and potential ground loss.

Immediately contact the Engineer if unanticipated existing subsurface drainage structures or other utilities are discovered during excavation or drilling. Suspend work in these areas until remedial measures meeting the Engineer's approval are implemented.

5 - Excavation

Coordinate the work and the excavation so the micropile structures are safely constructed. Perform the micropile construction and related excavation in accordance with the Plans and approved submittals.

6 - Micropile Allowable Construction Tolerances

1. Centerline of piling shall not be more than 3 inches from indicated plan location.
2. Pile shall be plumb or battered within 2 percent of total-length plan alignment.
3. Top elevation of pile shall be plus 1 inch or minus 1 inch maximum from vertical elevation indicated.
4. Centerline of reinforcing steel shall not be more than 0.5 inches from indicated location.

7 - Micropile Installation

The micropile Contractor shall select the drilling method, the grouting procedure and the grouting pressure used for installation of the micropiles. The micropile Contractor shall also determine the micropile casing size, final drillhole diameter and bond length, and central tendon reinforcement steel sizing necessary to develop the specified load capacities and load testing requirements. The micropile Contractor is also responsible for estimating the grout take. There will be no extra payment for grout overruns.

Should the plans require uncased drilling of the micropile into bedrock, the permanent and/or temporary casing shall be drilled a minimum 6 inches into ledge or to a depth within the ledge so as to prevent subsidence of over burden into the uncased and/or bond zone portion of the drill hole (i.e. the rock socket). The plans show estimated permanent casing lengths for each

substructure unit. Any difference in the required length of permanent casing installed and accepted by the Engineer from the estimated lengths shown on the plans shall be measured for payment and/or credit. There will be no payment for differences in required length of temporary casing.

The drilling equipment and methods shall be suitable for drilling through the conditions to be encountered, without causing damage to the overburden above rock head, any overlying or adjacent structures, buried structures or utilities, or services. If called for in the drilling method description, or by the nature of the stratum to be drilled through, the micropile Contractor shall furnish an overburden casing of the type and thickness, which can be installed without distortion. Casings that fail, fracture, or otherwise distort during drilling or after drilling shall, unless otherwise directed, be withdrawn or replaced at the micropile Contractor's expense. The drillhole must be open along its full length to at least the design minimum drillhole diameter prior to placing grout and reinforcement.

Temporary casing or other approved method of pile drillhole support will be required in caving or unstable ground to permit the pile shaft to be formed the minimum design drillhole diameter. The Contractor's proposed method(s) to provide drillhole support and to prevent detrimental ground movements shall be reviewed by the Engineer. Detrimental ground movement is defined as movement which requires remedial repair measures, in order to maintain site conditions as determined by the Engineer. Use of drilling fluid containing bentonite or any other non-reverting drilling fluid is not allowed.

During construction, the Contractor shall observe the ground conditions in the vicinity of the micropile construction site on a daily basis for signs of ground heave or subsidence. Immediately notify the Engineer if signs of movements are observed. The micropile Contractor shall immediately suspend or modify drilling or grouting operations if ground heave or subsidence is observed, if the micropile structure is adversely affected, or if adjacent structures are damaged from the drilling or grouting. If the Engineer determines that the movements require corrective action, the micropile Contractor shall take corrective actions necessary to stop the movement or perform repairs.

Reinforcement may be placed prior to grouting the drillhole. Reinforcement surface shall be free of deleterious substances such as soil, mud, grease or oil that might contaminate the grout or coat the reinforcement and impair bond. Pile reinforcement groups, if used, shall be sufficiently strong to withstand the installation and grouting process without damage or disturbance.

The micropile Contractor shall check pile top elevations and adjust all installed micropiles to the planned elevations.

Centralizers and spacers shall be provided at 10ft centers maximum spacing. The upper and lower most centralizer shall be located a maximum of 3ft from the top and bottom of the micropile. Centralizers and spacers shall permit the free flow of grout without misalignment of the reinforcing bar(s) and permanent casing. The reinforcing steel shall be inserted into the drill hole to the desired depth without difficulty. Partially inserted reinforcing bars shall not be driven or forced into the hole. The micropile Contractor shall re-drill and reinsert reinforcing steel when necessary to facilitate insertion.

Lengths of casing and reinforcing bars to be spliced shall be secured in proper alignment and in a manner to avoid eccentricity or angle between the axes of the two lengths to be spliced. Splices and threaded joints shall meet the requirements of the rebar material. Threaded pipe casing joints shall be located at least two casing diameters (OD) from a splice in any reinforcing bar. When multiple bars are used, bar splices shall be staggered at least 1 foot.

Micropiles shall be grouted the same day the load transfer bond length is drilled. The grouting equipment used shall be a colloidal grout plant, and shall produce a grout free of lumps and undispersed cement. Paddle type mixers are not acceptable. The micropile Contractor shall have means and methods of measuring the grout quantity and pumping pressures during the grouting operations. The grout pump shall be equipped with a pressure gauge to monitor grout pressure. A second pressure gauge shall be placed at the point of injection into the pile top. The pressure gauge shall be capable of measuring pressures of at least 145 psi or twice the actual grout pressure used, whichever is greater. The grout shall be kept in agitation prior to mixing. Grout shall be placed within one hour of mixing. The grouting equipment shall be sized to enable each pile to be grouted in one continuous operation. The grout shall be injected from the lowest point of the drill hole and injection shall continue until uncontaminated grout flows from the top of the pile. The grout may be pumped through pumped through grout tubes, casing, hollow stem augers or drill rods. Temporary casing, if used, shall be extracted in stages ensuring that, after each length of casing is removed the grout level is brought back up to the ground level before the next length is removed. The tremie pipe or casing shall always extend below the level of the existing grout in the drillhole. The grout takes shall be controlled to prevent excessive heave or fracturing of rock or soil formations. Upon completion of grouting, the grout tube may remain in the hole, but must be filled with grout.

If the Contractor elects to use a post-grouting system, Working Drawings and details shall be submitted to the Engineer for review in accordance with Article 1.05 of the Form 816.

Grout within the micropile verification and proof test piles shall attain the minimum required 3-day compressive strength prior to load testing. During production, micropile grout shall be tested by the Contractor for compressive strength in accordance with AASHTO T106/ASTM C109 at a frequency of no less than one set of three 2 inch grout cubes, or 3” cylinders, from each grout plant each day of operation or per every 10 piles, whichever occurs more frequently. The compressive strength shall be the average of the 3 cubes tested.

Grout consistency as measured by grout density shall be determined by the micropile Contractor per API RP-13B-1 at a frequency of at least one test per pile, conducted just prior to start of pile grouting. The Baroid Mud Balance used in accordance with API RP-13B-1 is an approved device for determining the grout density of neat cement grout.

Provide grout cube/cylinder compressive strength and grout density test results to the Engineer within 24 hours of testing.

8 - Micropile Installation Records.

The micropile Contractor shall prepare and submit to the Engineer full-length installation records for each micropile installed. The records shall be submitted within one work shift after that pile installation is completed. The data shall be recorded on a micropile installation log. A separate log shall be provided for each micropile.

9 – Verification and Proof Tests

Perform verification and proof testing of piles at the locations specified on the plans. Perform compression load testing in accord with ASTM D1143 and tension load testing in accord with ASTM D3689, except as modified herein.

Perform pre-production verification pile load test(s) to verify the design of the pile system and the construction methods proposed prior to installing any production piles. Sacrificial verification test pile(s) shall be constructed in conformance with the approved Working Drawings. Verification test pile(s) shall be installed at the location(s) shown on the plans or at a location(s) approved by the Engineer.

Verification load test(s) shall be performed to verify that the Contractor installed micropiles will meet the compression and/or tensile load capacities and load test acceptance criteria and to verify the length of the micropile load transfer bond zone is adequate. The micropile verification load test results must verify the Contractor's design and installation methods.

The drilling method, grouting method, casing length, micropile diameter (cased and uncased), reinforcing bar length and length of embedment for the verification test pile shall be identical to those specified for the production piles at the given locations. The verification test micropile structural steel sections shall be sized to safely resist the maximum test load.

The maximum verification and proof test loads applied to the micropile shall not exceed 80 percent of the structural capacity of the micropile structural elements; include steel yield in tension, steel yield or buckling in compression, or grout crushing in compression. Any required increase in strength of the verification and proof test pile elements above the strength required for the production piles shall be provided for in the Contractor's bid price.

Testing equipment shall include dial gauges, dial gauge independent reference frame, jack and pressure gauge, electronic load cell (with readout device), and a reaction frame. The load cell is required only for the creep test portion of the verification test. The contractor shall provide a description of test setup and jack, pressure gauge and load cell calibration curves in accordance with the Submittals Section.

Design the testing reaction frame to be sufficiently rigid and of adequate dimensions such that excessive deformation of the testing equipment does not occur. Align the jack, bearing plates, and stressing anchorage such that unloading and repositioning of the equipment will not be required during the test.

Apply and measure the test load with a hydraulic jack and pressure gauge. The pressure gauge

shall be graduated in 100psi increments or less. The jack and pressure gauge shall have a pressure range not exceeding twice the anticipated maximum test pressure. Jack ram travel shall be sufficient to allow the test to be done without resetting the equipment. Monitor the creep test load hold during verification tests with both the pressure gauge and the electronic load cell. Use the load cell to accurately maintain a constant load hold during the creep test load hold increment of the verification test.

Measure the pile top movement with a dial gauge capable of measuring to 0.001 inches. The dial gauge shall have a travel sufficient to allow the test to be done without having to reset the gauge. Visually align the gauge to be parallel with the axis of the micropile and support the gauge independently from the jack, pile or reaction frame. Use a minimum of two dial gauges when the test setup requires reaction against the ground or single reaction piles on each side of the test pile.

Test verification piles to a maximum test load of 2.0 times the maximum allowable compressive load, hereafter termed, “Design Load” shown on the Plans. The verification pile load tests shall be made by incrementally loading the micropile in accordance with the following cyclic load schedule for both compression and tension loading (test the compression prior to tension):

Verification Test Loading Schedule		
AL = Alignment Load DL = Design Load		
	LOAD	HOLD TIME
1	AL (.05 DL)	1 minute
2	0.25 DL	1 minute
3	0.50 DL	1 minute
4	AL	1 minute
5	0.25 DL	1 minute
6	0.50 DL	1 minute
7	0.75 DL	1 minute
8	AL	1 minute
9	0.25 DL	1 minute
10	0.50 DL	1 minute
11	0.75 DL	1 minute
12	1.00 DL	1 minute
13	AL	1 minute
14	0.25 DL	1 minute
15	0.50 DL	1 minute
16	0.75 DL	1 minute
17	1.00 DL	1 minute
18	1.33 DL	60 minutes
19	1.75 DL	1 minute
20	2.00 DL (Maximum Test Load)	10 minutes
23	AL	1 minute

The test load shall be applied in increments of 25 percent of the DL load. Each load increment shall be held for a minimum of 1 minute. Pile top movement shall be measured at each load increment. The load-hold period shall start as soon as each test load increment is applied. The verification test pile shall be monitored for creep at the 1.33 Design Load (DL). Pile movement during the creep test shall be measured and recorded at 1, 2, 3, 4, 5, 6, 10, 20, 30, 50, and 60 minutes. The alignment load shall not exceed 5 percent of the DL load. Dial gauges shall be reset to zero after the initial AL is applied.

The acceptance criteria for micropile verification load test are:

1. The Engineer shall determine the criteria for tolerable movement during the load test at the top of the micropile.

2. At the end of the 1.33 DL creep test load increment, test piles shall have a creep rate not exceeding 0.05 inch/log cycle time (1 to 10 minutes) or 0.1 inch/log cycle time (6 to 60 minutes or the last log cycle if held longer). The creep rate shall be linear or decreasing throughout the creep load hold period.
3. Failure does not occur at any load increment up to and including the 2.0 D.L. max test load. Failure is defined as load at which attempts to further increase the test load simply result in continued pile movement.

Upon completion of the test, the Contractor shall submit a report stamped by a qualified Professional Engineer licensed in the State of Connecticut of the test results for review and acceptance by the Engineer prior to beginning installation of production micropiles. This report shall include written confirmation of the verification micropile's capacity.

If a verification tested micropile fails to meet the acceptance criteria, the Contractor shall modify the design, the construction procedure, or both. These modifications may include modifying the installation methods, increasing the bond length, or changing the micropile type. Any modification that necessitates changes to the structure shall be submitted as a revision to the working drawings and require the Engineer's review and acceptance. Any modifications of design or construction procedures or cost of additional verification test piles and load testing shall be at the Contractor's expense. At the completion of verification testing, test piles shall be removed down to the elevation specified by the Engineer.

Perform proof load tests at the micropile locations as shown on the plans. Perform proof load tests on the first set of production piles installed at each designated substructure unit prior to the installation of the remaining production piles in that unit. The initial proof test piles shall be installed at the locations shown on the plans. Upon completion of each test, the Contractor shall submit a report stamped by a qualified Professional Engineer licensed in the State of Connecticut of the test results for review and acceptance by the Engineer

Proof test piles to a maximum test load of 1.67 times the micropile Design Load shown on the Plans or Working Drawings. Proof tests shall be made by incrementally loading the micropile in accordance with the following schedule, to be used for both compression and tension loading:

Proof Test Loading Schedule		
AL = Alignment Load DL = Design Load		
	LOAD	HOLD TIME
1	AL	1 minute
2	0.25 DL	1 minute
3	0.50 DL	1 minute
4	0.75 DL	1 minute
5	1.00 DL	1 minute
6	1.33 DL	60 minutes Creep Test
7	1.67 DL (Maximum Test Load)	1 minute
8	AL	1 minute

Depending on performance, either a 10 minute or 60 minute creep test shall be performed at the 1.33 DL Test Load. Where the pile top movement between 1 and 10 minutes exceeds 1 mm, the Maximum Test Load shall be maintained an additional 50 minutes. Movements shall be recorded at 1, 2, 3, 5, 6, 10, 20, 30, 50 and 60 minutes. The alignment load shall not exceed 5 percent of DL. Dial gauges shall be reset to zero after the initial AL is applied.

The acceptance criteria for micropile proof load tests are:

1. The Engineer shall determine the criteria for tolerable movement during the load test at the top of the micropile.

2. At the end of the 1.33 DL creep test load increment, test piles shall have a creep rate not exceeding 0.05 inch/log cycle time (1 to 10 minutes) or 0.1 inch/log cycle time (6 to 60 minutes).The creep rate shall be linear or decreasing throughout the creep load hold period.

3. Failure does not occur at the 1.67 DL maximum test load. Failure is defined as the load at which attempts to further increase the test load simply result in continued pile movement.

If a proof-tested micropile fails to meet the acceptance criteria, the Contractor shall immediately proof test another micropile within that footing. For failed piles and further construction of other piles, the Contractor shall modify the design, the construction procedure, or both. These modifications may include installing replacement micropiles, incorporating piles at not more than 50% of the maximum load attained, post-grouting the tested pile and re-proof testing the pile, modifying installation methods, increasing the bond length, or changing the micropile type. Any modification that necessitates changes to the structure design shall require the Engineer's prior review and acceptance. Any modifications of design or construction procedures, or cost of additional verification test piles and verification and/or proof load testing, or replacement production micropiles, shall be at the Contractor's expense.

Method of Measurement: Measurement will be made as follows for the quantity, as specified or directed by the Engineer. Micropiles will be measured as each installed, and accepted. There will be no separate measurement for mobilization and demobilization associated with this item. Verification Tests (performed on sacrificial micropiles) and Proof Tests (performed on production piles) for Micropiles will be measured as each. Micropile Length Adjustment will be measured in feet as the difference between the estimated length of permanent casing, as shown on the plans, and the actual length of permanent casing installed and accepted by the Engineer. Note that the permanent casing length is measured from the bottom of the pile cap to the permanent casing tip, including the required embedment into rock. Embedment into the pile cap will not be measured for payment because it is considered incidental to micropile construction. Any increase in casing length will be measured for payment to the Contractor, and any decrease in casing length will be measured for credit to the State.

Basis of Payment: The quantities accepted for payment will be paid for at the contract unit prices for the for the items listed below, complete in place and accepted, which price shall include all materials, equipment, tools, proper disposal of drilling spoil, and labor incidental thereto.

Pay Item	Pay Unit
Micropiles	EA.
Verification Test for Micropiles	EA.
Proof Test for Micropiles	EA.
Micropile Length Adjustment	L.F.

ITEM #0728020A – STONE BALLAST

Description:

This Section specifies the material requirements for ballast to be furnished and placed by the Contractor in accordance with the Plans and Specifications. This Section also includes furnishing all labor, materials and equipment necessary and incidental to placing ballast as directed by the Engineer.

Materials:

The Contractor shall submit, under the provisions of this Section, the following information:

Compliance: Supplier's certification that the material delivered to the site is in compliance with the Specifications.

Samples: Submit as one representative sample and one sample of each new source of supply as requested by Engineer. Samples of not less then 150 lbs should be submitted.

References:

The Contractor shall comply with provisions of Codes, Specifications, Standards, and recommended practices of the most recent edition and addenda thereto of:

AREMA: American Railway Engineering and Maintenance of Way Association, Manual for Railway Engineering

ASTM International (formerly American Society for Testing and Materials)
ASTM: C 29, C 88, C 117, C 127, C 131, C 136, C 142, C535, D 75, D 4791 and E11.

AASHTO: American Association of State Highway and Transportation Officials

Ballast Requirements:

Testing and inspection shall conform to the AREMA Manual.

Material not meeting the Specifications shall not be used in the work.

Furnish prepared ballast that is of crushed rock, hard, strong, angular, durable particles, containing no carbonates or slag, free from injurious amounts of deleterious substances.

The ballast shall have a minimum Sand Equivalent of 50 when measured by California Test 217.

Determination of weight per cubic yard shall be in accordance with ASTM C29.

All particles of the ballast shall have been broken by the crusher and have at least two broken surfaces.

All boulders which will pass through a 5-inch circular opening before crushing shall be rejected.

Type A ballast shall be crushed trap rock or granite. It shall: a) be composed of angular fragments which are clear and free from deleterious substance; b) have proper gradation; and c) meet all requirements of this specification. Additionally, ballast shall be in conformance with AREMA Chapter 1, Part 2 except as otherwise specified herein.

Ballast shall conform to the following scale when tested with laboratory sieves having square openings. (Sieves must conform to ASTM E11):

Size No.	Ballast Type	Nominal Size Sq. Openings	Amounts Finer Than Each Sieve (Sq. Opening Laboratory Sieve- Pct. by Wgt) 2”	1½”	1”	3/4”	½”	3/8”	No.4
4	A	1½” - 3/4”	100	90-100	20-55	0-15		0-5	
5	A	1” - 3/8”		100	90-100	40-75	15-35	0-15	0-5

Deleterious substances in ballast shall not be present in excess of the following amounts:

Description:	Percent by Weight:
Soft and friable pieces	3.0 percent
Material finer than No. 200 Sieve	0.5 percent
Clay lumps	0.5 percent

Hardness shall be between 5.5 and 7.0 as measured on Moh Hardness scale.

Water absorption shall not exceed 1.2% when tested in accordance with ASTM C127.

Type A ballast chemical analysis shall reveal quantitatively that at least 70% of test sample is composed of silicon dioxide, aluminum oxide, and iron oxide, but that not more than 25% of test sample is comprised of magnesium oxide, magnesium carbonate and calcium carbonate.

The Contractor shall be responsible for assuring ballast cleanliness. A suitable washing facility shall be provided at the quarry for this purpose. This facility shall consist of a high pressure spray over the ballast as it passes on the belt. A quality control plan along with washing procedures must be submitted with Contractor’s quotation. The QC plan and washing procedures will be subject to approval by the Engineer.

Prepared ballast shall be handled in such a manner that it is kept clean and free from segregation. It shall be only loaded into cars which are in good order, tight enough to prevent leakage and waste of material, and clean and free from rubbish or any substance which would foul the ballast.

L.A. Abrasion	Type "A"
Percent of wear shall not exceed grading of sample	14.6

When L.A. abrasion is in excess of 13.0% wear, cementing value in pounds per square inch shall not exceed 375.

The quality of stone for ballast from any quarry or new strata opened up, including its soundness, resistance to abrasion, chemical composition, absorption, impedance, hardness and weight per cubic foot, shall be determined prior to its acceptance at a testing laboratory selected by the purchaser. Each stratum or portion of quarry containing a variation of quality of stone shall be tested separately and not averaged. Quality tests and gradation tests shall subsequently be made from time to time as deemed necessary by the purchaser to control the quality and size of ballast furnished by the producer.

Sufficient visual observations, determinations of deleterious substances and analyses of gradation shall be made by the producer prior to shipment to assure compliance with these specifications.

The Contractor shall provide certified results of tests required by specifications. The Engineer reserves the right to witness the performance of tests. If the Contractor desires to use its own testing facilities to make the aforementioned tests, the Engineer's concurrence must be received.

The Sieve Analysis shall be made in accordance with the Method of Tests for Sieve Analysis of Fine and Course Aggregate (ASTM Designation C136).

Los Angeles Abrasion Loss shall be treated in accordance with Method of Test for Abrasion of Course Aggregate by use of the Los Angeles Machine (ASTM Designation C131) except that Grading of the sample for testing shall be as follows:

Sieve Size - Square Openings Passing	Retained On	Weight in Grams
2"	1¾ "	1250
1¾"	1½"	1250
1½"	1¼"	1250
1¼"	1"	1250

Soundness shall be treated in accordance with the current Method of Test for Soundness of Aggregate by use of Sodium Sulfate (ASTM Designation C88).

Percent of loss shall not exceed 5.

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Cementing values shall be tested in accordance with the Logan Walter Page Method (U.S. Department of Agriculture, Bulletin No. 347, 1916, Page 15) except as modified as follows:

1. 500 grams of fines developed from the Los Angeles Abrasion Test (ASTM C131) that has been screened through a 100 mesh sieve, mixed with sufficient water, kneaded for five minutes and allowed to stand in air tight container for two hours, thereby forming a stiff dough that is to be molded into cylindrical briquettes 1 inch diameter by 1 inch in height under pressure of 1877.5 pounds per square inch, after which they are dried for 20 hours in air at room temperature, 4 hours in a hot air bath at a temperature of 212°F, then cooled for 20 minutes in a desiccator, and immediately tested in a compression testing machine for static crushing strength, the bearing heads being suspended by pivots to secure uniform distribution of load which is applied at 600 pounds per minute approximately.

2. The average crushing strength in pounds per square inch of 5 specimens measures the cementing value of this stone.

The Contractor shall certify that ballast delivered to the Railroad is typical of that upon which specified tests have been made.

The selection of samples is as important as the laboratory testing, and care must be taken that the samples obtained show the true nature and conditions of the material to be examined.

Samples of all ballast and samples of stone at quarries for test to determine the acceptability of the source, as well as samples for quality control, shall be selected by a representative of the purchaser. The owner of the quarry or producer may submit samples for inspection or preliminary testing if such action is approved by the Engineer.

Samples of the finished product for gradation and other required tests shall be taken from each 1,000 tons of prepared ballast unless otherwise ordered by the Engineer. Samples shall be representative (full belt) and shall weigh not less than 100 pounds. Where the acceptability of stone from a quarry is to be determined, a 150 pound sample consisting of pieces of approximately 6 by 6 by 4 inches should also be furnished. Method of sampling shall be furnished to the Engineer for approval.

If material prior to, during or after being loaded, does not conform to specifications, Inspector shall notify Contractor to stop operations until all faults have been corrected. Disposal and/or removal of defective material shall be done without cost to the Railroad.

As it is impractical to inspect all ballast at quarry, the Engineer reserves the right to reject any car of ballast (whether previously inspected or not) that does not conform to specifications upon arrival at unloading site.

No ballast shall be unloaded unless it has been approved by the Engineer or agency authorized by the Railroad to test and approve ballast.

Should ballast that does not meet specifications be unloaded prior to the Engineer's approval, then payment will not be made to Contractor. Contractor must remove all defective material from site without cost to the Railroad.

Defective material arriving at site for unloading shall be rejected by the Engineer and disposed of at expense (including all freight and switching costs) of Contractor.

Construction Methods:

Do not place ballast until the Engineer has approved the subgrade upon which the ballast is to be placed.

The Contractor shall place stone ballast to the limits and depths, and to the grade, shown on the Plans, or as directed by the Engineer. Unless otherwise indicated or directed, ballast shall be placed to 1'-7" below top of rail elevation. Ballast above that elevation will be placed by Amtrak.

The ballast layer shall be thoroughly compacted until the surface is true and unyielding, displaying no deformation or movement under the compaction equipment. Compact ballast to 100-percent maximum density by vibratory compaction equipment specifically manufactured for compaction purposes, or self-propelled pneumatic-tired roller. Self-propelled, pneumatic-tired roller shall have a gross weight of 10- to 15-tons. Vibratory compactor shall have a weight of not less than 10-tons and be capable of applying a dynamic load of not less than 18,000-pounds at 1,300- to 1,500-cpm. .

Leave top of ballast bed flat and level to within plus or minus 1-inch across a 12-foot wide platform centered on the track centerline. After installation of ballast layer, refrain from driving vehicles on the ballast layer that would foul ballast or cause center-binding of ties. Replace any ballast that has become fouled by mud or fine materials at no cost to ConnDOT or Amtrak.

Method of Measurement:

All aggregate required for this work shall be weighed on scale furnished by and at the expense of the Contractor, except as otherwise permitted herein. The scales shall be of a type satisfactory to the Engineer and shall be sealed, at the expense of the Contractor, as often as the Engineer may require. All weighing shall be done in the presence of a representative of the Engineer.

If material is shipped by rail, ballast shall be ordered and payment based upon net ton in carload lots. Adjustments to compensation shall be made for deficiencies in plan depth and cross section as specified herein.

Cars shall be weighed and such weights shall be forwarded with car numbers to the Engineer.

If weighing cars is impractical, weight per cubic yard shall be obtained by weighing sample cubic yard volumes at such intervals as the Engineer may designate. Weight per cubic yard obtained by

such tests, amount of cubic yards loaded in each car and car number shall be furnished to the Engineer, and shall be used in calculating weight per car until additional tests are made.

If material is shipped by rail, the car weights may be accepted but scales shall be provided as specified above if the Engineer so directs.

Measurements shall be subject to the following provisions:

Determination of Thickness: The thickness shall be as indicated on the plans, or as ordered by the Engineer and within a tolerance of minus three-quarters of an inch (-¾") to plus one-half inch (+½").

Measurements to determine the thickness will be taken by the Engineer at intervals of 500 feet or less, and shall be considered representative of the lane.

If a thickness measurement is taken and found deficient, the Engineer will take such additional measurements as he considers necessary to determine the longitudinal limits of the deficiency.

The Engineer may waive an occasional measurement outside the tolerances if in his judgment it is not representative of true conditions and providing that:

(a) Other thickness measurements taken nearby for the course are within acceptable limits;

(b) proper controls have been exercised by the Contractor; and

(c) if there would be no impairment to the serviceability of the complete construction.

No adjustment of the quantity accepted for payment will be made where the thickness does not exceed the allowable plus or minus tolerances.

Where the thickness exceeds that indicated on the plans by more than the prescribed tolerance, that material which is in excess of the total planned depth, plus the tolerance, will not be included for payment.

Areas represented by measurements deficient in thickness in excess of the allowable minus deviation shall be corrected at the Contractor's expense, or with written permission of the Engineer, the deficient areas may remain, and payment will be made at an equitable adjusted price based on weight per cubic yard.

An adjustment in quantity will be made in the materials placed beyond the horizontal limits indicated on the plans by deducting the computed weight of that material extending more than three inches beyond the horizontal plan dimensions.

Basis of Payment:

This work will be paid for at the contract unit price per ton for “Stone Ballast”, complete in place, which price shall include all materials, tools, equipment and work incidental thereto.

Pay Item	Pay Unit
Stone Ballast	ton

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ITEM #0728032A – NO. 6 CRUSHED STONE

Description: This item shall consist of crushed stone placed to a uniform depth to the limits and for the depth shown on the plans, or as directed by the Engineer.

Materials: The material for this work shall conform to the requirements of Article M.01.01 for No. 6 Crushed Stone.

Construction Methods: The Contractor shall place crushed stone to the limits and depths, and to the grade, shown on the Plans, or as directed by the Engineer.

Method of Measurement: This work will be measured for payment by the actual number of cubic feet of No. 6 Crushed Stone completed, accepted and measured in place after compaction.

Basis of Payment: This work will be paid for at the contract unit price per cubic yard for "No. 6 Crushed Stone," complete in place, which price shall include all materials, tools, equipment and work incidental thereto.

Pay Item	Pay Unit
No. 6 Crushed Stone	c.y.

ITEM #0901003A – STEEL BOLLARD

Description: This item shall consist of furnishing and installing a steel bollard in a concrete footing, of the type specified, at the location, to the dimensions and details as shown on the plans in accordance with these specifications, or as directed by the Engineer. The purpose of the bollard is to prevent an errant vehicle from mounting a flush curb.

Material: Material for this work shall conform to the following requirements:
Concrete Article M.03.01 Class "A" Concrete.
6" Steel Post ASTM Schedule 80.
The steel post shall be painted. Painting shall consist of one primer coat conforming to Federal Specification TT-P-615d, Type II. There shall be two finished coats of paint. The final finish coat shall conform to Federal Specification TT-E-527 Air Drying, and the color shall be pavement marking yellow conforming to Article M.07.01

Construction Methods: The steel post shall have an exposed length of 5'. The post shall be installed to a depth of 2'-6", set in a concrete footing of at least 24" in diameter and 2'-6" deep on a 6" deep compacted gravel base. The post shall be filled with concrete. The top shall be rounded to a convex surface. No sharp edges, burrs, threads or other defects shall be exposed.

Method of Measurement: This work shall be measured for payment by the number of Steel Bollards installed and accepted in place.

Basis of Payment: This work will be paid for at the contract unit price each for "Steel Bollard", which price shall include the steel post, concrete, excavation, backfill, gravel, painting, all necessary tools, equipment and labor required for installation. Concrete sidewalk shall be paid for by square foot at the contract price.

Pay Item	Pay Unit
Steel Bollard	Ea.

ITEM #0913857A – VEHICLE BARRIER GATE

Description: Work under this item shall consist of furnishing and installing vehicle barrier gates as shown on the plans, or as directed by the Engineer, and in accordance with these specifications.

Materials: Materials for this work shall conform to the following requirements:

Rails and Posts: All rails and posts shall conform to the specifications of ASTM F1043, Group IC (Steel Pipe Class 2) for heavy industrial fence (See Sheet HW-913_01 for Dimensions). All rails and posts shall have an F1043 Type B, 0.9 oz/ft² minimum hot-dip zinc coating plus a chromate conversion and a clear polymer coating external protective coating, and a F1043 Type D, 81% nominal zinc pigmented coating minimum 3 mils thick internal coating. All coatings shall be applied in accordance with ASTM F1043.

Fittings: All fittings shall be galvanized pressed steel, malleable iron, or aluminum alloy materials conforming to the specifications of ASTM F626. Galvanized steel wire for the attachment of the fabric to the post and rails shall not be less than #9 gauge.

Non-shrink grout: All Non-shrink grout shall be in conformance with Subarticle M.03.01-12.

Swing Gate: Swing gates shall be single leaf opening gates at the dimensions specified on the plans. Fabricate swing gates in accordance with ASTM F900. Gate frame to be of welded construction. Weld areas to be protected with zinc-rich paint per ASTM A780. Exterior members to be 1.900” OD pipe, interior members when required shall be 1.660” OD pipe. Pipe to be Grade 2 ASTM F1043 Group IC.

Hinges, hot dip galvanized pressed steel or malleable iron, structurally capable of supporting gate leaf and allow opening and closing without binding. Non-lift-off type hinge design shall permit gate to swing 180°

Latch: Galvanized forked type capable of retaining gate in closed position and have provision for padlock. Latch shall permit operation from either side of gate.

Gate holdback: Provide galvanized gate hold back keeper for each gate leaf. Gate keeper shall consist of mechanical device for securing free end of gate when in full open position.

Gate posts: Grade 2 pipe ASTM F1043 Group IC. (See Sheet HW-913_01 for Dimensions)

Construction Methods: The gates shall be accurately fabricated and installed in accordance with ASTM F567, manufacturer’s instructions, the design plans, and as directed by the Engineer.

Concrete Set Posts: Excavate holes in firm, undisturbed or compacted soil. Holes shall have diameter 4 times greater than outside dimension of post, and depths approximately 6” deeper

than post bottom. Excavate deeper as required for adequate support in soft and loose soils, and for posts with heavy lateral loads. Set post bottom 36” below surface when in firm, undisturbed soil. Place concrete around posts in a continuous pour. Trowel finish around post and slope to direct water away from posts. Dome caps shall be installed on top of all posts.

Gate Installation: Installation of swing gates and gate posts shall be per ASTM F567. Direction of swing shall be as shown on drawings. Gates shall be hung plumb in the closed position with minimal space from grade to bottom of gate leaf. Gate leaf holdbacks shall be installed on all l gate leafs greater than 5’ in width.

Before fabricating any materials, the Contractor shall submit shop drawings to the Engineer for approval in accordance with Article 1.05.02-3.

Method of Measurement: Vehicle Barrier Gates will be measured for payment per each unit, installed and accepted.

Basis of Payment: This work will be paid for at the contract unit price each for, “Vehicle Barrier Gate complete in place, which price shall include all materials, equipment, tools and labor, incidental thereto.

Pay Item	Pay Unit
Vehicle Barrier Gate	ea.

ITEM #0913950A – PROTECTIVE FENCE (CHAIN LINK)

Work under this item shall conform to the requirements of Section 9.13 amended as follows:

9.13.01 - Description: Add the following:

Work under this item shall consist of furnishing, installing and maintaining a protective chain link fence with a minimum height as indicated in the contract plans to restrict access across Amtrak's track bed. The fence shall follow the Amtrak centerline of tracks as shown on the plans and as ordered by the Engineer.

9.13.02 - Materials: Delete the article and replace with the following:

The materials for this work shall conform to the requirements of Article M.10.05.

When aluminum-coated steel fabric is used, the posts and hardware will be galvanized.

When aluminum fabric is used, the posts and hardware will be aluminum.

Concrete for anchorages shall be Class "A" and shall meet the requirements of Article M.03.01.

9.13.03 - Construction Methods: Delete the article and replace with the following:

Construction of the Protective Fence (Chain Link) shall be as indicated in the Contract Drawings and shall be subject to approval of the ENGINEER and AMTRAK.

A suitable driving cap shall be used to insure that no damage is caused to the post or to the galvanization. Posts not driven, and all other type posts shall be set in concrete acceptable to the Engineer.

In earth, the hole for the concrete footing shall extend at least 4 inches below the bottom of the post but not less than 9 inches in diameter for all line posts and 12 inches in diameter for terminal, pull or corner posts. The tops of the concrete footings shall be crowned to shed water.

When ledge rock is encountered, the posts shall be set in holes drilled into rock at least 12 inches in depth and grouted or otherwise firmly held in correct position.

End posts shall be braced. Where braces are required, they shall be spaced as indicated by the ENGINEER. Braces shall be securely fastened to posts by suitable connections and trussed from line post back to post requiring bracing with 3/8-inch round rod, having a turnbuckle adjustment.

Fabric shall be fastened to frames with bands or wire clamps of No. 6-gage aluminized steel wire 4 3/4 inches long. These bands shall be spaced approximately 14 inches apart. The fabric shall be

fastened to the top rail with tie wires. These tie wires shall be 6 1/4 inches long, spaced approximately 24 inches apart.

The Contractor shall maintain the fencing in good condition during the construction phase and shall immediately repair any damaged sections.

9.13.04 - Method of Measurement: Delete the article and replace with the following:

This work will be measured for payment by the number of linear feet of completed and accepted chain link fence of the height specified, measured from outside to outside of terminal posts.

Fencing installed by the Contractor for purposes other than separating the railroad tracks within the AMTRAK right-of-way shall not be measured for payment under this item but shall be considered incidental to the general cost of construction.

9.13.05 - Basis of Payment: Delete the article and replace with the following:

This item will be paid for at the contract unit price per linear foot for "Protective Fence (Chain Link)", which price shall include all materials, equipment, tools, excavation, backfill, disposal of surplus material and labor incidental thereto.

ITEM #0921001A – CONCRETE SIDEWALK

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

Article 9.21.01 - Description: Add the following:

This item shall include furnishing and installing Detectable Warning Strips in the locations and to the dimensions and details shown on the plans or as ordered by the Engineer.

Article 9.21.02 – Materials: Add the following:

The Detectable Warning Strip shall be a prefabricated detectable warning surface tile as manufactured from Engineered Plastics Inc. 300 International Drive, Suite 100 Williamsville, NY 14221, telephone number (800) 682-2525 or the approved equal from ADA Fabricators, INC. P.O Box 179 North Billerica, MA 01862 telephone number (978) 262-9900. The tile shall conform to the dimensions shown on the plans and have a brick red homogeneous color throughout in compliance with Federal Standard 595A Color #22144 or approved equal.

Article 9.21.03 – Construction Methods: Add the following:
The Detectable Warning Strip for new construction shall be set directly in poured concrete according to the plans and the manufacturer's specifications or as directed by the Engineer. The contractor shall place two 25 pound concrete blocks or sandbags on each tile to prevent the tile from floating after installation in wet concrete.

Article 9.21.04 - Method of Measurement: Add the following:

The Detectable Warning strip will not be measured for payment. All materials, equipment, tools and labor incidental thereto shall be included in the Bid price for Concrete Sidewalk.

ITEM #0949003A – FURNISHING, PLANTING AND MULCHING TREES, SHRUBS, VINES AND GROUND COVER PLANTS

Work under this item shall conform to the latest supplemental requirements of Section 9.49 of the Form 816 and amended as follows:

9.49.02 - Materials: *Add the following:*

Submittals:
The apparent low bidder shall submit to the Manager of Contracts a Schedule of Values within 14 days after bid opening. Any bidder that the Department may subsequently designate as the apparent low bidder shall make the aforesaid submission within 14 days from the date on which the Department notifies said Contractor that has become the low bidder. If, however, the Department deems it necessary for such a submission within a shorter period of time, the Contractor shall make the submission within the time designated by the Department.

The Schedule of Values shall be divided into "Line Items" listed separately by plant type. Each line item shall be assigned a unit price. The sum of the line items in the schedule of Values shall equal the amount bid for the item "Furnishing, Planting and Mulching Trees, Shrubs, Vines, and Ground Cover Plants."

The Schedule of Values shall be in the following format:

Schedule of Values

Plant Type, Variety and Size – **BRANFORD STATION**	Quantity	Unit Cost	Cost
Acer rubrum ‘Red Sunset’, Red Sunset Red Maple, 3”-31/2” Cal. B.B.	3		
Amelanchier x grandiflora ‘Autumn Brilliance’, Apple Serviceberry, 8’-10’ Ht. Clump B.B.	6		
Betula nigra ‘Heritage’, Heritage River Birch, 10’-12’ Ht. Clump B.B.	3		
Cornus alba ‘Elegantissima’, Red Variegated Twig Dogwood, 6 Gal. Pots	34		
Cornus alba 'Ivory Halo', Ivory Halo Dogwood, 24”-36” Ht. B.B.	16		
Cornus florida ‘Cherokee Princess’, Flowering Dogwood, 3”-31/2” Cal. B.B.	3		
Deutzia gracilis 'Nikko', Spreading Deutzia, 2 Gal. Pots	140		
Ilex verticillata ‘Southern Gentleman’, Winterberry, male, 3’-4’ Ht. B.B.	3		
Ilex verticillata ‘Winter Red’, Winterberry, female, 5’-6’ Ht. B.B.	5		
Juniperus horizontalis 'Wiltoni’, Blue Rug Juniper, 1 Gal. Pots	188		
Nyssa sylvatica, Black Tupelo, 4”-41/2” Cal. B.B.	1		
Rhododendron P.J.M. ‘Compacta’, PJM Rhododendron, 3 Gal. Pots	81		
Rhododendron P.J.M. ‘Elite’, PJM Rhododendron, 3 Gal. Pots	40		
Rhododendron ‘Purple Gem’, Purple Gem Rhododendron, 3 Gal. Pots	14		
Spirea japonica ‘Alpina’, Japanese Spirea Alpina, 2 Gal. Pots	76		
Syringa meyerii ‘Paliban’, Dwarf Korean Lilac, 6 Gal. Pots	4		
Syringa patula ‘Ms. Kim’, Ms. Kim Lilac, 6 Gal. Pots	37		
Thuja plicata ‘Green Giant’, Western Red Cedar, 8’-10 Ht. B.B.	21		
Viburnum dentatum ‘Blue Muffin’, Arrowwood, 3 Gal. Pots	43		
Viburnum dentatum ‘Chicago Lustre’, Arrowwood, 3’-4’ Ht. B.B.	6		
Viburnum x burkwoodii ‘Mohawk’, Burkwood Viburnum Hybrid, 4’-5’ Ht. B.B.	15		
Viburnum plicatum tomentosum ‘Watanabei’, Summer Snowflake, 5’-6’ Ht. B.B.	4		
Viburnum trilobum ‘Compactum’, American Cranberry Bush, 6 Gal. Pots	44		
		Total	

Plant Type, Variety and Size – **GUILFORD STATION**	Quantity	Unit Cost	Cost
Abelia x grandiflora 'Edward Goucher', Glossy Albelia, 3 Gal. Pot	7		
Deutzia gracilis 'Nikko', Spreading Deutzia, 1 Gal. Pot	26		
Juniperus horizontalis 'Icee Blue', Creeping Juniper, 1 Gal. Pot	22		
Juniperus squamata ‘Blue Star’, Single Seed Juniper , 1 Gal. Pot	23		

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Magnolia stellata 'Royal Star', Star Magnolia, 6'-7' Ht. B.B.	1		
Pinus flexilis 'Vanderwolf', Pine, Vanderwolf's Pyramid, 7'-8' Ht. B.B.	3		
Spiraea japonica 'Little Princess', Compact Spirea, 2 Gal. Pot	11		
Syringa patula 'Ms. Kim', Dwarf Korean Lilac, 6 Gal. Pot	10		
Viburnum x burkwoodii 'Mohawk', Burkwood Viburnum Hybrid, 4'-5' Ht. B.B.	1		
Weigela florida 'Wine and Roses', Compact Weigela, 3 Gal. Pot	9		
		Total	

9.49.04 – Method of Measurement: *Replace Subsection 1 with the following:*

1- Plantings:
Replace this Subsection with the following:
This work is being paid as a Lump Sum and will not be measured for payment.

9.49.05 – Basis of Payment: *Replace Subsection 1 with the following:*

1- Plantings:

Partial payment for this work will be made up to 80% of the schedule of values price each for the kind and size of plant and the method of planting, as the case may be, satisfactorily completed in place. Final payment will not be provided until final acceptance of all plantings.

Pay Item	Pay Unit
Furnishing, Planting and Mulching Trees, Shrubs, Vines and Ground Cover Plants	L.S.

ITEM #0950202A – SHORELINE GRASS ESTABLISHMENT

Description: The work included in this item shall consist of providing an accepted stand of established grasses by furnishing and placing seed as shown on the plans or as directed by the Engineer.

Materials: The materials for this work shall conform to the requirements of Section 9.50 of Standard Specification Form 816. The following mix shall be used for this item:

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

Species	Proportion (Percent)
RED FESCUE (FESTUCA RUBRA L. SSP. ARCTARED) CERTIFIED VARIETY: OR EQUAL CERTIFIED VARIETY	20
RED FESCUE (FESTUCA RUBRA L. SSP. BOREAL) CERTIFIED VARIETY: OR EQUAL CERTIFIED VARIETY	20
LITTLE BLUESTEM (SCHIZACHYRIUM SCOPARIUM) CERTIFIED VARIETY:	10
INDIAN GRASS (SORGHASTRUM NUTANS) CERTIFIED VARIETY:	10
SWITCHGRASS (PANICUM VIRGATUM) CERTIFIED VARIETY	10
BIG BLUESTEM (ANDROPOGON GERARDII) CERTIFIED VARIETY:	10
CANADA WILDRYE (ELYMUS CANADENSIS) CERTIFIED VARIETY:	20

Construction Methods: Construction methods shall be those established as agronomically acceptable and feasible and that are approved by the Engineer. Rate of application shall be field determined in Pure Live Seed (PLS) based on the minimum purity and minimum germination of the seed obtained. Calculate the PLS for each seed species in the mix. Adjust the seeding rate for the above composite mix, based on 100 lbs. per acre (115 kg per 1 hectare). The seed shall be mulched in accordance with Article 9.50.03.

Method of Measurement: This work will be measured for payment by the number of square yards (square meters) of surface area of accepted established grasses as specified or by the number of square yards (square meters) surface area of seeding actually covered and as specified.

Basis of Payment: This work will be paid for at the contract unit price per square yards (square meters) for "Shoreline Grass Establishment," which price shall include all materials maintenance, equipment, tools, labor, and work incidental thereto. Partial payment of up to 60% may be made for work completed, but not accepted.

Pay Item	Pay Unit
Shoreline Grass Establishment	S.Y. (S.M.)

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ITEM #0969000A – PROJECT COORDINATOR

Section 1.05.08 of the Standard Specifications is hereby deleted.

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 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 shall be submitted for approval by name, in writing with a resume of his qualifications, 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 that his designated candidate is experienced and versatile in the preparation, interpretation and modification of Primavera construction schedules. This must include successful completion of at least 2 construction projects of similar complexity, where he served in a lead scheduling capacity. If he does not have a person in his 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, he shall be present at the first meeting, along with the Project Coordinator, prepared to discuss, in detail, the methods and techniques he proposes to use. Thereafter, the Project Coordinator or the Consultant responsible for updating the Critical Path Method (CPM) Schedule shall attend all meetings between the Contractor, his 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 as described more fully hereinafter.

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 version 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.

A) Software – Minimum Specification:

The Contractor shall provide the Engineer with a licensed copy of the latest version of the 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.

B) HP Officejet Pro K8600 Color Printer – Minimum or equivalent (to be installed as a local printer on a computer provided under the field office specification):
Paper – 11 in x17 in, 8.5 in x 11 in and duplex/double-side print
Resolution – 1200x1200 DPI
Print Drivers – Must support HP PCL6.
RAM – 32 MB RAM
Print speed – 10 ppm – color, 13 ppm - black
Printer cable – 1.8 m (6 ft).

The contractor is responsible for service and repairs to all computer hardware. All repairs must be performed with-in 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 his 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.

The Contractor shall prepare a CPM Schedule in accordance with the pertinent provisions of "Section 1.03 - Award and Execution of Contract," "Section 1.05 - Control of the Work," and "Section 1.08 - Prosecution of Progress" of the Standard Specifications. The schedule shall incorporate the Sequence of Construction as outlined on the Plans and in the Specifications. All other limiting factors that affect construction shall also be incorporated into the schedule. All milestones or constrained dates within the schedule shall be clearly indicated.

The CPM schedule shall contain a list of activities that represents the major elements of the project. At a minimum, this list should include a breakdown by individual structure or stage, including major components of each. The schedule shall contain sufficient detail to describe the progression of the work in a comprehensive manner. As a guide, 10 to 15 activities should be provided for each $1 million of contract value. The following list of items is provided as an example only and is not meant to be all-inclusive (or all-applicable):

General Items Applicable to all projects
Contractual Constraints
- -Winter shutdowns
- -Environmental permits/application time of year restrictions
- -Milestones
- -Third Party approvals
- -Long lead time items (procurement and fabrication of major elements)
- -Adjacent Projects or work by others

Award
Notice to Proceed
Signing (Construction, temporary, permanent by location)
Mobilization
Permits as required
Field Office
Utility Relocations
Submittals/shop drawings/working drawings/product data
Construction of Waste Stock pile area
Clearing and Grubbing
Earthwork (Borrow, earth excavation, rock excavation, etc.)
Traffic control items (including illumination and signalization)
Pavement markings
Roadway Construction (Breakdown into components)
Drainage (Breakdown into components)
Culverts
Final Plantings (including turf establishment)
Final Cleanup

The following additional guidelines supplement the general guidelines listed above for the specific project types indicated:

A. For bridges and other structures, include major components such as: Abutments, wingwalls, piers, decks and retaining walls; further breakdown by footings, wall sections, parapets etc.

Temporary Earth Retention Systems
Cofferdam and Dewatering
Structure Excavation
Piles/test piles
Temporary Structures
Removal of Superstructure
Bearing Pads
Structural Steel (Breakdown by fabrication, delivery, installation, painting etc.)
Bridge deck

B. Multiple location projects such as traffic signal, incident management, lighting, planting and guiderail projects will be broken down first by location and then by operation. Other major activities of these types of projects should include, but are not limited to:

Installation of anchors
Driving posts

Foundations
Trenching and Backfilling
Installation of Span poles/mast arms
Installation of luminaires
Installation of cameras
Installation of VMS
Hanging heads
Sawcut loops
Energizing equipment

C. Facility Projects shall reflect the same breakdown of the project as the schedule of values:

Division 2 – Existing Conditions
Division 3 – Concrete
Division 4 – Masonry
Division 5 – Metals
Division 6 – Wood, Plastic, and Composites
Division 7 – Thermal and Moisture Protection
Division 8 – Openings
Division 9 – Finishes
Division 10 – Specialties
Division 11 – Equipment
Division 12 – Furnishings
Division 13 – Special Construction
Division 14 – Conveying Equipment
Division 21 – Fire Suppression
Division 22 – Plumbing
Division 23 – Heating, Ventilating, and Air Conditioning
Division 26 – Electrical
Division 27 – Communications
Division 28 – Electronic Safety and Security
Division 31 – Earthwork
Division 32 – Exterior Improvements
Division 33 – Utilities

The CPM schedule will be compiled using this list of major activities. It will be the responsibility of the contractor to detail all milestones, environmental permit "window" periods, winter shutdowns etc. and include them on their schedule under the corresponding dates.

If the Engineer determines that additional detail is necessary, the Contractor shall provide it.

All documents, which require approval by the Department, shall be clearly identified within the schedule. The Department shall be allocated a minimum of thirty (30) calendar days (exclusive

of weekends and holidays) for review and approval of each submittal. Any submittals requiring approval by an outside Agency (ConnDEP, 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 Contractor is responsible to inform its subcontractor(s) and supplier(s) of the project schedule and any relevant updates.

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 utilize the same criteria in a consistent manner throughout the term of the project. If, at any time, the Contractor alters his logic, original durations, descriptions, adds activities, or activity codes or in any way modifies the Baseline Schedule, he must notify the Engineer of the change, in writing, with presentation detailing 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 parameters for each activity:

- ES - earliest start time: the earliest time at which the activity can start given that its precedent activities must be completed first.
- EF - earliest finish time, equal to the earliest start time for the activity plus the time required to complete the activity.
- LF - latest finish time: the latest time at which the activity can be completed without delaying the project.
- 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 State or the Contractor. During the course of contract execution, 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 State 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 diskette which includes all Primavera project files. The diagrams shall be on 2' x 3' sheets. Additional, more detailed, diagrams for important aspects or phases of the work will 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. #, etc.) and stage or phase number should be included.

The Project Coordinator shall be required to prepare and submit the following documents:

1.) <u>Baseline Submittal Requirements:</u> The Contractor shall be guided by the following requirements when submitting the CPM Schedules for review and approval.

a.) Within ten (10) calendar days after award, the contractor and his scheduler will attend a meeting to discuss his submittal requirements. Within twenty (20) calendar days after contract award, the Contractor shall prepare and submit for review and approval a detailed CPM Schedule for all work. The review and approval process may take up to 21 calendar days and is more fully described in paragraph (b) of this section.

The work shall be broken out into sufficient detail such that no activity has a duration greater than twenty (20) days, unless approved by the Engineer. As a guide, 25 to 35 activities should be provided per $1 million of contract work. The Engineer shall be the sole judge as to whether the schedule is sufficiently detailed.

All work shall be shown in sufficient detail such that the Critical Path may be identified and the schedule shall incorporate all contract milestones. Upon approval, this schedule shall be designated the "Baseline".

Failure to submit and gain approval for the "Baseline" may result in the Contractor being found in violation of Article 1.02.02 of the Standard Specifications. All elapsed contract time prior to the approval of the “Baseline”, will be considered to be accurately represented by the actual as-built schedule of that time period. No claims for delays during that period will be allowed.

The approval of a Baseline Schedule shall in no way waive the requirements of the contract nor shall it excuse the Contractor from any obligations under the contract.

In no instance will the Contractor be permitted to commence work on any significant portion of the work for which a Baseline Schedule has not been approved.

b.) The Contractor, represented by the Project Coordinator and/or the Consultant, shall participate with the Engineer in the review and evaluation of each schedule submitted. Any and all revisions made necessary as a result of this review shall be made by the Contractor and a revised schedule submitted within ten (10) calendar days. Any further revisions required thereafter shall also be submitted for approval within (10) calendar days.

2.) Monthly Updates: Each month, as of a calendar date mutually acceptable to the Contractor and to the Engineer, the Contractor shall deliver to the Engineer three (3) prints of all required schedule diagrams and tabulations. In addition, the Contractor shall deliver one (1) copy of the project backup data diskette (s), which includes all Primavera project files. The schedule shall be updated to show the work actually accomplished during the preceding months, the actual time consumed for each activity, and the estimated time remaining for any activity which as been started but not completed.

The monthly update shall also include revisions to the CPM schedule necessitated by revisions to the project, which have been directed by the Engineer (including, but not limited to extra work) during the month preceding the update. Similarly, any changes to the schedule due to Contractor influences shall also be included within the schedule.

Any changes or revisions made to the approved Baseline shall be identified in narrative form in a cover letter accompanying the monthly update. The Engineer reserves the right to approve or reject any such changes. The narrative shall also describe in general terms the progress of the work since the last schedule update and shall identify any items of special interest. If the schedule revisions extend the contract completion date, due to extra or added work or delays beyond the control of the Contractor, the Contractor must submit a request in writing for an extension of time in accordance with Article 1.08.08. This request should be supported by the schedules submitted previously.

The contractor shall be responsible to develop mitigation measures for all delays, regardless of responsibility, and to identify all time and cost impacts to the work associated with those mitigation measures.

Except as otherwise authorized by the Engineer, monthly submissions received after the due date are considered late.

The reports required for each monthly update shall include all reports generated for approval of the CPM Schedule for that particular portion of the work. On larger or complex projects, the Engineer may require the schedule data sorted by an activity code to better reflect the progression of the work. Summary barcharts may also be required.

3.) Biweekly Schedules: Each week, the Contractor shall be required to produce and submit to the Engineer a biweekly schedule showing all activities planned for the following two week period. This short term schedule may be handwritten but shall clearly indicate all work planned on a crew basis for the two week period.

4.) 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 his 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.

5.) 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 diskette which include all Primavera project files for the Engineer's exclusive use.

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 his 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; 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 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 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, 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 shall 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 shall 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 project payments.

2) In the event the project 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 which will be paid at the per month cost for the services of the Project Coordinator.

3) Failure of the Contractor to submit a "Baseline", monthly update or Recovery Schedule for any portion of the work in accordance with this specification shall result in the withholding of all contract payments until the schedule is submitted to, and approved by, the Engineer.

Pay Item	Pay Unit
Project Coordinator	L.S.

ITEM #0969064A – CONSTRUCTION FIELD OFFICE, LARGE

Description: Under the item included in the bid document, adequate weatherproof office quarters will be provided by the Contractor for the duration of the work, and if required, for a maximum of ninety days thereafter for the exclusive use of ConnDOT forces and others who may be engaged to augment ConnDOT forces with relation to the contract. The office quarters shall be located convenient to the work site and installed in accordance with Article 1.08.02, this office shall be separated from any office occupied by the Contractor. Ownership and liability of the office quarters shall remain with the Contractor.

Materials: Materials shall be in like new condition for the purpose intended and shall be approved by the Engineer.

Office Requirements: The Contractor shall furnish the office quarters and equipment as described below.

	Description:
1,000 SF	Sq. Ft. of floor space with a minimum ceiling height of 7 ft. and shall be partitioned as shown on building floor plan as provided by the Engineer.
2 EA	Minimum number of exterior entrances.
10 EA	Minimum number of parking spaces.

Office layout: The office shall have a minimum square footage as indicated in the table above, and shall be partitioned as shown on building floor plan as provided by the Engineer. The underside of the office shall be fully skirted to the ground.

Lavatory Facilities: The Contractor shall furnish a minimum of two (2) separate lavatories and toilet facilities ("men" and "women"), in separately enclosed rooms that are properly ventilated and comply with applicable sanitary codes. The Contractor shall provide each lavatory with hot and cold running water and flush-type toilets. He shall also supply lavatory and sanitary supplies as required.

Windows and Entrances: The windows shall be of a type that will open and close conveniently, shall be sufficient in number and size to provide adequate light and ventilation, and shall be fitted with locking devices, blinds and screens. The entrances shall be secure, screened, and fitted with a lock for which four keys shall be furnished. All keys to the construction field office shall be furnished to the Department and will be kept in their possession while State personnel are using the office. Any access to the entrance ways shall meet applicable building codes and be slip resistant, with appropriate handrails.

Lighting: The Contractor shall equip the office interior with electric lighting that provides a minimum illumination level of 100 foot-candles at desk level height, and electric outlets for each desk and drafting table. The Contractor shall also provide exterior lighting that provides a minimum illumination level of 2 foot-candles throughout the parking area and for a minimum distance of 10 ft. on each side of the field office.

The Contractor shall provide the following additional equipment, facilities, and/or services at the Field Office on this project to include at least the following to the satisfaction of the Engineer:

Parking Facility: Adequate parking spaces with adequate illumination on a paved surface, with surface drainage if needed. If paved parking does not exist adjacent to the field office, the Contractor shall provide a parking area of sufficient size to accommodate the number of vehicles indicated in the table above. Construction of the parking area and driveway, if necessary, will consist of a minimum of 6 inches of processed aggregate base graded to drain. The base material will be extended to the office entrance.

Field Office Security: Physical Barrier Devices - This shall consist of physical means to prevent entry, such as: 1) All windows shall be barred or security screens installed; 2) All field office doors shall be equipped with dead bolt locks and regular day operated door locks; and 3) Other devices as directed by the Engineer to suit existing conditions.

Electric Service: The field office shall be equipped with an electric service panel to serve the electrical requirements of the field office, including: lighting, general outlets, computer outlets, calculators etc., and meet the following minimum specifications:

A. 120/240 volt, 1 phase, 3 wire.
B. Ampacity necessary to serve all equipment. Service shall be a minimum 100 amp dedicated to the construction field office.
C. The electrical panel shall include a main circuit breaker and branch circuit breakers of the size and quantity required.
D. Additional 120 volt, single phase, 20 amp, isolated ground dedicated power circuit with dual NEMA 5-20 receptacles will be installed at each computer workstation location.
E. Additional 120 volt, single phase, 20 amp, isolated ground dedicated power circuit with dual NEMA 5-20 receptacles will be installed, for use by the Telephone Company.
F. Additional 120-volt circuits and duplex outlets as required meeting National Electric Code requirements.
G. One exterior (outside) wall mounted GFI receptacle, duplex, isolated ground, 120 volt, straight blade.
H. After work is complete and prior to energizing, the State's ConnDOT electrical inspector, must be contacted at 860-594-2240. (Do Not Call Local Town Officials)
I. Prior to field office removal the ConnDOT Data Communications office must be notified to deactivate the communications equipment.

Heating, Ventilation and Air Conditioning (HVAC): The field office shall be equipped with sufficient heating, air conditioning and ventilation equipment to maintain a temperature range of 68°-80° Fahrenheit within the field office.

The Following Furnishings and Equipment Shall Be Provided In The Applicable Field Office Type:

Qty	Description:
5 EA	Office desks (2.5 ft x 5 ft) with drawers, locks, and matching desk chairs that have

Qty	Description:
	pneumatic seat height adjustment and dual wheel casters on the base.
4 EA	Office Chairs.
2 EA	Fire resistant cabinets (legal size/4 drawer), locking.
2 EA	Non-fire resistant cabinets (legal size/4 drawer), locking.
1 EA	Storage racks to hold 3 ft x 5 ft display charts.
1 EA	Mail slot bin - legal size.
1 EA	Drafting type tables (3 ft x 6 ft) and supported by wall brackets and legs; and matching drafters stool that have pneumatic seat height adjustment, seat back and dual wheel casters on the base.
1 EA	Flat file (4/drawers).
3 EA	Personal computer tables (4 ft x 2.5 ft).
1 EA	Hot and cold water dispensing unit and supply of cups and bottled water shall be supplied by the Contractor for the duration of the project.
2 EA	Electronic office type printing calculators capable of addition, subtraction, multiplication and division with memory and a supply of printing paper.
4 EA	Telephone.
1 EA	Telephone answering machine.
1 EA	Plain paper facsimile (FAX) machine capable of transmitting via telephone credit card. All supplies, paper and maintenance shall be provided by the Contractor.
1 EA	Copier/Scanner - dry, plain paper with automatic feeder and reducing capability. All supplies, paper and maintenance shall be provided by the Contractor.
4 EA	Computer systems as specified below under Computer Hardware and Software. All supplies and maintenance shall be provided by the Contractor.
1 EA	Laser printer as specified below under Computer Hardware and Software. All supplies, paper and maintenance shall be provided by the Contractor.
3 EA	Digital Camera as specified below under Computer Hardware and Software. All supplies and maintenance shall be provided by the Contractor.
1 EA	Wastebaskets - 30 gal., including plastic waste bags.
6 EA	Wastebaskets - 5 gal., including plastic waste bags.
2 EA	Electric pencil sharpeners.
* EA	Fire extinguishers - provide and install type and number to meet applicable State and local codes for size of office indicated, including a fire extinguisher suitable for use on a computer terminal fire.
6 EA	Interior partitions - 6 ft x 6 ft, soundproof type, portable and freestanding.
2 EA	Vertical plan racks for 2 sets of 2 ft x 3 ft plans for each rack..
1 EA	Double door supply cabinet with 4 shelves and a lock - 6 ft x 4 ft.
1 EA	Easel/chalkboard.
2 EA	Open bookcases - 3 shelves - 3 ft long.
1 EA	Infrared Thermometer, including certified calibration, case, cleaning wipes.
1 EA	Concrete Curing Box as specified below under Concrete Testing Equipment.
1 EA	Concrete Air Meter as specified below under Concrete Testing Equipment.
1 EA	Concrete Slump Cone as specified below under Concrete Testing Equipment.

The furnishings and equipment required herein shall remain the property of the Contractor. Any supplies required to maintain or operate the above listed equipment or furnishings shall be provided by the Contractor for the duration of the project.

Telephone Service: This shall consist of two (2) telephone lines: one (1) line for phone/voice service and one (1) line dedicated for the facsimile machine. The Contractor shall pay all charges except for out-of-state toll calls made by State personnel.

Data Communications Facility Wiring: Contractor shall install a Category 5e 468B patch panel in a central wiring location and Cat 5e cable from the patch panel to each PC station, terminating in a (category 5e 468B) wall or surface mount data jack. The central wiring location shall also house either the data circuit with appropriate power requirements or a category 5 cable run to the location of the installed data circuit. The central wiring location will be determined by the ConnDOT Data Center staff in coordination with the designated field office personnel as soon as the facility is in place. The ConnDOT Project Engineer will provide the Contractor with a copy of the current PC specifications, approved printer list and data wiring schematic as soon as possible after the contract is awarded.

Contractor to run a CAT 5e LAN cable a minimum length of 25 feet for each computer to LAN switch area leaving an additional 10 feet of cable length on each side with terminated RJ45 connectors. Each run / jack shall be clearly labeled with an identifying Jack Number.

The installation of a data communication circuit between the field office and the ConnDOT Data Communication Center in Newington will be coordinated between the ConnDOT District staff, ConnDOT Office of Information Systems and the local phone company. The ConnDOT District staff will coordinate the installation of the data communication service with ConnDOT PC Support once the field office phone number is issued. The Contractor shall provide the field office telephone number(s) to the ConnDOT Project Engineer as soon as possible to facilitate data line and computer installations.

Computer Hardware and Software:

The ConnDOT Project Engineer will provide the Contractor with a copy of the current PC specifications, approved printer list and data wiring schematic as soon as possible after the contract is awarded.

Before ordering the computer hardware and software, the Contractor must submit a copy of their proposed PC specifications and the type of printer to the ConnDOT Project Engineer for review by the ConnDOT Data Center. If the specification meets or exceeds the minimum specifications listed below, then the Contractor will be notified that the order may be placed.

Before any equipment is delivered to the Data Center, arrangements must be made a minimum of 24 hours in advance by contacting 860-594-3500. All software, hardware and licenses listed below shall be clearly labeled, specifying the (1) Project No., (2) Contractor Name, (3) Project Engineer's Name and (4) Project Engineer's Phone No., and shall be delivered to the ConnDOT

Data Center, 2710 Berlin Turnpike, Newington, CT, where it will be configured and prepared for field installation. Installation will then be coordinated with ConnDOT field personnel and the computer system specified will be stationed in the Department's project field office.

The computer system furnished shall have all software and hardware necessary for the complete installation of the latest versions of the software listed, and therefore supplements the minimum specifications below. The Engineer reserves the right to expand or relax the specification to adapt to the software and hardware limitations and availability, the compatibility with current agency systems, and to provide the Department with a computer system that can handle the needs of the project. This requirement is to ensure that the rapid changing environment that computer systems have experienced does not leave the needs of the project orphan to what has been specified. There will not be any price adjustment due to the change in the minimum system requirements.

The Contractor shall provide the Engineer with a licensed copy registered in the Department's name of the latest versions of the software listed and maintain customer support services offered by each software producer for the duration of the Contract. The Contractor shall deliver to the Engineer all supporting documentation for the software and hardware including any instructions or manuals. The Contractor shall provide original backup media for the software.

The Contractor shall provide the computer system with all required supplies, maintenance and repairs (including labor and parts) throughout the Contract life.

Once the Contract has been completed, the computer will remain the property of the Contractor. Prior to the return of any computer(s) to the Contractor, field personnel will coordinate with the Data Center personnel for the removal of Department owned equipment, software, data, and associated equipment.

A) <u>Computer – Minimum Specification:</u>

Processor – Intel® Core 2 Duo Processor (2.00 GHz, 800 MHz FSB 2MB L2 Cache)
Memory – 2 GB DIMM DDR2 667MHz.
Monitor – 19.0 inch LCD color monitor.
Graphics – Intel Graphics Media Accelerator 3100. or equivalent.
Hard Drive – 160 GB Ultra ATA hard drive (Western Digital, IBM or Seagate).
Floppy Drive – 3.5 inch 1.44MB diskette drive.
Optical Drive – CD-RW/DVD-RW Combo.
Multimedia Package – Integrated Sound Blaster Compatible AC97 Sound and speakers.
Case – Small Form or Mid Tower, capable of vertical or horizontal orientation.
Integrated Network Adapter – comparable to 3COM PCI 10/100 twisted pair Ethernet.
Keyboard – 104+ Keyboard.
Mouse – Optical 2-button mouse with scroll wheel.
Operating System – Windows XP Professional Service Pack 2; Windows Vista Capable.
Application Software – MS Office 2007 Professional Edition.
Additional Software (Latest Releases, including subscription services for the life of the Contract.–

- Norton Anti-Virus and CD/DVD burning software (ROXIO or NERO),
- Adobe Acrobat Standard

Resource or Driver CD/DVD – CD/DVD with all drivers and resource information so that computer can be restored to original prior to shipment back to the contractor.

Uninterrupted power supply – APC Back-UPS 500VA.

Note A1: All hardware components must be installed before delivery. All software documentation and CD-ROMs/DVD for Microsoft Windows XP Professional, Microsoft Office 2007 Professional Edition, and other software required software must be provided. Computer Brands are limited to Dell, Gateway and HP brands only. No other brands will be accepted. The ConnDOT Project Engineer will provide the Contractor with a copy of the current PC specifications and approved printer list as soon as possible after the contract is awarded.

Note A2: As of June 30, 2008, Microsoft will no longer distribute Windows XP for retail sale, although the date for specific computer manufacturers may be different. Please consult your manufacturer for details. The Department still requires Windows XP on all PCs. Microsoft has stated that any PCs that are purchased with either Windows Vista Business, or Vista Ultimate are automatically entitled to "downgrade rights", which allow the PC to be rolled back to Windows XP. Please consult the specific manufacturer for details on downgrading new PCs to Microsoft Windows XP after June 30, 2008.

B) Laser Printer – Minimum Specification:

Print speed – 20 ppm.
Resolution – 1,200 x 1,200 dpi.
Paper size – Up to 216 mm x 355 mm (8.5 in x 14 in).
RAM – 16 MB.
Print Drivers – Must support HP PCL6 and HP PCL5e.
Printer cable – 1.8 m (6 ft).

Note B1: Laser printer brands are limited to Hewlett-Packard and Savin brands only. The ConnDOT Project Engineer will provide the Contractor with a copy of the current PC specifications and approved printer list as soon as possible after the contract is awarded.

Note B2: It is acceptable to substitute a multi-function all-in-one printer/copier/scanner/fax machine listed on the approved printer list in place of the required laser printer and fax machine.

C) Digital Camera – Minimum Specification:

Optical – 5 mega pixel, with 3x optical zoom.
Memory – 2 GB.
Features – Date/time stamp feature.
Connectivity – USB cable or memory card reader.
Software – Must be compatible with Windows XP and Vista.
Power – Rechargeable battery and charger.

The Contractor is responsible for service and repairs to all computer hardware. All repairs must be performed with-in 48 hours. If the repairs require more than a 48 hours then a replacement must be provided. All supplies, paper and maintenance for the computers, laptops, printers, copiers, and fax machines shall be provided by the Contractor.

Concrete Testing Equipment: If the Contract includes items that require compressive strength cylinders for concrete, in accordance with the Schedule of Minimum Testing Requirements for Sampling Materials for Test, the Contractor shall provide the following. All testing equipment will remain the property of the Contractor at the completion of the project.

A) Concrete Cylinder Curing Box – meeting the requirements of Section 6.12 of the Standard Specifications.

B) Air Meter – The air meter provided shall be in good working order and will meet the requirements of AASHTO T 152.

C) Slump Cone Mold – Slump cone, base plate, and tamping rod shall be provided in like-new condition and meet the requirements of AASHTO T119, Standard Test Method for Slump of Hydraulic-Cement Concrete.

Insurance Policy: The Contractor shall provide a separate insurance policy, with no deductible, in the minimum amount of forty thousand dollars ($40,000.00) in order to insure all State-owned data equipment and supplies used in the office against all losses. The Contractor shall be named insured on that policy, and the Department shall be an additional named insured on the policy. These losses shall include, but not be limited to: theft, fire, and physical damage. The Department will be responsible for all maintenance costs of Department owned computer hardware. In the event of loss, the Contractor shall provide replacement equipment in accordance with current Department equipment specifications, within seven days of notice of the loss. If the Contractor is unable to provide the required replacement equipment within seven days, the Department may provide replacement equipment and deduct the cost of the equipment from monies due or which may become due the Contractor under the contract or under any other contract. The Contractor's financial liability under this paragraph shall be limited to the amount of the insurance coverage required by this paragraph. If the cost of equipment replacement required by this paragraph should exceed the required amount of the insurance coverage, the Department will reimburse the Contractor for replacement costs exceeding the amount of the required coverage.

Maintenance: During the occupancy by the Department, the Contractor shall maintain all facilities and furnishings provided under the above requirements, and shall maintain and keep the office quarters clean through the use of weekly professional cleaning to include, but not limited to, washing & waxing floors, cleaning restrooms, removal of trash, etc. Exterior areas shall be mowed and clean of debris. A trash receptacle (dumpster) with weekly pickup (trash removal) shall be provided. Snow removal, sanding and salting of all parking, walkway, and entrance ways areas shall be accomplished during a storm if on a workday during work hours, immediately after a storm and prior to the start of a workday. If snow removal, salting and

sanding are not completed by the specified time, the State will provide the service and all costs incurred will be deducted from the next payment estimate.

Method of Measurement: The furnishing and maintenance of the construction field office will be measured for payment by the number of calendar months that the office is in place and in operation, measured to the nearest month.

There will not be any price adjustment due to any change in the minimum computer system requirements.

Basis of Payment: The furnishing and maintenance of the construction field office will be paid at the listed unit price per month for the respective item "Construction Field Office, Large", which price shall include all material, equipment, labor, utility services and work incidental thereto.

The cost of providing the parking area, external illumination, trash removal and snow and ice removal shall be included in the monthly unit price bid for the respective item "Construction Field Office, Large".

The State will be responsible for payment of data communication user fees and for toll calls by State personnel.

Pay Item	Pay Unit
Construction Field Office, Large	Month

ITEM #0970006A - TRAFFICPERSON (MUNICIPAL POLICE OFFICER)
ITEM #0970007A - TRAFFICPERSON (UNIFORMED FLAGGER)

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

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

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

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

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

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

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

Trafficpersons shall consist of the following types:

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

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

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

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

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

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

Trafficpersons shall not work more than twelve hours in any one 24 hour period. In case such services are required for more than twelve hours, additional Trafficpersons shall be furnished and measured for payment. In cases where the Trafficperson is an employee on the Contractor's

payroll, payment under the item "Trafficperson (Uniformed Flagger)" will be made only for those hours when the Contractor's employee is performing Trafficperson services.

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

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

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

9.70.05—Basis of Payment: Trafficpersons will be paid in accordance with the schedule described herein.
There will be no direct payment for safety garments or STOP/SLOW paddles. All costs associated with furnishing safety garments and STOP/SLOW paddles shall be considered included in the general cost of the item.

1. Uniformed Law Enforcement Personnel: The sum of money shown on the Estimate and in the itemized proposal as "Estimated Cost" for this work will be considered the bid price even though payment will be made as described below. The estimated cost figure is not to be altered in any manner by the bidder. Should the bidder alter the amount shown, the altered figures will be disregarded and the original price will be used to determine the total amount for the contract.

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

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

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

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

ITEM #0971001A – MAINTENANCE AND PROTECTION OF TRAFFIC

Article 9.71.01 – Description is supplemented by the following:

The Contractor shall maintain and protect traffic as follows and as limited in the Special Provision "Prosecution and Progress":

The Contractor shall maintain and protect one lane of through traffic in each direction, each lane on a paved travelpath not less than 11 feet (3.3 m) in width.

Excepted therefrom will be those periods, during the allowable periods, when the Contractor is actively working, at which time the Contractor will be allowed to maintain and protect at least an alternating one-way traffic operation on a paved travelpath not less than 12 feet (3.6 m) in width. The length of the alternating one-way traffic operation shall not exceed 300 feet (91 m).

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:

SIGNING

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

When the necessary construction is completed, the Contractor shall remove existing signs and install new signs as shown on the Signing and Pavement Marking Plans contained in the contract plans. *OR "When the necessary construction is completed, the Contractor shall re-install the existing signs in their original locations or as directed by the Engineer."*

REQUIREMENTS FOR WINTER

The Contractor shall schedule a meeting with representatives of the Engineer, Maintenance, Traffic, and the Town/City 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 per the direction of the Engineer. Proper distances between advance warning signs and proper taper lengths are mandatory. 42 Inch (1 m) Traffic Cones or Traffic Drums are to be utilized to continue a lane closure on expressways.

ITEM #0980001A – CONSTRUCTION STAKING

9.80.01—Description: The work under this item shall consist of construction layout and reference staking necessary for the proper control and satisfactory completion of all work on the project, except property lines, highway lines, or non-access lines.

9.80.02—Materials: All stakes used for control staking shall be of the same quality as used by the Department for this purpose. For slope limits, pavement edges, gutter lines, etc., where so-called "green" or "working" stakes are commonly used, lesser quality stakes will be acceptable, provided the stakes are suitable for the intended purpose.

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

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

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

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

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

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

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

All staking shall be performed by qualified engineering or surveying personnel who are trained, experienced and skilled in construction layout and staking of the type required under the contract. Prior to start of work, the Contractor shall submit for review and comment the qualifications of personnel responsible for construction staking on the project. On all projects with an original contract value greater than $25 million and bridge rehabilitation and reconstruction projects greater than $10 million, surveying shall be performed under the direct supervision of a Professional Surveyor licensed in the State of Connecticut. The submission shall

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

The Department may check the control of the work, as established by the Contractor, at any time as the work progresses. The Contractor will be informed of the results of these checks, but the Department by so doing in no way relieves the Contractor of responsibility for the accuracy of the layout work. The Contractor shall correct or replace, at the Contractor's own expense, any deficient layout and construction work which may be the result of the inaccuracies in the Contractor's staking operations or the failure to report such inaccuracies, or the Contractor's failure to report inaccuracies found in work done by the Department or by others. If, as a result of these inaccuracies, the Department is required to make further studies, redesign, or both, all expenses incurred by the Department due to such inaccuracies will be deducted from any monies due the Contractor.

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

For roadways where the existing pavement markings need to be reestablished:
Prior to any resurfacing or obliteration of existing pavement markings, the Contractor and a representative of the Engineer must establish and document pavement marking control points from the existing markings. These control points shall be used to reestablish the positions of the lanes, the beginnings and endings of tapers, channelization lines for on and off ramps, lane use arrows, stop bars, and any lane transitions in the project area. The Contractor shall use these control points to provide appropriate premarking prior to the installation of the final markings.

The Contractor shall provide and maintain reference stakes and/or markings at 100 foot intervals immediately off the edge of pavement to be used to reestablish the existing pavement markings. The Contractor shall also provide and maintain reference stakes and/or markings at any point where there is a change in pavement markings to reestablish the existing pavement markings.

For non-limited access roadways
On non-limited access roadways it may be necessary to adjust the final locations of the pavement markings to accommodate pedestrians and bicyclists where feasible. Prior to any resurfacing or obliteration of existing pavement markings, the Contractor, a representative of the Engineer, and a representative of the Division of Traffic Engineering must establish and document pavement marking control points from the existing markings as described above. The control points at that time may be adjusted to provide minimum shoulder widths of 4 to 5 feet wherever possible while maintaining travel lane widths of no less than 11 feet and no more than 12 feet.

9.80.04—Method of Measurement: Construction staking will be at the Contract lump sum for construction staking.

When no price for "Construction Staking" is asked for on the proposal form, the cost of the work described above shall be included in the general cost of the work and no direct payment for "Construction Staking" will be made.

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

Pay Item	Pay Unit
Construction Staking	l.s.

ITEM #1220013A – CONSTRUCTION SIGNS - BRIGHT FLUORESCENT SHEETING

Article 12.20.01 – Description: The Contractor shall furnish construction signs with bright fluorescent sheeting and their required portable supports or metal sign posts that conform to the requirements of NCHRP Report 350 (TL-3). The construction signs and their required portable supports or metal sign posts shall conform to the signing requirements stated in Article 9.71 "Maintenance and Protection of Traffic", as shown on the plans and/or as directed by the Engineer.

Article 12.20.02 – Materials: Prior to using the construction signs and their portable supports, the Contractor shall submit to the Engineer a copy of the Letter of Acceptance issued by the FHWA to the manufacturer documenting that the devices (both sign and portable support tested together) conform to NCHRP Report 350 (TL-3).

Portable sign supports shall be designed and fabricated so as to prevent signs from being blown over or displaced by the wind from passing vehicles. Portable sign supports shall be approved by the Engineer before they are used. Mounting height of signs on portable sign supports shall be a minimum of 1 foot and a maximum of 2 feet, measured from the pavement to the bottom of the sign.

All sign faces shall be rigid and reflectorized. Sheet aluminum sign blanks shall conform to the requirements of Article M.18.13. Metal sign posts shall conform to the requirements of Article M.18.14. Application of reflective sheeting, legends, symbols, and borders shall conform to the requirements specified by the reflective sheeting manufacturer. Attachments shall be provided so that the signs can be firmly attached to the portable sign supports or metal posts without causing damage to the signs. A Materials Certificate and Certified Test Report conforming to Article 1.06.07 shall be required for the reflective sheeting.

The following types of construction signs shall not be used: mesh, non-rigid, roll-up, corrugated or waffle board types substrates, foam core and composite aluminum sign substrates.

Reflective sheeting shall conform to the following:
The fluorescent orange prismatic retroreflective sheeting shall consist of prismatic lenses formed in a transparent fluorescent orange synthetic resin, sealed, and backed with an aggressive pressure sensitive adhesive protected by a removable liner. The sheeting shall have a smooth surface.

Physical Properties:

A. Photometric - Coefficient of Retroreflection R_A

When the sheeting applied on test panels is measured in accordance with ASTM E 810, it shall have minimum coefficient of retroreflection values as shown in Table I. The rotation angle shall be as designated by the manufacturer for test purposes, the observation angles

shall be 0.2 degrees and 0.5 degrees, the entrance angles (component B_1) shall be -4 degrees and +30 degrees.

TABLE I

Minimum Coefficient of Retroreflection R_A

Candelas per footcandle per square foot

Observation Angle (deg.)	Entrance Angle (deg.)	R_A Orange
0.2	- 4	200
0.2	+ 30	90
0.5	- 4	80
0.5	+ 30	50

The rotation shall be as designated by the manufacturer.

B. Daytime Color

Color shall conform to the requirements of Table II. Daytime color and maximum spectral radiance factor (peak reflectance) of sheeting mounted on test panels shall be determined instrumentally in accordance with ASTM E 991. The values shall be determined on a Hunter Lab Labscan 6000 0/45 Spectrocolorimeter with option CMR 559 (or approved equal 0/45 instrument with circumferential viewing illumination). Computations shall be done in accordance with ASTM E 308 for the 2 degree observer.

TABLE II

Color Specification Limits** (Daytime)

Color	1		2		3		4		Reflectance Limit Y (%)	
	X	Y	X	Y	X	Y	X	Y	MIN	MAX
Orange (new)	.583	.416	.523	.397	.560	.360	.631	.369	28	-
Orange (weathered)	.583	.416	.523	.397	.560	.360	.631	.369	20	45

Maximum Spectral Radiance Factor, new: 110%, min.
weathered: 60%, min.

** The four pairs of chromaticity coordinates determine the acceptable color in terms of the CIE 1931 standard colorimetric system measured with standard illuminant D65.

C. Nighttime Color

Nighttime color of the sheeting applied to test panels shall be determined instrumentally in accordance with ASTM E 811 and calculated in the u', v' coordinate system in accordance with ASTM E 308. Sheeting shall be measured at 0.33 degrees observation

and -4 degree entrance at rotation as determined by the manufacturer for test purposes. Color shall conform to the requirements of Table III.

TABLE III

Color Specification Limits ** (Nighttime)

Color	1		2		3		4	
	u'	v'	u'	v'	u'	v'	u'	v'
Orange (new and weathered)	.400	.540	.475	.529	.448	.522	.372	.534

D. Resistance to Accelerated Weathering

The retroreflective surface of the sheeting shall be weather resistant and show no appreciable cracking, blistering, crazing, or dimensional change after one year's unprotected outdoor exposure in south Florida, south-facing and inclined 45 degrees from the vertical, or after 1500 hours exposure in a xenon arc weatherometer in accordance with ASTM G26, Type B, Method A. Following exposure, panels shall be washed in a 5% HCL solution for 45 seconds, rinsed thoroughly with clean water, blotted with a soft clean cloth and brought to equilibrium at standard conditions. After cleaning, the coefficient of retroreflection shall be not less than 100 when measured as in D.2, below, and the color is expected to conform to the requirements of Tables II and III for weathered sheeting. The sample shall:

1. Show no appreciable evidence of cracking, scaling, pitting, blistering, edge lifting or curling or more than 0.031 inch shrinkage or expansion.

2. Be measured only at angles of 0.2 degrees observation, -4 degrees entrance, and rotation as determined by the manufacturer for test purposes. Where more than one panel of color is measured, the coefficient of retroreflection shall be the average of all determinations.

E. Impact Resistance

The retroreflective sheeting applied according to the manufacturer's recommendations to a test panel of alloy 6061-T6, 0.040 inch by 3 inches by 5 inches and conditioned for 24 hours, shall show no cracking outside the impact area when the face of the panel is subjected to an impact of 100 inch-pounds, using a weight with a 0.625 inch diameter rounded tip dropped from a height necessary to generate an impact of 100 inch-pounds, at test temperatures of both 32° F and 72° F.

F. Resistance to Heat

The retroreflective sheeting, applied to a test panel as in E., above, and conditioned for 24 hours, shall be measured in accordance with Paragraph A. at 0.2 degree observation and -4 degree entrance angles at rotation as determined by the manufacturer for test purposes and

exposed to 170° ± 5° F for 24 hours in an air circulating oven. After heat exposure the sheeting shall retain a minimum of 70% of the original coefficient of retroreflection.

G. Field Performance:

Retroreflective sheeting processed and applied to sign blank materials in accordance with the sheeting manufacturer's recommendations, shall perform effectively for a minimum of 3 years. The retroreflective sheeting will be considered unsatisfactory if it has deteriorated due to natural causes to the extent that: (1) the sign is ineffective for its intended purpose when viewed from a moving vehicle under normal day and night driving conditions; or (2) the coefficient of retroreflection is less than 100 when measured at 0.2 degrees observation and -4 degree entrance. All measurements shall be made after sign cleaning according to the sheeting manufacturer's recommendations.

Article 12.20.03 – Construction Methods: Ineffective signs, as determined by the Engineer and in accordance with the ATSSA guidelines contained in "Quality Standards for Work Zone Traffic Control Devices", shall be replaced by the Contractor at no cost to the State.

Signs and their portable sign supports or metal posts that are no longer required shall be removed from the project and shall remain the property of the Contractor.

Article 12.20.04 – Method of Measurement: Construction Signs - Bright Fluorescent Sheeting will be measured for payment by the number of square feet of sign face. Sign supports will not be measured for payment.

Article 12.20.05 – Basis of Payment: "Construction Signs - Bright Fluorescent Sheeting" required and used on the project will be paid for at the Contact unit price per square foot. This price shall include the furnishing and maintenance of the signs, portable sign supports, metal sign posts and all hardware. Each sign and support or posts will be paid for once, regardless of the number of times it is used.

Pay Item	Pay Unit
Construction Signs – Bright Fluorescent Sheeting	S.F.

ITEM #1700001A – SERVICE CONNECTIONS (ESTIMATED COST)

Description: This work shall consist of disconnection, alteration and reconnection of those existing utility services owned by property owners at locations necessary to complete this project and as ordered by the Engineer. This work shall include the coordination with the affected utility companies and customers. Any damage caused by the Contractor or Subcontractors, as determined by the Engineer, shall be corrected by the Contractor in accordance with this specification.

Materials: All materials shall be provided by the Contractor and shall meet the current standards of the affected service.

Construction Methods: The Contractor shall perform all work in coordination with the Utility Company and affected property owner and as directed by the Engineer. Certain work may require use of a licensed and/or certified tradesman when such work is required by local and/or state codes.

Any utility customer's service interruption shall be done in a way that minimizes adverse impacts to the customer and affected utility.

Any work and materials supplied by the utility companies shall be on a billable basis to the Contractor.

Method of Measurement: The work and materials shall be measured for payment as provided for under Article 1.04.05 Extra Work.

The sum of money shown on the estimate and in the itemized proposal as "Estimated Cost" for this work will be considered the price bid even though payment will be made only for actual work performed. The estimated cost figure is not to be altered in any manner by the bidder. Should the bidder alter the amount shown, the altered figure will be disregarded and the original price will be used to determine the total amount for the contract.

Corrective work required to repair damage caused by the Contractor or its Subcontractors shall not be measured for payment.

Basis of Payment: This work will be paid as Extra Work.

Pay Item	Pay Unit
Service Connections (Estimated Cost)	Estimated Cost

ITEM #1700003A – CONTRACTOR SUPPLIED MATERIALS TO OTHERS (ESTIMATED COST)

Description: This section describes requirements for purchasing materials for AMTRAK to complete certain railroad force account construction work associated with this contract.

Construction Methods:

Contractor Responsibilities:

The Contractor shall coordinate with the AMTRAK for the construction of a temporary platform as indicated on the Contract Drawings. The Contractor may be required to purchase, deliver and store required construction materials to the project site. Actual construction will be accomplished by AMTRAK personnel. The Contractor shall provide AMTRAK access to the site and stage its work so as not to interfere with AMTRAK.

Method of Measurement: Reimbursement for purchase and delivery of materials for work described in this Section, will be measured for payment as provided for under Article 1.09.04 – "Extra and Cost-Plus Work" of Form 816.

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 the cost of the 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: Reimbursement for payments for purchase and delivery of materials for work described in this Section will be paid under Article 1.09.04, "Extra and Cost-Plus Work", and will consist of the actual cost paid by the Contractor for the work described.

Pay Item	Pay Unit
Contractor Supplied Materials to Others	EST

CSI SPECIFICATIONS

INDEX OF CSI FORMATTED SPECIFICATIONS

Note: This index 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 index shall not be considered part of the contract.

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01141A Safety and Protection of Railroad Traffic and Property (AMTRAK)

01142A Submission Documentation Required For Amtrak Review and Approval of Plans for Bridge Erection, Demolition and Other Crane/ Hoisting Operations over Railroad Right -Of-Way (AMTRAK)

01520A Requirements for Temporary Protection Shields For Demolition and Construction of Overhead Bridges and Other Structures (AMTRAK)

02261A Requirements for Temporary Sheeting and Shoring to Support Amtrak Tracks (AMTRAK)

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034100 Precast Structural Concrete

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047200 Cast Stone Masonry

DIVISION 5 - METALS

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END OF INDEX OF CSI FORMATTED SPECIFICATIONS

SECTION 01141A -SAFETY AND PROTECTION OF RAILROAD TRAFFIC AND PROPERTY

PART 1 -GENERAL

1.1 SCOPE

A. This specification describes the safety procedures and protection provisions for Contractors and Permittees entering and working upon railroad property.

B. Use of this specification is as required by Amtrak, as described in Amtrak Engineering Practice EP3014.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.3 DEFINITIONS

A. CHIEF ENGINEER: Amtrak Chief Engineer

B. RAILROAD: National Railroad Passenger Corporation (Amtrak), and/or the duly authorized representative

C. ENGINEERING PRACTICE: Amtrak Engineering Practices establish a system of uniform practices, notices and instructions for the Amtrak Engineering Department, providing current, permanent and temporary, departmental procedures and policies.

PART 2 -PRODUCTS (Not Used)

PART 3 -EXECUTION

3.1 PRE-ENTRY MEETING

A. Before entry of Permittee and/or Contractors onto Railroad's property, a pre-entry meeting shall be held at which time Permittee and/or Contractors shall submit for written approval of the Chief Engineer, plans, computations and a detailed description of proposed methods for accomplishing the work, including methods for protecting Railroad's traffic. Any such written approval shall not relieve Permittee and/or Contractor of their complete responsibility for the adequacy and safety oftheir operations.

3.2 RULES, REGULATIONS AND REQUIREMENTS

A. Railroad traffic shall be maintained at all times with safety and continuity, and Permittee and/or Contractors

shall conduct their operations in compliance with all rules, regulations, and requirements of Railroad (including these Specifications) with respect to any work performed on, over, under, within or adjacent to Railroad's property. Permittee and/or Contractors shall be responsible for acquainting themselves with such rules, regulations and requirements. Any violation of Railroads safety rules, regulations, or requirements shall be grounds for the immediate suspension of the Permittee and/or Contractor work, and the re-training of all personnel, at the Permittee's expense.

3.3 MAINTENANCE OF SAFE CONDITIONS

A. If tracks or other property of Railroad are endangered during the work, Permittee and/or Contractor shall immediately take such steps as may be directed by Railroad to restore safe conditions, and upon failure of Permittee and/or Contractor to immediately carry out such direction, Railroad may take whatever steps are reasonably necessary to restore safe conditions. All costs and expenses of restoring safe conditions, and of repairing any damage to Railroad's trains, tracks, right-of-way or other property caused by the operations of Permittee and/or Contractors, shall be paid by Permittee.

3.4 PROTECTION IN GENERAL

A. Permittee and/or Contractors shall consult with the Chief Engineer to determine the type and extent of protection required to insure safety and continuity of railroad traffic. Any Inspectors, Track Foremen, Track Watchmen, Flagman, Signalmen, Electric Traction Linemen, or other employees deemed necessary by Railroad, at its sole discretion, for protective services shall be obtained from Railroad by Permittee and/or Contractors. The cost of same shall be paid directly to Railroad by Pennittee. The provision of such employees by Railroad, and any other precautionary measures taken by Railroad, shall not relieve Permittee and/or Contractors from their complete responsibility for the adequacy and safety oftheir operations.

3.5 PROTECTION FOR WORK NEAR ELECTRIFIED TRACK OR WIRE

A. Whenever work is performed in the vicinity of electrified tracks and/or high voltage wires, particular care must be exercised, and Railroad's requirements regarding clearance to be maintained between equipment and tracks and/or energized wires, and otherwise regarding work in the vicinity of electrified tracks, must be strictly observed. No employees or equipment will be permitted to work near overhead wires, except when protected by a Class A employee of Railroad. **Permittee and/or Contractors must supply an adequate length of grounding cable (4/0 copper with approved clamps) for each piece of equipment working near or adjacent to any overhead wire.**

3.6 FOULING OF TRACK OR WIRE

A. No work will be permitted within twenty-five (25) feet of the centerline of track or the energized wire or have potential of getting within twenty-five (25) feet of track wire without the approval of the Chief Engineer's representative. Permittee and/or Contractors shall conduct their work so that no part of any equipment or material shall foul an active track or overhead wire without the written permission of the Chief Engineer's representative. When Permittee and/or Contractors desire to foul an active track, they must provide the Chief Engineer's representative with their site-specific work plan a minimum of twenty-one (21) working days in advance, so that, if approved, arrangements may be made for proper protection of Railroad. Any equipment shall be considered to be fouling a track or overhead wire when located (a) within fifteen

(15) feet from the centerline of the track or within fifteen (15) feet from the wire, or (b) in such a position that failure of same, with or without a load, would bring it within fifteen (15) feet from the centerline of the track or within fifteen (15) feet from the wire and requires the presence of the proper Railroad protection personnel.

B. If acceptable to the Chief Engineer' s representative, a safety barrier (approved temporary fence or barricade) may be installed at fifteen (15) feet from centerline of track or overhead wire to afford the Permittee and/or Contractor with a work area that is not considered fouling. Nevertheless, protection personnel may be required at the discretion of the Chief Engineer's representative.

3.7 TRACK OUTAGES

A. Permittee and/or Contractors shall verify the time and schedule of track outages from Railroad before scheduling any of their work on, over, under, within, or adjacent to Railroad's right-of-way. Railroad does not guarantee the availability of any track outage at any particular time. Permittee and/or Contractors shall schedule all work to be performed in such a manner as not to interfere with Railroad operations. Permittee and/or Contractors shall use all necessary care and precaution to avoid accidents, delay or interference with Railroad's trains or other property.

3.8 DEMOLITION

A. During any demolition, the Contractor must provide horizontal and vertical shields, designed by a Professional Engineer registered in the state in which the work takes place. These shields shall be designed in accordance with the Railroad's specifications and approved by the Railroad, so as to prevent any debris from falling onto the Railroad's right-of-way or other property. A grounded temporary vertical protective barrier must be provided if an existing vertical protective barrier is removed during demolition. In addition, if any openings are left in an existing bridge deck, a protective fence must be erected at both ends of the bridge to prohibit unauthorized persons from entering onto the bridge.

B. Ballasted track structure shall be kept free of all construction and demolition debris. Geotextiles or canvas shall be placed over the track ties and ballast to keep the ballast clean.

3.9 EQUIPMENT CONDITION

A. All equipment to be used in the vicinity of operating tracks shall be in "certified" first-class condition so as to prevent failures that might cause delay to trains or damage to Railroad's property. No equipment shall be placed or put into operation near or adjacent to operating tracks without first obtaining permission from the Chief Engineer's representative. **Under no circumstances shall any equipment or materials be placed or stored within twenty-five (25) feet from the centerline of an outside track, except as approved by the Site Specific Safety Work Plan.** To insure compliance with this requirement, Permittee and/or Contractors **must establish a twenty-five (25) foot foul line prior to the start of work** by either driving stakes, taping off or erecting a temporary fence, or providing an alternate method as approved by the Chief Engineer's representative. Permittee and/or Contractors will be issued warning stickers which must be placed in the operating cabs of all equipment as a constant reminder of the twenty-five (25) foot clearance envelope.

3.10 STORAGE OF MATERIALS AND EQUIPMENT

A. No material or equipment shall be stored on Railroad's property without first having obtained permission from the Chief Engineer. Any such storage will be on the condition that Railroad will not be liable for loss of or damage to such materials or equipment from any cause.

B. If permission is granted for the storage of compressed gas cylinders on Railroad property, they shall be stored a minimum of 25 feet from the nearest track in an approved lockable enclosure. The enclosure shall be locked when the Permittee and/or Contractor is not on the project site.

3.11 CONDITION OF RAILROAD'S PROPERTY

A. Permittee and/or Contractors shall keep Railroad's property clear of all refuse and debris from its operations. Upon completion of the work, Permittee and/or Contractors shall remove from Railroad's property all machinery, equipment, surplus materials, falsework, rubbish, temporary structures, and other property of the Permittee and/or Contractors and shall leave Railroad's property in a condition satisfactory to the Chief Engineer.

3.12 SAFETY TRAINING

A. All individuals, including representatives and employees of the Permittee and/or Contractors, before entering onto Railroad's property or coming within twenty-five (25) feet of the centerline of the track or energized wire shall first attend Railroad's Safety Contractor/Leasee Employee Training Class. The Safety Orientation Class will be provided by Railroad's Safety Representative at Permittee's expense. A photo I.D. will be issued and must be worn/displayed while on Railroad property. All costs of complying with Railroad's safety training shall be at the sole expense of Permittee. Permittee and/or Contractors shall appoint a qualified person as their Safety Representative. The Safety Representative shall continuously assure that all individuals comply with Railroad's safety requirements. All safety training records shall be maintained with site specific work plan.

3.13 NO CHARGES TO RAILROAD

A. It is expressly understood that neither these Specifications, nor any document to which they are attached, include any work for which Railroad is to be billed by Permittee and/or Contractors, unless Railroad gives a written request that such work be performed at Railroad's expense.

END OF SECTION 01141A

SECTION 01142A -SUBMISSION DOCUMENTATION REQUIRED FOR AMTRAK REVIEW AND APPROVAL OF PLANS FOR BRIDGE ERECTION, DEMOLITION AND OTHER CRANE/ HOISTING OPERATIONS OVER RAILROAD RIGHT -OF-WAY

PART 1 -GENERAL

1.1 SCOPE

A. Amtrak requires that a site-specific work plan for accomplishing hoisting operations be prepared for every applicable project, and for each type of lift on a project.
   1. The plan shall demonstrate adherence to Amtrak safety rules.
   2. The plan shall demonstrate constructability.
   3. The plan shall minimize impact to rail operations.
   4. The approved plan will provide the basis for field inspection and verification of the actual work.

B. Preparation, review and approval of the Crane/ Hoisting site-specific work plan does not relieve the Contractor from meeting other Amtrak requirements for adequate planning and documentation of proposed work procedures within the Right-of-Way of the railroad.

C. Current Amtrak safety rules shall be adhered to in every respect.

D. Use of this specification is as required by Amtrak, as described in Amtrak Engineering Practice EP3014.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division I Specification Sections, apply to this Section.

1.3 DEFINITIONS

A. CHIEF ENGINEER: Amtrak Vice President, Chief Engineer

B. RAILROAD: National Railroad Passenger Corporation (Amtrak), and/or the duly authorized representative

C. ENGINEERING PRACTICE: Amtrak Engineering Practices establish a system of uniform practices, notices and instructions for the Amtrak Engineering Department, providing current, permanent and temporary, departmental procedures and policies.

1.4 SUBMISSION REQUIREMENTS

A. Unless otherwise directed in the Contract, the Contractor shall submit five sets of plans and calculations to the authorized representative of the Chief Engineer, Structures, whose name and address will be provided at the project pre-construction meeting.

B. Submitted calculations and plans shall be signed and sealed by a Professional Engineer, registered in the State in which the work will be performed.

C. The Contractor shall revise and resubmit plans and calculations as many times as necessary, until a complete and correct site-specific work plan for crane/ hoisting operations has been approved.

PART 2 -PRODUCTS (Not Used)

PART 3 -EXECUTION

THE CONTRACTOR SHALL PROVIDE, AT A MINIMUM, THE FOLLOWING INFORMATION FOR REVIEW AND APPROVAL BY AMTRAK ENGINEERING STRUCTURES:

A. Plan view showing location(s) of cranes, operating radii, with delivery and/or disposal locations shown. Provide all necessary dimensions for locating the elements ofthe plan.

B. Plans and computations showing the weight ofthe pick.

C. Crane rating sheets, demonstrating that cranes are adequate for 150% of the calculated pick weight. That is, the cranes shall be capable of picking 150% of the load, while maintaining normal, recommended factors of safety. The adequacy of the crane for the proposed pick shall be determined by using the manufacturer's published crane rating chart and not the maximum crane capacity. Crane and boom nomenclature is to be indicated.

D. Calculations demonstrating that slings, shackles, lifting beams, etc. are adequate for 150% of the calculated pick weight.

E. Location plan showing obstructions, indicating that the proposed swing is possible. "Walking" of load using two cranes will not be permitted. Rather, multiple picks and repositioning of the crane may be permitted to get the load to the needed location for the final pick, if necessary.

F. Data sheet listing types and sizes of slings and other connecting equipment. Include copies of catalog cuts for specialized equipment. Detail attachment methods on the plans.

G. A complete procedure, indicating the order of lifts and any repositioning or re-hitching of the crane or cranes.

H. Temporary support of any components or intermediate stages, as may be required.

I. A time schedule of the various stages, as well as a schedule for the entire lifting process.

END OF SECTION 01142A

SECTION 01520A – REQUIREMENTS FOR TEMPORARY PROTECTION SHIELDS FOR DEMOLITION AND CONSTRUCTION OF OVERHEAD BRIDGES AND OTHER STRUCTURES

PART 1 – GENERAL

1.1 SCOPE

A. This specification describes items to be included in the design and construction of temporary protection shields for construction overhead and near to Amtrak tracks.

B. Use of this specification is as required by Amtrak, as described in Amtrak Engineering Practice EP3014.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.3 DEFINITIONS

A. CHIEF ENGINEER: Amtrak Vice President, Chief Engineer

B. RAILROAD: National Railroad Passenger Corporation (Amtrak), and/or the duly authorized representative

C. ENGINEERING PRACTICE: Amtrak Engineering Practices establish a system of uniform practices, notices and instructions for the Amtrak Engineering Department, providing current, permanent and temporary, departmental procedures and policies.

1.4 SUBMISSION REQUIREMENTS

A. Unless otherwise directed in the Contract, the Contractor shall submit five sets of plans and calculations to the authorized representative of the Chief Engineer, Structures, whose name and address will be provided at the project pre-construction meeting.

B. Submitted calculations and plans shall be signed and sealed by a Professional Engineer, registered in the State in which the work will be performed.

C. The Contractor shall revise and resubmit plans and calculations as many times as necessary, until a complete and correct site-specific work plan for crane/hoisting operations has been approved.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION

3.1 CONTRACTORS WORKING ON OVERHEAD OR NEARBY DEMOLITION AND/OR CONSTRUCTION ADJACENT TO AMTRAK TRACKS, SHALL CONFORM TO THE FOLLOWING

3.2 DESIGN AND CONSTRUCTION REQUIREMENTS FOR TEMPORARY PROTECTION SHIELDING:

A. The Contractor shall maintain a specified level of protection to railroad facilities, during demolition and construction activities that occur overhead and nearby Amtrak tracks, as shown on the Contract Plans, as detailed in the Contract Specifications, and a described below.

B. Prior to the start of construction, the Contractor shall submit to Amtrak for review and approval, detailed site specific plans for temporary protection shields. The plans will be reviewed as to the methods of erection, and as to whether or not the proposed installation will provide the required level of protection. No construction shall proceed until the Contractor has received written approval of the Contractor's complete, site specific plans, from Amtrak.

C. The Contractor shall design the protection shields to conform to all applicable and governing federal, state and local laws and regulations.

D. Drawings for the proposed temporary protection shields shall be signed and sealed by a Licensed Professional Engineer. Complete design calculations, clearly referenced to the drawings, and easy to review, shall be provided with submission of drawings.

E. Protection shields shall be designed for the following, minimum load and size criteria.

1. The horizontal shield design live load on horizontal surfaces shall be the greater of a minimum of 100 pounds per square foot (psf) [5000 Pascals] or the anticipated live load to be produced by the Contractor's anticipated operations. When determining the appropriate design live load, the designer shall consider factors such as the physical capacity of proposed debris-catching platforms to retain materials, and the type of equipment the platforms might support. Positive means of demolition and construction controls shall be provided to assure that debris that may collect on the shield will not exceed the design live load. The horizontal protection shield, in plan view, shall cover no less than the area directly over the tracks plus ten feet minimum beyond the centerline of the outermost tracks.
2. The vertical shield shall be designed to carry a minimum 30 psf [1500 Pascals] allowance for wind load. The vertical shield shall extend a minimum of 6'-6" [1950 millimeters] above the top of the adjacent surface, such as curb or sidewalk. Anti-climb wings shall be installed at each end, as necessary, to restrict access to the railroad property.

F. The vertical and horizontal clearance envelopes required for maintenance of railroad operations, shall be indicated on the site specific work plans. These clearances are subject to review and approval by Amtrak. If applicable, both temporary and permanent envelopes shall be indicated on the plans. The temporary protection shields shall be installed outside the limits of these minimum vertical and horizontal clearances shown on the site specific work plans.

G. In electrified territory, temporary protection shields shall be bonded and grounded.

H. Temporary protection shields shall be designed and constructed to prevent dust, debris, concrete, formwork, paint, tools, or anything else from falling onto the railroad property below.

I. The temporary protection shields shall be attached to the structure in accordance with site specific work plans submitted by the Contractor and approved by Amtrak. Drilling in structural members and welding will generally not be permitted in members that are scheduled to remain in place in the reconstructed structure. For existing members scheduled for demolition or for later reconstruction, any proposed attachment shall be designed with consideration of potential existing, deteriorated conditions.

J. The Contractor shall provide the Amtrak on-site representative, for review and approval prior to any construction activity in the effected area, a proposed construction schedule for the installation, maintenance and removal of the temporary protection shields.

K. The temporary protection shields shall be installed prior to the start of any other work over the railroad in the effected areas. No construction shall proceed until the Amtrak on-site representative reviews and approves the Contractor's installed protection. Before proceeding with the work, Amtrak must be satisfied, in its sole judgement, that sufficient protection has been provided to proceed with the work.

L. The Contractor shall install and remove temporary protection shields only when an Amtrak representative is on-site.

M. The Contractor shall not install or remove temporary protection shields during train operations.

N. Temporary protection shields shall remain in place for the duration of construction activities over and nearby the railroad in the effected areas. The Contractor may remove temporary construction only after approved by Amtrak on-site representatives.

O. Where site specific conditions impose insurmountable restrictions to the design of temporary construction conforming to the limitations listed above, the design of temporary construction shall be developed in close coordination with Amtrak design review personnel. The Chief Engineer, Structures shall Provide final approval of temporary construction that does not conform to the above limitations.

END OF SECTION 01520A

SECTION 02261A – REQUIREMENTS FOR TEMPORARY SHEETING AND SHORING TO SUPPORT AMTRAK TRACKS

PART1-GENERAL

1.1 SCOPE

A. This engineering practice describes items to be included in the design and construction of temporary sheeting and shoring construction adjacent and proximate to Amtrak tracks.

B. Use of this specification is as required by Amtrak, as described in Amtrak Engineering Practice EP3014.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.3 DEFINITIONS

A. CHIEF ENGINEER: Amtrak Vice President, Chief Engineer

B. RAILROAD: National Railroad Passenger Corporation (Amtrak), and/or the duly authorized representative.

C. ENGINEERING PRACTICE: Amtrak Engineering Practices establish a system of uniform practices, notices and instructions for the Amtrak Engineering Department, providing current, permanent and temporary, departmental procedures and policies.

1.4 SUBMISSION REQUIREMENTS

A. Unless otherwise directed in the Contract, the Contractor shall submit five sets of plans and calculations to the authorized representative of the Chief Engineer, Structures, whose name and address will be provided at the project pre-construction meeting.

B. Submitted calculations and plans shall be signed and sealed by a Professional Engineer, registered in the State in which the work will be performed.

C. The Contractor shall revise and resubmit plans and calculations as many times as necessary, until a complete and correct site-specific work plan for temporary sheeting and shoring has been approved.

PART 2 -PRODUCTS (Not Used)

PART 3 -EXECUTION

3.1 CONTRACTORS INSTALLING TEMPORARY CONSTRUCTION SHEETING AND SHORING TO SUPPORT AMTRAK TRACKS SHALL CONFORM TO THE FOLLOWING :

A. Footings for all piers, columns, walls, or other facilities shall be located and designed so that any temporary sheeting and shoring for support of adjacent track or tracks during construction will not be closer than toe of ballast slope. The dimension from gage of rail to toe of ballast, along tangent track, is 7'-5"; see dimensions on Track standard plans for curved track dimensions.

B. USE OF SHEETING: When support of track or tracks is necessary during construction of the above-mentioned facilities, interlocking steel sheeting, adequately braced and designed to carry Cooper E80 live-load plus 50 percent impact allowance is required. Soldier piles and lagging will be permitted for track support ONLY when required penetration of steel sheet piling cannot be obtained, due to site-specific conditions that make steel sheet piling placement impracticable, in the opinion of the authorized, Amtrak design review engineer.
   1. For usual soil conditions and limited excavations, sheeting is required when the near-track excavation extends beneath or nearer to the track than the Theoretical Railroad Embankment Line. The Theoretical Railroad Embankment Line is defined as a line that starts at grade, ten foot from the centerline of the outer track, and extends downward, away from the track, at a slope of 1-1/2 horizontal to one vertical.
   2. For special soil conditions, such as soft organic soils and rock conditions, and for unusual excavation conditions, temporary supports for excavations may be necessary even when the limits fall beyond the Theoretical Railroad Embankment Line, requiring site specific analysis by a professional, geotechnical engineer.
   3. See Sketch SK-l, "Normal Requirements for Sheet Piling Adjacent to Tracks".

C. Exploratory trenches, three feet deep and 15 inches wide in the form of an "H", with outside dimensions matching the proposed outside dimensions of sheeting, shall be hand dug, prior to placing and driving the sheeting, in any area where railroad or utility underground installations are known or suspected. These trenches are for exploratory purposes only, and shall be backfilled and immediately compacted, in layers. This work shall be performed only in the presence of a railroad inspector.

D. Absolute use of track is required while driving sheeting adjacent to running track. Track usage shall be prearranged per standard procedures, through the Amtrak project representative.

E. Cavities adjacent to sheet piling, created by pile driving, shall be filled with sand, and any disturbed ballast shall be restored and tamped immediately.

F. Sheet piling cutoffs
   1. During construction, sheeting shall be cut off at an elevation no higher than the top of tie.
   2. At the completion of construction activities involving the use of sheet piling, sheet piling may be pulled if there will be no adverse impact to the railroad track support bed, as determined by the Amtrak site engineer. This will generally be permitted when both of these conditions are met:
      a. the sheeting face is at least ten feet distant from the centerline of track, and
      b. the bottom of the excavation that the sheeting supported prior to backfilling, does not fall within an assumed influence zone under the tracks. The assumed influence zone is defined as the area, as seen in cross-sectional view, falling beneath the Theoretical Underground Track Disturbance Line. This line is defined as a line that starts at the end and bottom of the ties, and extends from the track outward and downward at a one-to-one (45-degree) slope.

3. Sheet piling that is to be left in-place, shall be cut off below the ground line
   a. at least eighteen inches below final ground line at the sheeting, and
   b. no higher than 24 inches below the elevation of the bottom of the nearest ties
4. See Sketch SK-l, "Normal Requirements for Sheet Piling Adjacent to Tracks".

G. The excavation adjacent to the track shall be covered, ramped and protected by handrails, barricades and warning lights, as required by applicable safety regulations, and as directed by Amtrak.

H. Final backfilling of excavation shall conform to project specifications.

I. The Contractor shall provide Amtrak with a detailed schedule of proposed construction operations, detailing each step of the proposed temporary construction operations in proximity to Amtrak tracks, so that Amtrak may review and approve the proposed operations, and may properly inspect and monitor operations.

J. Drawings for the proposed temporary sheeting and shoring shall be signed and sealed by a Licensed Professional Engineer. Complete design calculations, clearly referenced to the drawings, and easy to review, shall be provided with submission of drawings.

K. Where site specific conditions impose insurmountable restrictions to the design of temporary construction conforming to the limitations listed above, the design of temporary construction shall be developed in close coordination with Amtrak design review personnel. The Chief Engineer, Structures shall provide final approval of temporary construction that does not conform to the above limitations.
   1. When Amtrak grants approval for sheeting closer than standard minimum clearances, the Contractor shall develop a survey plan, if not already required by the project, for the adjacent tracks, to be conducted prior to, during, and after the temporary sheeting construction operations. If settlement is detected, construction operations shall be suspended until the track has been returned to its initial condition, and stabilized, as determined by the Amtrak project site representative.
   2. The Contractor shall stockpile ten (10) tons of approved ballast at the project site, and maintain that amount in ready reserve, to allow for the possible need to restore track profile.

L. Particular care shall be taken in the planning, design and execution of temporary construction, as relates to railroad slope protection and drainage facilities. Erosion and sediment control best management practices shall be designed and employed, as approved by Amtrak. Any unintended disruption to railroad drainage facilities, caused by the temporary construction, shall be promptly remedied, as directed by the Engineer, solely at the Contractor's cost.

M. The following Information Sketch is attached:

1 Figure No. SK-l: Normal Requirements for Sheet Piling Adjacent to Track

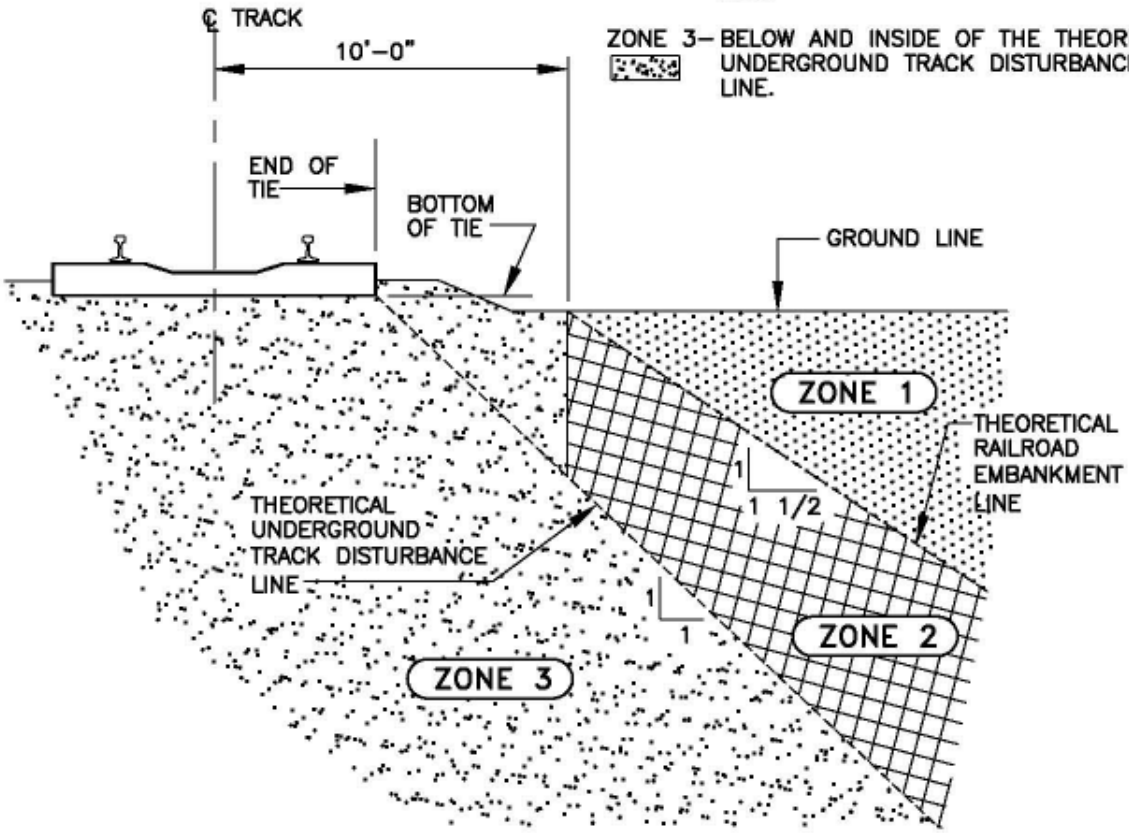
END OF SECTION 02261A

LEGEND

ZONE 1 – ABOVE AND OUTSIDE THE THEORETICAL RAILROAD EMBANKMENT LINE.

ZONE 2 – FARTHER THAN 10 FEET FROM THE CENTERLINE OF TRACK, BELOW THE THEORETICAL RAILROAD EMBANKMENT LINE AND ABOVE THE THEORETICAL UNDERGROUND TRACK DISTURBANCE LINE.

ZONE 3 – BELOW AND INSIDE OF THE THEORETICAL UNDERGROUND TRACK DISTURBANCE LINE.



NORMAL REQUIREMENTS FOR SHEET PILING ADJACENT TO TRACK

1. EXCAVATIONS WITHIN ZONE 1 – ABOVE AND OUTSIDE OF THE THEORETICAL RAILROAD EMBANKMENT LINE – DO NOT NORMALLY REQUIRE SHEETING TO PROTECT RAILROAD ROAD BED. SHEETING MAY BE REQUIRED FOR OTHER REASONS.
2. EXCAVATIONS WHOSE BOTTOMS EXTEND INTO ZONE 2 REQUIRE SHEETING, BUT THE SHEETING MAY NORMALLY BE PULLED AFTER THE EXCAVATION HAS BEEN BACKFILLED.
3. EXCAVATIONS WHOSE BOTTOMS EXTEND INTO ZONE 3 WILL NORMALLY REQUIRE THE SHEETING TO BE LEFT IN PLACE AND CUT–OFF PER REQUIREMENTS.

Amtrak®	Office of Chief Engineer STRUCTURES National Railroad Passenger Corporation 30th Street Station, Philadelphia, Pennsylvania 19104	SKETCH 1 SPEC. 02261A – REV. 1 Designed CJR Drawn JLM Date 6/08/01	File No: Design No: 3501 Sheet No. 1 of 1 Dwg. No. SK–1

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions of Division 1, State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, and Incidental Construction, Form 816 - 2004 and supplemental specifications thereto, shall be a part of this specification.

B. Work included in this section may require coordination with Amtrak regarding track outages, flagmen, or other issues related to work around railroad facilities. The Contractor shall pay special attention to the specification entitled "SAFETY AND PROTECTION OF RAILROAD TRAFFIC AND PROPERTY" and other Amtrak Specifications contained in the Contract.

1.2 SUMMARY

A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:

1. Footings.
2. Foundation walls.
3. Piers.
4. Slabs-on-grade.
5. Suspended slabs.
6. Building walls.
7. Electrical equipment pads.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

1.4 ACTION SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Product Data: For each type of product indicated.

C. Evidence that concrete materials have been tested and the test results are on file with the State of Connecticut Department of Transportation Laboratory.

D. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1. Indicate amounts of mixing water to be withheld for later addition at Project site.

E. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

1.5 INFORMATIONAL SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Form materials and form-release agents.
4. Steel reinforcement and accessories.
5. Waterstops.
6. Curing compounds.
7. Floor and slab treatments.
8. Bonding agents.
9. Adhesives.
10. Vapor retarders.
11. Semirigid joint filler.
12. Joint-filler strips.
13. Repair materials.

C. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:

1. Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.

D. Field quality-control reports.

E. Minutes of preinstallation conference.

1.6 QUALITY ASSURANCE

A. Source Limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

B. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

C. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

D. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.

E. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

F. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D 1.4M, "Structural Welding Code - Reinforcing Steel."

G. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301, "Specifications for Structural Concrete," Sections 1 through 5.
2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

H. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

I. Preinstallation Conference: Conduct conference at Project site.

1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:

a. Contractor's superintendent.
b. Independent testing agency responsible for concrete design mixtures.
c. Ready-mix concrete manufacturer.
d. Concrete subcontractor.

2. Review Amtrak requirements for work near tracks, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semirigid joint fillers, forms and form removal

1.7 DELIVERY, STORAGE, AND HANDLING

A. Refer to Form 816 Article 1.06.03 and Form 816 Article 1.20-1.06.03 for additional information.

B. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage. Avoid damaging coatings on steel reinforcement.

C. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete (All visible areas): Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

1. Plywood, metal, or other approved panel materials.
2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
   a. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.

B. Rough-Formed Finished Concrete (Areas concealed from view): Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

C. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that will produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.

D. Pan-Type Forms: Glass-fiber-reinforced plastic or formed steel, stiffened to resist plastic concrete loads without detrimental deformation.

E. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.

F. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

G. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
2. Furnish ties that, when removed, will leave holes no larger than 1 inch in diameter in concrete surface.
3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.2 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A-615, Grade 60, deformed.

B. Epoxy-Coated Reinforcing Bars: ASTM A-775, epoxy coated, with less than 2 percent damaged coating in each 12-inch bar length.

C. Steel Bar Mats: ASTM A-184, fabricated from ASTM A-615, Grade 60, deformed bars, assembled with clips.

D. Deformed-Steel Wire: ASTM A 496.

E. Epoxy-Coated Wire: ASTM A 884, Class A, Type 1 coated, as-drawn, plain deformed-steel wire, with less than 2 percent damaged coating in each 12-inch wire length.

F. Plain-Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated from as-drawn steel wire into flat sheets.

G. Deformed-Steel Welded Wire Reinforcement: ASTM A 497, flat sheet.

H. Epoxy-Coated Welded Wire Reinforcement: ASTM A 884, Class A coated, Type 1, plain steel.

2.3 REINFORCEMENT ACCESSORIES

A. Epoxy-Coated Joint Dowel Bars: ASTM A 615, Grade 60, plain-steel bars, ASTM A 775 epoxy coated.

B. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating; compatible with epoxy coating on reinforcement and complying with ASTM A 775.

C. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.
2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.

2.4 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

1. Portland Cement: ASTM C 150, Type I/II (Type II when in contact with earth).

   a. Fly Ash: ASTM C 618, Class F or C.
   b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

B. Normal-Weight Aggregates: ASTM C 33, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.

1. Maximum Coarse-Aggregate Size: 1-1/2 inches nominal and 3/4 inch nominal for slabs-on-deck and toppings.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Water: ASTM C 94/C 94M and potable.

2.5 ADMIXTURES

A. Air-Entraining Admixture: ASTM C 260.

B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.6 WATERSTOPS

A. Self-Expanding Butyl Strip Waterstops: Manufactured rectangular or trapezoidal strip, butyl rubber with sodium bentonite or other hydrophilic polymers, for adhesive bonding to concrete, 3/4 by 1 inch.

1. Products: Subject to compliance with requirements, provide the following available products that may be incorporated into the Work include, but are not limited to, the following:

   a. Carlisle Coatings & Waterproofing, Inc.; MiraSTOP.
   b. CETCO; Volclay Waterstop-RX.

c. Concrete Sealants Inc.; Conseal CS-231.
d. Greenstreak; Swellstop.
e. Henry Company, Sealants Division; Hydro-Flex.
f. JP Specialties, Inc.; Earth Shield Type 20.

2.7 VAPOR RETARDERS

A. Sheet Vapor Retarder: ASTM E 1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Carlisle Coatings & Waterproofing, Inc.; Blackline 400.
b. Fortifiber Building Systems Group; Moistop Ultra 10.
c. Grace Construction Products, W. R. Grace & Co.; Florprufe 120.
d. Meadows, W. R., Inc.; Perminator 10 mil.
e. Raven Industries Inc.; Vapor Block 10.
f. Stego Industries, LLC; Stego Wrap 10 mil Class A.

2.8 FLOOR AND SLAB TREATMENTS

A. Slip-Resistive Emery Aggregate Finish: Factory-graded, packaged, rustproof, nonglazing, abrasive, crushed emery aggregate containing not less than 50 percent aluminum oxide and not less than 20 percent ferric oxide; unaffected by freezing, moisture, and cleaning materials with 100 percent passing 3/8-inch sieve.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Anti-Hydro International, Inc.; Emery.
b. Dayton Superior Corporation; Emery Tuff Non-Slip.
c. Lambert Corporation; EMAG-20.
d. L&M Construction Chemicals, Inc.; Grip It.
e. Metalcrete Industries; Metco Anti-Skid Aggregate.

2.9 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Axim Italcementi Group, Inc.; CATEXOL CimFilm.
b. BASF Construction Chemicals - Building Systems; Confilm.
c. ChemMasters; SprayFilm.
d. Conspec by Dayton Superior; Aquafilm.

e. Dayton Superior Corporation; Sure Film (J-74).
f. Edoco by Dayton Superior; BurkeFilm.
g. Euclid Chemical Company (The), an RPM company; Eucobar.
h. L&M Construction Chemicals, Inc.; E-CON.
i. Meadows, W. R., Inc.; EVAPRE.
j. Metalcrete Industries; Waterhold.
k. Sika Corporation; SikaFilm.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

E. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. BASF Construction Chemicals - Building Systems; Kure 1315.
b. ChemMasters; Polyseal WB.
c. Conspec by Dayton Superior; Sealcure 1315 WB.
d. Edoco by Dayton Superior; Cureseal 1315 WB.
e. Euclid Chemical Company (The), an RPM company; Super Diamond Clear VOX; LusterSeal WB 300.
f. L&M Construction Chemicals, Inc.; Lumiseal WB Plus.
g. Meadows, W. R., Inc.; Vocomp-30.
h. Metalcrete Industries; Metcure 30.

2.10 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.

B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 per ASTM D 2240.

C. Bonding Agent: ASTM C 1059/C 1059M, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

D. Reglets: Fabricate reglets of not less than 0.022-inch- thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.

E. Dovetail Anchor Slots: Hot-dip galvanized-steel sheet, not less than 0.034 inch thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

2.11 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109/C 109M.

B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch and that can be filled in over a scarified surface to match adjacent floor elevations.

1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109/C 109M.

2.12 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash: 25 percent.
2. Ground Granulated Blast-Furnace Slag: 50 percent.
3. Combined Fly Ash or Pozzolan and Ground Granulated Blast-Furnace Slag: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.

C. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

D. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.

2.13 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Footings: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 4000 psi at 28 days.
2. Maximum Water-Cementitious Materials Ratio: 0.45 unless strength data is available.
3. Slump Limit: 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch.
4. Air Content: 5.5 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size.

B. Foundation Walls: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 4000 psi at 28 days.
2. Maximum Water-Cementitious Materials Ratio: 0.45.
3. Slump Limit: 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch.
4. Air Content: 5.5 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size.

C. Slabs-on-Grade: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 4000 psi at 28 days.
2. Minimum Cementitious Materials Content: 520 lb/cu. yd..
3. Slump Limit: 4 inches, plus or minus 1 inch.
4. Air Content: 5.5 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size.
5. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.

D. Suspended Slabs: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 4000 psi at 28 days.
2. Minimum Cementitious Materials Content: 540 lb/cu. yd..
3. Slump Limit: 4 inches, plus or minus 1 inch.
4. Air Content: 5.5 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size.
5. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.

2.14 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.15 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:

1. Class A, 1/16 inch for exterior exposed to view smooth-formed finished surfaces.
2. Class A, 1/8 inch for smooth-formed finished surfaces.
3. Class B, 1/4 inch for rough-formed finished surfaces.

D. Construct forms tight enough to prevent loss of concrete mortar.

E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.

1. Install keyways, reglets, recesses, and the like, for easy removal.
2. Do not use rust-stained steel form-facing material.

F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

H. Chamfer exterior corners and edges of permanently exposed concrete.

I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."
2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
3. Install dovetail anchor slots in concrete structures as indicated.

3.3 REMOVING AND REUSING FORMS

A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations and curing and protection operations need to be maintained.

1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.
2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Engineer.

3.4 SHORES AND RESHORES

A. Comply with ACI 318 and ACI 301 for design, installation, and removal of shoring and reshoring.

1. Do not remove shoring or reshoring until measurement of slab tolerances is complete.

B. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

3.5 VAPOR RETARDERS

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.

1. Lap joints 6 inches and seal with manufacturer's recommended tape.

3.6 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

1. Weld reinforcing bars according to AWS D1.4/D 1.4M, where indicated.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

F. Epoxy-Coated Reinforcement: Repair cut and damaged epoxy coatings with epoxy repair coating according to ASTM D 3963/D 3963M. Use epoxy-coated steel wire ties to fasten epoxy-coated steel reinforcement.

3.7 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.

2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
5. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
7. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.
2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants, specified in Section 079200 "Joint Sealants," are indicated.
3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

E. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.8 WATERSTOPS

A. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated, according to manufacturer's written instructions, adhesive bonding, mechanically fastening, and firmly pressing into place. Install in longest lengths practicable.

3.9 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Engineer.

C. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

D. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

E. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

F. Hot-Weather Placement: Comply with ACI 301 and as follows:

1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of

2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.10 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces exposed to public view, to receive a rubbed finish.

C. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete on all areas exposed to public view:

1. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.

D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.11 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch in one direction.

1. Apply scratch finish to surfaces indicated and to receive concrete floor toppings.

C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.

D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces exposed to view.
2. Finish surfaces to the following tolerances, according to ASTM E 1155, for a randomly trafficked floor surface:
   a. Specified overall values of flatness, F(F) 35; and of levelness, F(L) 25; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 17; for slabs-on-grade.

3. Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.- long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/8 inch.

E. Broom Finish: Apply a broom finish to exterior concrete only where indicated.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

F. Slip-Resistive Finish: Before final floating, apply slip-resistive aggregate finish where indicated and to concrete stair treads, platforms, and ramps. Apply according to manufacturer's written instructions and as follows:

1. Uniformly spread 25 lb/100 sq. ft. of dampened slip-resistive aggregate over surface in one or two applications. Tamp aggregate flush with surface, but do not force below surface.
2. After broadcasting and tamping, apply float finish.
3. After curing, lightly work surface with a steel wire brush or an abrasive stone and water to expose slip-resistive aggregate.

3.12 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.

3.13 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.

D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

   a. Water.
   b. Continuous water-fog spray.
   c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

   a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer.

4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.14 JOINT FILLING

A. Prepare, clean, and install joint filler according to manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least one month(s). Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.15 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete. Limit cut depth to 3/4 inch. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
2. After concrete has cured at least 14 days, correct high areas by grinding.

3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
4. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
5. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
6. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Designer’s approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.16 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Inspections:

1. Steel reinforcement placement.
2. Steel reinforcement welding.
3. Headed bolts and studs.
4. Verification of use of required design mixture.
5. Concrete placement, including conveying and depositing.
6. Curing procedures and maintenance of curing temperature.
7. Verification of concrete strength before removal of shores and forms from beams and slabs.

C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
1. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mixture placed each day.

a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C 231, pressure method, for normal-weight concrete;one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
5. Compression Test Specimens: ASTM C 31/C 31M.

   a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
   b. Cast and field cure two sets of two standard cylinder specimens for each composite sample.

6. Compressive-Strength Tests: ASTM C 39/C 39M; test one laboratory-cured specimen at 7 days and one set of two specimens at 28 days. Hold last specimen for possible 56 day test.
   a. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.

7. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
8. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
9. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
10. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
11. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
12. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
13. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

D. Measure floor and slab flatness and levelness according to ASTM E 1155 within 48 hours of finishing.

END OF SECTION 033000

SECTION 034100 - PRECAST STRUCTURAL CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions of Division 1, State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, and Incidental Construction, Form 816 - 2004 and supplemental specifications thereto, shall be a part of this specification.

B. Work included in this section may require coordination with Amtrak regarding track outages, flagmen, or other issues related to work around railroad facilities. The Contractor shall pay special attention to the specification entitled “SAFETY AND PROTECTION OF RAILROAD TRAFFIC AND PROPERTY” and other Amtrak Specifications contained in the Contract.

1.2 SUMMARY

A. Section Includes:
1. Precast Concrete Stairs.
2. Precast/Prestressed Railroad Platform Elements.
3. Miscellaneous Precast Slabs.
4. Precast Light Pole Bases.

B. Related Sections:

1. Section 033000 "Cast-in-Place Concrete" for concrete topping and placing connection anchors in concrete.
2. Section 051200 "Structural Steel Framing" for furnishing and installing connections attached to structural-steel framing.
3. Section 079200 "Joint Sealants" for elastomeric joint sealants and sealant backings.

1.3 DEFINITION

A. Design Reference Sample: Sample of approved precast structural concrete color, finish, and texture, preapproved by Designer.

1.4 PERFORMANCE REQUIREMENTS

A. Structural Performance: Precast structural concrete units and connections shall withstand design loads indicated within limits and under conditions indicated.

B. Delegated Design: Design precast structural concrete, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

C. Structural Performance: Provide precast structural concrete units and connections capable of withstanding the following design loads within limits and under conditions indicated:

1. Dead Loads: self weight of the precast structural concrete units and as indicated on the drawings.
2. Concrete Topping Load: concrete topping self weight using normal weight concrete and as indicated on the drawings.
3. Live Loads: as indicated on the drawings.
4. Roof Loads: as indicated on the drawings.
5. Snow Loads: as indicated on the drawings.
6. Seismic Loads: as indicated on the drawings.
7. Wind Loads: as indicated on the drawings.
8. Design precast structural concrete and connections to maintain clearances at openings, to allow for fabrication and construction tolerances, to accommodate live-load deflection, shrinkage and creep of primary structure, and other movements. Maintain precast structural concrete deflections within limits of ACI 318.
   a. Thermal Movements: Allow for in-plane thermal movements resulting from annual ambient temperature changes of minus 5 to plus 100 deg F.

1.5 ACTION SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Product Data: For each type of product indicated.

C. Design Mixtures: For each precast concrete mixture. Include compressive strength and water-absorption tests.

D. Shop Drawings: Include member locations, plans, elevations, dimensions, shapes and sections, openings, support conditions, and types of reinforcement, including special reinforcement. Detail fabrication and installation of precast structural concrete units.

1. Indicate joints, reveals, and extent and location of each surface finish.
2. Indicate separate face and backup mixture locations and thicknesses.
3. Indicate welded connections by AWS standard symbols. Show size, length, and type of each weld.
4. Detail loose and cast-in hardware, lifting and erection inserts, connections, and joints.
5. Indicate locations, tolerances, and details of anchorage devices to be embedded in or attached to structure or other construction.
6. Include and locate openings larger than by 10 inches.
7. Indicate location of each precast structural concrete unit by same identification mark placed on panel.
8. Indicate relationship of precast structural concrete units to adjacent materials.
9. Indicate estimated camber for precast floor slabs with concrete toppings.
10. Indicate shim sizes and grouting sequence.
11. Design Modifications: If design modifications are proposed to meet performance requirements and field conditions, submit design calculations and Shop Drawings. Do not adversely affect the appearance, durability, or strength of units when modifying details or materials and maintain the general design concept.

E. Delegated-Design Submittal: For precast structural concrete indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.6 INFORMATIONAL SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Qualification Data: For Installer and fabricator.

C. Welding certificates.

D. Material Certificates: For the following, from manufacturer:

1. Cementitious materials.
2. Reinforcing materials and prestressing tendons.
3. Admixtures.
4. Bearing pads.
5. Structural-steel shapes and hollow structural sections.

E. Material Test Reports: For aggregates.

F. Source quality-control reports.

G. Manufacturer Certification Letter in accordance with NOTICE TO CONTRACTOR – POTENTIAL FOR ASBESTOS CONTAINING MATERIALS.

1.7 QUALITY ASSURANCE

A. Source Limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

B. Fabricator Qualifications: A firm that assumes responsibility for engineering precast structural concrete units to comply with performance requirements. Responsibility includes preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.

1. Participates in PCI's Plant Certification program and is designated a PCI-certified plant as follows:
   a. Group CA, Category C4A - Prestressed Deflected-Strand Structural Members.

C. Installer Qualifications: An experienced precast concrete erector who, before erection of precast concrete, has retained a "PCI-Certified Field Auditor" to conduct a field audit of a project installed by erector in Category S1 - Simple Structural Systems and who produces an Erectors' Post Audit Declaration, according to PCI MNL 127, "PCI Erector's Manual - Standards and Guidelines for the Erection of Precast Concrete Products."

D. Design Standards: Comply with ACI 318 and design recommendations in PCI MNL 120, "PCI Design Handbook - Precast and Prestressed Concrete," applicable to types of precast structural concrete units indicated.

E. Quality-Control Standard: For manufacturing procedures and testing requirements, quality-control recommendations, and dimensional tolerances for types of units required, comply with PCI MNL 116, "Manual for Quality Control for Plants and Production of Structural Precast Concrete Products."

F. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D.1.1M, "Structural Welding Code - Steel."
2. AWS D1.4, "Structural Welding Code - Reinforcing Steel."

G. Mockups: After sample panel approval but before production of precast structural concrete units with architectural finish, construct full-sized mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockup as indicated on Drawings including sealants and precast structural concrete units with an architectural finish complete with anchors, connections, flashings, and joint fillers.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Designer specifically approves such deviations in writing.
3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

H. Preinstallation Conference: Conduct conference at Project site.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Refer to Form 816 Article 1.06.03 and Form 816 Article 1.20-1.06.03 for additional information.

B. Support units during shipment on nonstaining shock-absorbing material in same position as during storage.

C. Store units with adequate bracing and protect units to prevent contact with soil, to prevent staining, and to prevent cracking, distortion, warping or other physical damage.

1. Store units with dunnage across full width of each bearing point unless otherwise indicated.
2. Place adequate dunnage of even thickness between each unit.
3. Place stored units so identification marks are clearly visible, and units can be inspected.

D. Handle and transport units in a position consistent with their shape and design in order to avoid excessive stresses that would cause cracking or damage.

E. Lift and support units only at designated points shown on Shop Drawings.

1.9 COORDINATION

A. Furnish loose connection hardware and anchorage items to be embedded in or attached to other construction before starting that Work. Provide locations, setting diagrams, templates, instructions, and directions, as required, for installation.

PART 2 - PRODUCTS

2.1 MOLD MATERIALS

A. Molds: Rigid, dimensionally stable, non-absorptive material, warp and buckle free, that will provide continuous and true precast concrete surfaces within fabrication tolerances indicated; nonreactive with concrete and suitable for producing required finishes.

1. Mold-Release Agent: Commercially produced liquid-release agent that will not bond with, stain or adversely affect precast concrete surfaces and will not impair subsequent surface or joint treatments of precast concrete.

B. Surface Retarder: Chemical set retarder, capable of temporarily delaying final hardening of newly placed concrete mixture to depth of reveal specified.

2.2 REINFORCING MATERIALS

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

B. Epoxy-Coated Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed bars, ASTM A 775/A 775M epoxy coated, with less than 2 percent damaged coating in each 12-inch bar length.

C. Steel Bar Mats: ASTM A 184/A 184M, fabricated from ASTM A 615/A 615M, Grade 60, deformed bars, assembled with clips.

D. Deformed-Steel Welded Wire Reinforcement: ASTM A 497/A 497M, flat sheet.

E. Supports: Suspend reinforcement from back of mold or use bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place according to PCI MNL 116.

2.3 PRESTRESSING TENDONS

A. Pretensioning Strand: ASTM A 416/A 416M, Grade 250 or Grade 270, uncoated, 7-wire or ASTM A 886/A 886M, Grade 270, indented, 7-wire, low-relaxation strand.

B. Unbonded Post-Tensioning Strand: ASTM A 416/A 416M, Grade 270, uncoated, 7-wire, low-relaxation strand.

1. Coat unbonded post-tensioning strand with post-tensioning coating complying with ACI 423.6 and sheath with polypropylene tendon sheathing complying with ACI 423.6. Include anchorage devices and coupler assemblies.

C. Post-Tensioning Bars: ASTM A 722, uncoated high-strength steel bar.

2.4 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150, Type I or Type III, gray, unless otherwise indicated.

B. Supplementary Cementitious Materials:

1. Fly Ash: ASTM C 618, Class C or F, with maximum loss on ignition of 3 percent.

C. Normal-Weight Aggregates: Except as modified by PCI MNL 116, ASTM C 33, with coarse aggregates complying with Class 5S. Stockpile fine and coarse aggregates for each type of exposed finish from a single source (pit or quarry) for Project.

1. Face-Mixture-Coarse Aggregates: Selected, hard, and durable; free of material that reacts with cement or causes staining; to match selected finish sample.

a. Gradation: Uniformly graded.

D. Water: Potable; free from deleterious material that may affect color stability, setting, or strength of concrete and complying with chemical limits of PCI MNL 116.

E. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.

F. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and to not contain calcium chloride, or more than 0.15 percent chloride ions or other salts by weight of admixture.

1. Water-Reducing Admixtures: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. Water-Reducing and Accelerating Admixture: ASTM C 494/C 494M, Type E.
5. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
6. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
7. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M.

G. Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.

2.5 STEEL CONNECTION MATERIALS

A. Carbon-Steel Shapes and Plates: ASTM A 36/A 36M.

B. Carbon-Steel-Headed Studs: ASTM A 108, AISI 1018 through AISI 1020, cold finished, AWS D1.1/D1.1M, Type A or B, with arc shields and with minimum mechanical properties of PCI MNL 116.

C. Carbon-Steel Plate: ASTM A 283/A 283M.

D. Malleable-Iron Castings: ASTM A 47/A 47M.

E. Carbon-Steel Castings: ASTM A 27/A 27M, Grade 60-30.

F. High-Strength, Low-Alloy Structural Steel: ASTM A 572/A 572M.

G. Carbon-Steel Structural Tubing: ASTM A 500, Grade B.

H. Wrought Carbon-Steel Bars: ASTM A 675/A 675M, Grade 65.

I. Deformed-Steel Wire or Bar Anchors: ASTM A 496 or ASTM A 706/A 706M.

J. Carbon-Steel Bolts and Studs: ASTM A 307, Grade A; carbon-steel, hex-head bolts and studs; carbon-steel nuts, ASTM A 563; and flat, unhardened steel washers, ASTM F 844.

K. High-Strength Bolts and Nuts: ASTM A 325 or ASTM A 490, Type 1, heavy hex steel structural bolts; heavy hex carbon-steel nuts, ASTM A 563; and hardened carbon-steel washers, ASTM F 436.

1. Do not zinc coat ASTM A 490 bolts.

L. Zinc-Coated Finish: For exterior steel items and items indicated for galvanizing, apply zinc coating by hot-dip process according to ASTM A 123/A 123M or ASTM A 153/A 153M.

1. For steel shapes, plates, and tubing to be galvanized, limit silicon content of steel to less than 0.03 percent or to between 0.15 and 0.25 percent or limit sum of silicon and 2.5 times phosphorous content to 0.09 percent.
2. Galvanizing Repair Paint: High-zinc-dust-content paint with dry film containing not less than 94 percent zinc dust by weight, and complying with DOD-P-21035B or SSPC-Paint 20.

M. Shop-Primed Finish: Prepare surfaces of nongalvanized-steel items, except those surfaces to be embedded in concrete, according to requirements in SSPC-SP 3, and shop apply lead- and chromate-free, rust-inhibitive primer, complying with performance requirements in MPI 79 according to SSPC-PA 1.

N. Welding Electrodes: Comply with AWS standards.

O. Precast Accessories: Provide clips, hangers, plastic or steel shims, and other accessories required to install precast structural concrete units.

2.6 STAINLESS-STEEL CONNECTION MATERIALS

A. Stainless-Steel Plate: ASTM A 666, Type 304, of grade suitable for application.

B. Stainless-Steel Bolts and Studs: ASTM F 593, Alloy 304 or 316, hex-head bolts and studs; stainless-steel nuts; and flat, stainless-steel washers. Lubricate threaded parts of stainless-steel bolts with an antiseize thread lubricant during assembly.

C. Stainless-Steel-Headed Studs: ASTM A 276, with minimum mechanical properties of PCI MNL 116.

2.7 BEARING PADS

A. Provide one of the following bearing pads for precast structural concrete units:

1. Elastomeric Pads: AASHTO M 251, plain, vulcanized, 100 percent polychloroprene (neoprene) elastomer, molded to size or cut from a molded sheet, 50 to 70 Shore, Type A durometer hardness, ASTM D 2240; minimum tensile strength 2250 psi, ASTM D 412.

2.8 GROUT MATERIALS

A. Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, plasticizing and water-reducing agents, complying with ASTM C 1107, Grade A for drypack and Grades B and C for flowable grout and of consistency suitable for application within a 30-minute working time.

2.9 CONCRETE MIXTURES

A. Prepare design mixtures for each type of precast concrete required.
1. Limit use of fly ash to 25 percent replacement of portland cement by weight and granulated blast-furnace slag to 40 percent of portland cement by weight; metakaolin and silica fume to 10 percent of portland cement by weight.

B. Design mixtures may be prepared by a qualified independent testing agency or by qualified precast plant personnel at precast structural concrete fabricator's option.

C. Limit water-soluble chloride ions to maximum percentage by weight of cement permitted by ACI 318 or PCI MNL 116 when tested according to ASTM C 1218/C 1218M.

D. Normal-Weight Concrete Mixtures: Proportion face and backup mixtures or full-depth mixtures, at fabricator's option by either laboratory trial batch or field test data methods according to ACI 211.1, with materials to be used on Project, to provide normal-weight concrete with the following properties:

1. Compressive Strength (28 Days): 5000 psi.
2. Maximum Water-Cementitious Materials Ratio: 0.45.

E. Water Absorption: 6 percent by weight or 14 percent by volume, tested according to PCI MNL 116.

F. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content complying with PCI MNL 116.

G. When included in design mixtures, add other admixtures to concrete mixtures according to manufacturer's written instructions.

H. Concrete Mix Adjustments: Concrete mix design adjustments may be proposed if characteristics of materials, Project conditions, weather, test results, or other circumstances warrant.

2.10 MOLD FABRICATION

A. Molds: Accurately construct molds, mortar tight, of sufficient strength to withstand pressures due to concrete-placement operations and temperature changes and for prestressing and detensioning operations. Coat contact surfaces of molds with release agent before reinforcement is placed. Avoid contamination of reinforcement and prestressing tendons by release agent.

B. Maintain molds to provide completed precast structural concrete units of shapes, lines, and dimensions indicated, within fabrication tolerances specified.

1. Form joints are not permitted on faces exposed to view in the finished work.
2. Edge and Corner Treatment: Uniformly chamfered.

2.11 FABRICATION

A. Cast-in Anchors, Inserts, Plates, Angles, and Other Anchorage Hardware: Fabricate anchorage hardware with sufficient anchorage and embedment to comply with design requirements. Accurately position for attachment of loose hardware, and secure in place during precasting operations. Locate anchorage hardware where it does not affect position of main reinforcement or concrete placement.

1. Weld-headed studs and deformed bar anchors used for anchorage according to AWS D1.1/D1.1M and AWS C5.4, "Recommended Practices for Stud Welding."

B. Furnish loose hardware items including steel plates, clip angles, seat angles, anchors, dowels, cramps, hangers, and other hardware shapes for securing precast structural concrete units to supporting and adjacent construction.

C. Cast-in reglets, slots, holes, and other accessories in precast structural concrete units as indicated on the Contract Drawings.

D. Cast-in openings larger than 10 inches in any dimension. Do not drill or cut openings or prestressing strand without Designer's approval.

E. Reinforcement: Comply with recommendations in PCI MNL 116 for fabricating, placing, and supporting reinforcement.

1. Clean reinforcement of loose rust and mill scale, earth, and other materials that reduce or destroy the bond with concrete. When damage to epoxy-coated reinforcement exceeds limits specified, repair with patching material compatible with coating material and epoxy coat bar ends after cutting.

2. Accurately position, support, and secure reinforcement against displacement during concrete-placement and consolidation operations. Completely conceal support devices to prevent exposure on finished surfaces.
3. Place reinforcement to maintain at least 3/4-inch minimum coverage. Increase cover requirements according to ACI 318 when units are exposed to corrosive environment or severe exposure conditions. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position while placing concrete. Direct wire tie ends away from finished, exposed concrete surfaces.
4. Place reinforcing steel and prestressing strand to maintain at least 3/4-inch minimum concrete cover. Increase cover requirements for reinforcing steel to 1-1/2 inches when units are exposed to corrosive environment or severe exposure conditions. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position while placing concrete. Direct wire tie ends away from finished, exposed concrete surfaces.
5. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh spacing and wire tie laps, where required by design. Offset laps of adjoining widths to prevent continuous laps in either direction.

F. Reinforce precast structural concrete units to resist handling, transportation, and erection stresses.

G. Prestress tendons for precast structural concrete units by either pretensioning or post-tensioning methods. Comply with PCI MNL 116.

1. Delay detensioning or post-tensioning of precast, prestressed structural concrete units until concrete has reached its indicated minimum design release compressive strength as established by test cylinders cured under same conditions as concrete.
2. Detension pretensioned tendons either by gradually releasing tensioning jacks or by heat cutting tendons, using a sequence and pattern to prevent shock or unbalanced loading.
3. If concrete has been heat cured, detension while concrete is still warm and moist to avoid dimensional changes that may cause cracking or undesirable stresses.
4. Protect strand ends and anchorages with bituminous, zinc-rich, or epoxy paint to avoid corrosion and possible rust spots.
5. Protect strand ends and anchorages with a minimum of 1-inch- thick, nonmetallic, nonshrink, grout mortar and sack rub surface. Coat or spray the inside surfaces of pocket with bonding agent before installing grout.

H. Comply with requirements in PCI MNL 116 and in this Section for measuring, mixing, transporting, and placing concrete. After concrete batching, no additional water may be added.

I. Place face mixture to a minimum thickness after consolidation of the greater of 1 inch or 1.5 times the maximum aggregate size, but not less than the minimum reinforcing cover specified.

J. Place concrete in a continuous operation to prevent seams or planes of weakness from forming in precast concrete units.

1. Place backup concrete mixture to ensure bond with face-mixture concrete.

K. Thoroughly consolidate placed concrete by internal and external vibration without dislocating or damaging reinforcement and built-in items, and minimize pour lines, honeycombing, or entrapped air on surfaces. Use equipment and procedures complying with PCI MNL 116.

1. Place self-consolidating concrete without vibration according to PCI TR-6, "Interim Guidelines for the Use of Self-Consolidating Concrete in Precast/Prestressed Concrete Institute Member Plants."

L. Comply with ACI 306.1 procedures for cold-weather concrete placement.

M. Comply with PCI MNL 116 procedures for hot-weather concrete placement.

N. Identify pickup points of precast structural concrete units and orientation in structure with permanent markings, complying with markings indicated on Shop Drawings. Imprint or permanently mark casting date on each precast structural concrete unit on a surface that will not show in finished structure.

O. Cure concrete, according to requirements in PCI MNL 116, by moisture retention without heat or by accelerated heat curing using low-pressure live steam or radiant heat and moisture. Cure units until compressive strength is high enough to ensure that stripping does not have an effect on performance or appearance of final product.

P. Discard and replace precast structural concrete units that do not comply with requirements, including structural, manufacturing tolerance, and appearance, unless repairs meet requirements in PCI MNL 116 and meet Designer's approval.

2.12 FABRICATION TOLERANCES

A. Fabricate precast structural concrete units straight and true to size and shape with exposed edges and corners precise and true so each finished unit complies with PCI MNL 116 product dimension tolerances.

2.13 COMMERCIAL FINISHES

A. Grade A Finish (to be applied to all precast edges, unless noted otherwise in the plans or in this specification): Fill surface blemishes with the exception of air holes 1/16 inch in width or smaller, and form marks where the surface deviation is less than 1/16 inch. Float apply a neat cement-paste coating to exposed surfaces. Rub dried paste coat with burlap to remove loose particles. Discoloration at form joints is permitted. Grind smooth all form joints.

B. Screed or Float Finish (to be applied to precast edges completely obscured from view): Screed or float finish unformed surfaces. Strike off and consolidate concrete with vibrating screeds to a uniform finish. Hand screed at projections. Normal color variations, minor indentations, minor chips, and spalls are permitted. Major imperfections, honeycombing, or defects are not permitted.

C. Apply roughened surface finish according to ACI 318 to precast concrete units that will receive concrete topping after installation.

2.14 COMMERCIAL ARCHITECTURAL FINISHES

A. Commercial architectural finish is to be applied to precast stair assemblies and slabs.

B. Manufacture member faces free of joint marks, grain, and other obvious defects with corners, including false joints, uniform, straight, and sharp. Finish exposed-face surfaces of precast concrete units to match approved mockups and as follows:
   1. PCI's "Architectural Precast Concrete - Color and Texture Selection Guide," of plate numbers indicated.
   2. Smooth-Surface Finish: Provide surfaces free of excessive air voids, sand streaks, and honeycombs, with uniform color and texture.

2.15 SOURCE QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to evaluate precast structural concrete fabricator's quality-control and testing methods.

   1. Allow testing agency access to material storage areas, concrete production equipment, concrete placement, and curing facilities. Cooperate with testing agency and provide samples of materials and concrete mixtures as may be requested for additional testing and evaluation.

B. Testing: Test and inspect precast structural concrete according to PCI MNL 116 requirements.

   1. Test and inspect self-consolidating concrete according to PCI TR-6.

C. Strength of precast structural concrete units will be considered deficient if units fail to comply with ACI 318 requirements for concrete strength.

D. If there is evidence that strength of precast concrete units may be deficient or may not comply with ACI 318 requirements, employ a qualified testing agency to obtain, prepare, and test cores drilled from hardened concrete to determine compressive strength according to ASTM C 42/C 42M.

   1. A minimum of three representative cores will be taken from units of suspect strength, from locations directed by Architect.
   2. Cores will be tested in an air-dry condition or, if units will be wet under service conditions, test cores after immersion in water in a wet condition.
   3. Strength of concrete for each series of 3 cores will be considered satisfactory if average compressive strength is equal to at least 85 percent of 28-day design compressive strength and no single core is less than 75 percent of 28-day design compressive strength.
   4. Test results will be made in writing on same day that tests are performed, with copies to Architect, Contractor, and precast concrete fabricator. Test reports will include the following:

      a. Project identification name and number.
      b. Date when tests were performed.
      c. Name of precast concrete fabricator.
      d. Name of concrete testing agency.
      e. Identification letter, name, and type of precast concrete unit(s) represented by core tests; design compressive strength; type of break; compressive strength at breaks, corrected for length-diameter ratio; and direction of applied load to core in relation to horizontal plane of concrete as placed.

E. Patching: If core test results are satisfactory and precast structural concrete units comply with requirements, clean and dampen core holes and solidly fill with same precast concrete mixture that has no coarse aggregate, and finish to match adjacent precast concrete surfaces.

F. Defective Units: Discard and replace precast structural concrete units that do not comply with requirements, including strength, manufacturing tolerances, and color and texture range. Chipped, spalled, or cracked units may be repaired, subject to Architect's approval. Architect reserves the right to reject precast units that do not match approved samples, sample panels, and mockups.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting structural frame or foundation and conditions for compliance with requirements for installation tolerances, true and level bearing surfaces, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. Do not install precast concrete units until supporting, cast-in-place, building structural framing has attained minimum allowable design compressive strength or until supporting steel or other structure is complete.

3.2 INSTALLATION

A. Install clips, hangers, bearing pads, and other accessories required for connecting precast structural concrete units to supporting members and backup materials.

B. Erect precast structural concrete level, plumb, and square within specified allowable tolerances. Provide temporary structural framing, supports, and bracing as required to maintain position, stability, and alignment of units until permanent connection.

1. Install temporary steel or plastic spacing shims or bearing pads as precast structural concrete units are being erected. Tack weld steel shims to each other to prevent shims from separating.
2. Maintain horizontal and vertical joint alignment and uniform joint width as erection progresses.
3. Remove projecting lifting devices and grout fill voids within recessed lifting devices flush with surface of adjacent precast surfaces when recess is exposed.

C. Connect precast structural concrete units in position by bolting, welding, grouting, or as otherwise indicated on Shop Drawings. Remove temporary shims, wedges, and spacers as soon as practical after connecting and grouting are completed.

1. Do not permit connections to disrupt continuity of roof flashing.

D. Field cutting of precast units is not permitted without approval of the Engineer.

E. Fasteners: Do not use drilled or powder-actuated fasteners for attaching accessory items to precast, prestressed concrete units.

F. Welding: Comply with applicable AWS D1.1/D1.1M and AWS D1.4 for welding, welding electrodes, appearance, quality of welds, and methods used in correcting welding work.

1. Protect precast structural concrete units and bearing pads from damage by field welding or cutting operations, and provide noncombustible shields as required.
2. Clean weld-affected steel surfaces with chipping hammer followed by brushing, and apply a minimum 4.0-mil- thick coat of galvanized repair paint to galvanized surfaces according to ASTM A 780.
3. Remove, reweld, or repair incomplete and defective welds.

G. At bolted connections, use lock washers, tack welding, or other approved means to prevent loosening of nuts after final adjustment.

1. Where slotted connections are used, verify bolt position and tightness. For sliding connections, properly secure bolt but allow bolt to move within connection slot. For friction connections, apply specified bolt torque and check 25 percent of bolts at random by calibrated torque wrench.

H. Grouting: Grout connections and joints and open spaces at keyways, connections, and joints where required or indicated on the contract drawings. Retain grout in place until hard enough to support itself. Pack spaces with stiff grout material, tamping until voids are completely filled.

1. Place grout to finish smooth, level, and plumb with adjacent concrete surfaces.
2. Fill joints completely without seepage to other surfaces.
3. Trowel top of grout joints on roofs smooth and uniform. Finish transitions between different surface levels not steeper than 1 to 12.
4. Promptly remove grout material from exposed surfaces before it affects finishes or hardens.
5. Keep grouted joints damp for not less than 24 hours after initial set.

3.3 ERECTION TOLERANCES

A. Erect precast structural concrete units level, plumb, square, true, and in alignment without exceeding the noncumulative erection tolerances of PCI MNL 135.

B. Minimize variations between adjacent slab members by jacking, loading, or other method recommended by fabricator and approved by Engineer.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Field welds will be visually inspected and nondestructive tested according to ASTM E 165 or ASTM E 709. High-strength bolted connections will be subject to inspections.

C. Testing agency will report test results promptly and in writing to Contractor and Engineer.

D. Repair or remove and replace work where tests and inspections indicate that it does not comply with specified requirements.

E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

F. Prepare test and inspection reports.

3.5 REPAIRS

A. Repair precast structural concrete units if permitted by Engineer.

1. Repairs may be permitted if structural adequacy, serviceability, durability, and appearance of units has not been impaired.

B. Mix patching materials and repair units so cured patches blend with color, texture, and uniformity of adjacent exposed surfaces and show no apparent line of demarcation between original and repaired work, when viewed in typical daylight illumination from a distance of 5 feet.

C. Prepare and repair damaged galvanized coatings with galvanizing repair paint according to ASTM A 780.

D. Remove and replace damaged precast structural concrete units that cannot be repaired or when repairs do not comply with requirements as determined by Architect.

3.6 CLEANING

A. Clean exposed surfaces of precast concrete units after erection and completion of joint treatment to remove weld marks, other markings, dirt, and stains.

1. Perform cleaning procedures, if necessary, according to precast concrete fabricator's written recommendations. Clean soiled precast concrete surfaces with detergent and water, using stiff fiber brushes and sponges, and rinse with clean water. Protect other work from staining or damage due to cleaning operations.
2. Do not use cleaning materials or processes that could change the appearance of exposed concrete finishes or damage adjacent materials.

END OF SECTION 034100

SECTION 035320 – MICROSILICA CONCRETE OVERLAY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions of Division 1, State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, and Incidental Construction, Form 816 - 2004 and supplemental specifications thereto, shall be a part of this specification.

B. Work included in this section may require coordination with Amtrak regarding track outages, flagmen, or other issues related to work around railroad facilities. The Contractor shall pay special attention to the article entitled, "Safety and Protection of the Railroad Traffic and Property", "requirements for Temporary Protection Shields…" and other Amtrak Specifications in the General Provisions.

1.2 SUMMARY

A. Section Includes:
1. Cleaning, surface preparation, furnishing, placing, finishing and curing of the microsilica concrete (MSC) floor topping, saw cutting and installing joints, and final clean-up.
2. Bonding Agent and other required accessories

B. This Section specifies requirements for cast-in place microsilica concrete and bonding agent to be placed as an overlay to the precast concrete platform slabs and portions of the cast-in-place concrete floor and includes the following:

1. Performance requirements for the production of high strength concrete overlay with microsilica (silica fume) admixture for the reduction of concrete permeability to protect against intrusion by chlorides and other aggressive chemicals.

2. Microsilica concrete overlay shall be provided where indicated on the contract drawings or as directed by the Engineer.

3. MSC overlay shall vary in thickness as indicated in the contract drawings.

4. Any damage to adjacent or remaining structures caused by Contractor's operations will be repaired by the Contractor at his expense in a manner approved by the Engineer.

1.3 ACTION SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Product Data: For each type of product indicated.

1.4 INFORMATIONAL SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for concrete floor topping.

C. Manufacturer Certification Letter in accordance with NOTICE TO CONTRACTOR – POTENTIAL FOR ASBESTOS CONTAINING MATERIALS.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

B. Testing Agency Qualifications: An independent agency qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.

C. Manufacturer: Concrete admixtures shall be manufactured by a firm with a minimum of 5 years experience in the production of similar products. Manufacturers proposed for use but not named in these specifications shall submit evidence of ability to meet all requirements specified, and include a list of projects of similar design and complexity completed within the past five years.

D. Materials: For each type of material required for the work of this Section, provide primary materials which are the products of one manufacturer.

E. Pre-Installation Conference: A pre-installation conference shall be held two weeks prior to commencement of field operations to install the specified product in order to establish procedures, maintain optimum working conditions and coordinate this work with related and adjacent work. Agenda for meeting shall include concrete and admixture handling, placing, finishing, and curing. Conduct conference at Project site.

F. Manufacturer's Representative: A representative of the manufacturer shall be present for project start-up during initial concrete placement. Engineer may waive requirement for manufacturer's representative if Contractor provides sufficient evidence that producer and finisher have adequate experience with admixtures required.

G. Trial Mix: Provide a minimum 1 cubic yard trial mix containing proposed concrete design mix placed at the job site in a location acceptable to the Engineer. Engineer may waive requirement for trial mix if Contractor provides sufficient evidence that producer and finisher have adequate experience with low water cement ratio mixes.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Refer to Form 816 Article 1.06.03 and Form 816 Article 1.20-1.06.03 for additional information.

B. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storage, mixing with other components, and application.

C. Store materials to comply with manufacturer's written instructions to prevent deterioration from moisture or other detrimental effects.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Comply with manufacturer's written instructions for substrate temperature and moisture content, ambient temperature and humidity, ventilation, and other conditions affecting concrete overlay performance.

1. Place concrete overlay only when ambient temperature and temperature of base slabs are between 50 and 86 deg F or as required by the manufacturer.

B. Close areas to traffic during topping application and, after application, for time period recommended in writing by manufacturer.

PART 2 - PRODUCTS

2.1 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

1. Portland Cement: ASTM C 150, Type I/II, gray. Supplement with the following:
   a. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

B. Silica Fume: ASTM C 1240, amorphous silica.

C. Normal-Weight Aggregates: ASTM C 33, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.

1. Maximum Coarse-Aggregate Size: 3/8 inch nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

D. Water: ASTM C 94/C 94M and potable.

2.2 ADMIXTURES

A. Air-Entraining Admixture: ASTM C 260.

B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those

1. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.

2.3 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming; manufactured for application to fresh concrete.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

2.4 RELATED MATERIALS

A. Portland Cement: ASTM C 150, Type I or II.

B. Sand: ASTM C 404, fine aggregate passing No. 16 sieve.

C. Water: Potable.

D. Acrylic-Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. Dayton Superior Corporation; Day-Chem Ad-Bond
   b. Approved Equal

E. Epoxy Adhesive: ASTM C 881, Type V, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class and grade to suit requirements.

2.5 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Silica Fume: 10 percent.

2. Combined Fly Ash, Pozzolans, and Silica Fume: 35 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
3. Combined Fly Ash or Pozzolans, Ground Granulated Blast-Furnace Slag, and Silica Fume: 50 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.

C. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

D. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.

2.6 CONCRETE MIXTURES FOR MICROSILICA CONCRETE OVERLAY

A. Microsilica Concrete Overlay: Proportion normal-weight concrete mixture with microsilica to meet the following performance criteria:

1. Minimum Compressive Strength: 5000 psi at 28 days.
2. Maximum Permeability: 800 coulombs at 56 days. ASTM C 31 & ASTM C 1202
3. Minimum Bond strength: 150 psi at 28 days. ASTM C1042
4. Maximum Water-Cementitious Materials Ratio: 0.40.
5. Minimum Cementitious Materials Content: 700 lb/cu. yd..
6. Slump Limit: 6 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch.
7. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 3/8-inch nominal maximum aggregate size.

B. Microsilica, fly ash, blast furnace slag and cement are considered cementitious materials in calculations.

C. Add microsilica as a liquid slurry or in dry densified form in 25 lb Concrete Ready Bags packaging. The water content of slurry shall be included as mix design water.

D. Blended cements with interground microsilica will not be allowed.

E. Air Entrainment: For freeze-thaw durability comply with ACI 318 freezing and thawing exposure requirements, as determined by ASTM C 173 or ASTM C 281.

F. Concrete Admixtures: High-range water reducers meeting the requirements of ASTM C494, Type F are required to control slump, mixing, cementitious ratio and proper distribution of the microsilica, and shall be plant added. Additional water reducers may be added at the job site when required.

G. Additional Concrete Admixtures: Additional concrete admixtures conforming to ASTM C 494 or equivalent CSA 266 standards may be used as required.

2.7 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.8 CONCRETE MIXING

A. Microsilica Concrete shall be mixed in transit mixers only in accordance with microsilica manufacturer’s written requirements.

B. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M except as noted below, and furnish batch ticket information.

C. Special Mixing Requirements for Densified Microsilica: Densified microsilica requires enhanced mixing to ensure full dispersion. The following mix requirements shall be adhered to:

1. For all types of mixing equipment, mix times shall be increased by 40% over the minimum mix time required to achieve mix uniformity as defined by ASTM C 94.
2. For truck-mixed and central mixed concrete, maximum allowable batch size shall be 80% of the maximum as called out by ASTM C 94.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for conditions affecting performance of concrete overlay.

B. Verify that base concrete slabs comply with scratch finish requirements specified in Division 3 Section "Cast-in-Place Concrete."

C. Notify Engineer in writing of circumstances detrimental to the proper completion of the work.

D. Proceed with application only after unsatisfactory conditions have been corrected.

3.2 EQUIPMENT

A. Microsilica concrete shall be mixed by transit mixers only.

B. Equipment used shall supply air and water free of oil so as not to contaminate the deck surface. (i.e. equipped with oil trap).

3.3 PREPARATION

A. Existing Concrete: Remove existing surface treatments with hand-held waterblasting equipment. Remove deteriorated and unsound concrete. Ensure that base slabs exhibit a heavily scarified surface profile with an amplitude of 1/4 inch.

1. Prepare and clean existing base slabs. Fill voids, cracks, and cavities in base slabs.
2. Surface to receive MSC shall be cleaned no more than 24 hours prior to placement of overlay. The surface may require additional cleaning if placement is delayed.
3. Entire surface shall be cleaned by high-pressure water blasting or other approved method to remove any curing compound, loose concrete, laitance, oil or any other residue or contaminate that may be detrimental to achieving bond.
4. Exposed reinforcement bars shall be free of dirt, detrimental scale, paint, oil, and other foreign substances which may reduce bond with the concrete. A tight nonscaling coating of rust is not considered objectionable. Loose, scaling rust shall be removed by rubbing with burlap, wire brushing, blast cleaning or other methods approved by the Engineer. All loose reinforcement bars, as determined by the Engineer, shall be retied at the Contractor's expense.
5. All dust, concrete fines, debris, including water, resulting from the surface preparation shall be confined and shall be immediately and thoroughly removed from all areas of accumulation.
6. The surface shall be protected after cleaning but before placement of the MSC by covering all surfaces to receive the overlay with a minimum 6mil thick polyethylene film.
7. The concrete deck surface to receive the overlay shall be wetted for 12 hours prior to placement of the MSC or as required by the manufacturer of the bonding agent. Standing water shall be blown clear prior to placement of the overlay.

B. Install joint-filler strips where topping abuts vertical surfaces, such as columns, edging plates and other locations, as indicated.

1. Extend joint-filler strips full width and depth of joint, terminating flush with topping surface, unless otherwise indicated.
2. Terminate full-width, joint-filler strips 1/2 inch below topping surface where joint sealants, specified in Division 7 Section "Joint Sealants," are indicated.
3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

C. Epoxy-Coated Reinforcement: All reinforcing steel shall be epoxy coated. All reinforcing steel in contact with the overlay shall be cleaned of dirt, grease, concrete mortar and loose rust prior to placement. Repair cut and damaged epoxy coatings with epoxy repair coating according to ASTM D 3963/D 3963M. Use epoxy-coated steel wire ties to fasten epoxy-coated steel reinforcement. All damage to the epoxy coating shall be repaired prior to concrete placement.

3.4 OVERLAY APPLICATION

A. Start overlay application in presence of manufacturer's technical representative.

B. Existing Concrete: Apply bonding adhesive, mixed according to manufacturer's written instructions, and scrub into dry base slabs to a thickness of 1/16 to 1/8 inch, without puddling. Place overlay while adhesive is still tacky. All surfaces in contact with the microsilica concrete shall be evenly coated. No excess bonding adhesive shall be allowed to collect in pockets.

C. The application of bonding adhesive shall be limited to an area that can easily be covered with the MSC overlay before the adhesive begins to dry. If the Engineer determines that the bonding adhesive has dried before the application of the MSC, the contractor shall clean and re-prepare the surface as described above.

D. The MSC overlay and bonding adhesive shall not be placed in the rain.

E. Place concrete overlay continuously in a single layer, tamping and consolidating to achieve tight contact with bonding surface. Do not permit cold joints or seams to develop within pour strip.

1. Screed surface with a straightedge and strike off to correct elevations.
2. Slope surfaces uniformly where indicated.
3. Begin initial floating using bull floats to form a uniform and open-textured surface plane free of humps or hollows.

F. Concrete Cover: Minimum concrete cover over reinforcement shall be 1 ¼”.

G. Finishing: Under-finish microsilica concrete by limiting finishing operation to screeding, bull-float, and broom finish. Curing shall be initiated within one hour of concrete placement.

1. Finish and measure surface so gap at any point between surface and an unleveled freestanding 10-foot-long straightedge, resting on 2 high spots and placed anywhere on the surface, does not exceed 1/4 inch.

3.5 JOINTS

A. Construct joints true to line with faces perpendicular to surface plane of concrete floor topping, at locations indicated or as approved by Engineer. Construct joints as directed by Engineer, early in the curing process to avoid chipping, and before random contraction cracks develop.

B. Expansion/Construction Joints: Construct joints true to line with faces perpendicular to surface plane of concrete overlay, at locations indicated or as approved by Engineer.

C. Contraction Joints: Form weakened-plane contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete overlay when cutting action will not tear, abrade, or otherwise damage surface and before random contraction cracks develop.

1. Form joints in concrete overlay over expansion/construction joints in base slabs, unless otherwise indicated.
2. Construct contraction joints for a depth equal to one-fourth of concrete overlay thickness, but not less than 1/2 inch deep.

3.6 PROTECTING AND CURING

A. General: Protect freshly placed concrete overlay from premature drying and excessive cold or hot temperatures.

B. Wind breaks, sun shades, and fog misting may be utilized to minimize the rate of evaporation at the concrete surface.

C. Fog misting shall be provided when the rate of evaporation at the concrete surface exceeds 0.1 pound per square foot per hour as determined by ACI 308 Section 1.2.1. Fogging shall continue after the finishing operation until prewetted burlap or other approved curing material is placed

D. Evaporation Retarder: Apply evaporation retarder to concrete overlay surfaces in hot, dry, or windy conditions before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating and during final finish to protect the concrete.

E. Begin curing immediately after finishing concrete overlay. Cure by one or a combination of the following methods, according to microsilica manufacturer's written instructions:

1. Moisture Curing: Keep surfaces continuously moist with water-fog spray and absorptive cover. The MSC shall be wet cured with prewetted burlap for a minimum of 7 days. The burlap shall be lapped a minimum of 12 inches and shall be protected from displacement. The burlap shall be presoaked for a minimum of 24 hours and shall be drained of excess water prior to application.
2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

F. Protect completed work from damage and construction operations throughout finishing and curing operations.

G. Removal of the burlap should be done late in the day so as to reduce the thermal shock to the overlay.

3.7 JOINT FILLING

A. Prepare and clean contraction joints and install semirigid joint filler, according to manufacturer's written instructions, once topping has fully cured.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

C. Install semirigid joint filler full depth of contraction joints. Overfill joint and trim semirigid joint filler flush with top of joint after hardening.

3.8 REPAIRS

A. Defective Topping: Repair and patch defective concrete overlay areas, including areas that have not bonded to concrete substrate.

3.9 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Testing Services: Testing and inspecting of completed applications of concrete overlays shall take place in successive stages, in areas of extent and using methods as follows:

1. Sample Sets: At point of placement, a set of 3 molded-cube samples shall be taken from the topping mix for the first 1000 sq. ft., plus 1 set of samples for each subsequent 5000 sq. ft. of topping, or fraction thereof, but not less than 6 samples for each day's placement. Samples shall be tested according to ASTM C 109/C 109M for compliance with compressive-strength requirements.
2. Concrete overlay shall be tested for delamination by dragging a steel chain over the surface.
3. Concrete overlay shall be tested for compliance with surface flatness and levelness tolerances.

C. Remove and replace applications of concrete overlay where test results indicate that it does not comply with specified requirements.

D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

END OF SECTION 035320

SECTION 042113 - BRICK MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions of Division 1, State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, and Incidental Construction, Form 816 - 2004 and supplemental specifications thereto, shall be a part of this specification.

B. Work included in this section may require coordination with Amtrak regarding track outages, flagmen, or other issues related to work around railroad facilities. The Contractor shall pay special attention to the specification entitled “SAFETY AND PROTECTION OF RAILROAD TRAFFIC AND PROPERTY” and other Amtrak Specifications contained in the Contract.

1.2 SUMMARY

A. Section Includes:
1. Face brick.
2. Mortar and grout.
3. Ties and anchors.
4. Embedded flashing.
5. Miscellaneous masonry accessories.

B. Related Sections:
1. Section 047200 "Cast Stone Masonry" for furnishing cast stone trim.
2. Section 051200 "Structural Steel Framing" for installing anchor sections of adjustable masonry anchors for connecting to structural steel frame.
3. Section 055000 "Metal Fabrications" for furnishing steel lintels and shelf angles for brick masonry.
4. Section 099610 “Graffiti Control” for application of graffiti control coatings.

1.3 ACTION SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Product Data: For each type of product indicated.

C. Shop Drawings: For the following:

1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.

D. Samples for Initial Selection:
1. Colored mortar.

E. Samples for Verification: For each type and color of the following:
   1. Face brick.
   2. Pigmented and colored-aggregate mortar. Make Samples using same sand and mortar ingredients to be used on Project.
   3. Weep holes and vents.
   4. Accessories embedded in masonry.

1.4 INFORMATIONAL SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Manufacturer Certification Letter in accordance with NOTICE TO CONTRACTOR – POTENTIAL FOR ASBESTOS CONTAINING MATERIALS.

C. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.

   1. Submittal is for information only. Neither receipt of list nor approval of mockup constitutes approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Architect and approved in writing.

D. Material Certificates: For each type and size of the following:

   1. Masonry units.

      a. Include data on material properties.
      b. For brick, include size-variation data verifying that actual range of sizes falls within specified tolerances.
      c. For exposed brick, include test report for efflorescence according to ASTM C 67.

   2. Cementitious materials. Include brand, type, and name of manufacturer.
   3. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
   4. Grout mixes. Include description of type and proportions of ingredients.
   5. Anchors, ties, and metal accessories.

E. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate in accordance with Form 816 Article 1.20-1.06.01.

C. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.

D. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.

E. Sample Panels: Build sample panels to verify selections made under sample submittals and to demonstrate aesthetic effects. Comply with requirements in Section 014000 "Quality Requirements" for mockups.

1. Build sample panels for each type of exposed unit masonry construction in sizes approximately 48 inches long by 48 inches high by full thickness.
2. Where masonry is to match existing, erect panels adjacent and parallel to existing surface.
3. Clean one-half of exposed faces of panels with masonry cleaner indicated.
4. Protect approved sample panels from the elements with weather-resistant membrane.
5. Approval of sample panels is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; and other material and construction qualities specifically approved by Architect in writing.

    a. Approval of sample panels does not constitute approval of deviations from the Contract Documents contained in sample panels unless such deviations are specifically approved by Architect in writing.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Refer to Form 816 Article 1.06.03 and Form 816 Article 1.20-1.06.03 for additional information.

B. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

C. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

D. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

E. Deliver preblended, dry mortar mix in moisture-resistant containers designed for use with dispensing silos. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in covered weatherproof dispensing silos.

F. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.7 PROJECT CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

1. Extend cover a minimum of 24 inches down both sides of walls and hold cover securely in place.

B. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

C. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.

D. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 MASONRY UNITS, GENERAL

A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.

B. Fire-Resistance Ratings: If indicated on drawings, provide units that comply with requirements for fire-resistance ratings indicated as determined by testing according to ASTM E 119, by equivalent masonry thickness, or by other means, as acceptable to authorities having jurisdiction.

2.2 BRICK

A. General: Provide shapes indicated and as follows, with exposed surfaces matching finish and color of exposed faces of adjacent units.

1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
2. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels.
3. Provide special shapes for applications requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing.
4. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.

B. Face Brick: Facing brick complying with ASTM C 216.

1. Products: Subject to compliance with requirements, provide one of the following, or approved equal:

   a. Glen-Gery Augusta modular face brick, machine molded unfrogged

2. Grade: MW or SW.
3. Type: FBX or HBX
4. Initial Rate of Absorption: Less than 30 g/30 sq. in. per minute when tested per ASTM C 67.
5. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
6. Size (Actual Dimensions): 3-1/2 inches wide by 2-1/4 inches high by 7-1/2 inches long or 3-5/8 inches wide by 2-1/4 inches high by 7-5/8 inches long.

2.3 MORTAR MATERIALS

A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

B. Hydrated Lime: ASTM C 207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

D. Masonry Cement: ASTM C 91.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Capital Materials Corporation
    b. Cemex S.A.B. de C.V.
    c. Essroc, Italcementi Group
    d. Holcim (US) Inc.
    e. Lafarge North America Inc.
    f. Lehigh Cement Company
    g. National Cement Company, Inc.

E. Mortar Cement: ASTM C 1329.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Lafarge North America Inc.
    b. Approved equal.

F. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C 979. Use only pigments with a record of satisfactory performance in masonry mortar.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Davis Colors; True Tone Mortar Colors.
    b. Lanxess Corporation; Bayferrox Iron Oxide Pigments.
    c. Solomon Colors, Inc.; SGS Mortar Colors.

G. Colored Cement Product: Packaged blend made from portland cement and hydrated lime and mortar pigments, all complying with specified requirements, and containing no other ingredients.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Colored Portland Cement-Lime Mix:

        1) Capital Materials Corporation; Riverton Portland Cement Lime Custom Color.
        2) Holcim (US) Inc.; Rainbow Mortamix Custom Color Cement/Lime.
        3) Lafarge North America Inc.; Eaglebond Portland & Lime.
        4) Lehigh Cement Company; Lehigh Custom Color Portland/Lime Cement.

2. Formulate blend as required to produce color indicated or, if not indicated, as selected from manufacturer's standard colors.
3. Pigments shall not exceed 10 percent of portland cement by weight.

H. Aggregate for Mortar: ASTM C 144.

1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
3. White-Mortar Aggregates: Natural white sand or crushed white stone.
4. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.

2.4 REINFORCEMENT

A. Masonry Joint Reinforcement, General: ASTM A 951/A 951M.

B. Masonry Joint Reinforcement for Veneers Anchored with Seismic Masonry-Veneer Anchors: Single 0.187-inch- diameter, stainless-steel continuous wire.

2.5 TIES AND ANCHORS

A. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:
   1. Stainless-Steel Wire: ASTM A 580/A 580M, Type 316.
   2. Stainless-Steel Sheet: ASTM A 666, Type 316.
   3. Stainless-Steel Bars: ASTM A 276 or ASTM A 666, Type 304.

B. Corrugated Metal Ties: Metal strips not less than 7/8 inch wide with corrugations having a wavelength of 0.3 to 0.5 inch and an amplitude of 0.06 to 0.10 inch made from 0.062-inch-thick, stainless-steel sheet.

C. Wire Ties, General: Unless otherwise indicated, size wire ties to extend at least halfway through veneer but with at least 5/8-inch cover on outside face. Outer ends of wires are bent 90 degrees and extend 2 inches parallel to face of veneer.

D. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.

   1. Anchor Section for Welding to Steel Frame: Crimped 1/4-inch- diameter, stainless-steel wire.
   2. Tie Section: Triangular-shaped wire tie, sized to extend within 1 inch of masonry face, made from 0.25-inch- diameter, stainless-steel wire.

E. Adjustable Anchors for Connecting to Concrete: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.

   1. Connector Section: Dovetail tabs for inserting into dovetail slots in concrete and attached to tie section; formed from 0.109-inch- thick, stainless-steel sheet.

   2. Tie Section: Triangular-shaped wire tie, sized to extend within 1 inch of masonry face, made from 0.25-inch- diameter, stainless-steel wire.

3. Corrugated Metal Ties: Metal strips not less than 7/8 inch wide with corrugations having a wavelength of 0.3 to 0.5 inch and an amplitude of 0.06 to 0.10 inch made from 0.078-inch thick, stainless-steel sheet or 0.109-inch- thick, stainless-steel sheet with dovetail tabs for inserting into dovetail slots in concrete and sized to extend to within 1 inch of masonry face.

F. Adjustable Masonry-Veneer Anchors:

1. General: Provide anchors that allow vertical adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing to wood or metal studs, and as follows:

a. Structural Performance Characteristics: Capable of withstanding a 100-lbf load in both tension and compression without deforming or developing play in excess of 0.05 inch.

2. Contractor's Option: Unless otherwise indicated, provide any of the following types of anchors:
3. Screw-Attached, Masonry-Veneer Anchors: Units consisting of a wire tie and a metal anchor section.

a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

1) Dayton Superior Corporation, Dur-O-Wal Division
2) Heckmann Building Products Inc
3) Hohmann & Barnard, Inc
4) Wire-Bond

2.6 MISCELLANEOUS ANCHORS

A. Unit Type Inserts in Concrete: Cast-iron or malleable-iron wedge-type inserts.

B. Dovetail Slots in Concrete: Furnish dovetail slots with filler strips, of slot size indicated, fabricated from 0.034-inch, galvanized steel sheet.

2.7 EMBEDDED FLASHING MATERIALS

A. Metal Flashing: Provide metal flashing complying with SMACNA's "Architectural Sheet Metal Manual" and as follows:

1. Stainless Steel: ASTM A 240/A 240M, Type 304, 0.016 inch thick.
2. Copper: ASTM B 370, Temper H00, cold-rolled copper sheet, 16-oz./sq. ft. weight or 0.0216 inch thick or ASTM B 370, Temper H01, high-yield copper sheet, 12-oz./sq. ft. weight or 0.0162 inch thick.
3. Fabricate continuous flashings in sections 96 inches long minimum, but not exceeding 12 feet. Provide splice plates at joints of formed, smooth metal flashing.

4. Fabricate through-wall metal flashing embedded in masonry from stainless steel or copper, with ribs at 3-inch intervals along length of flashing to provide an integral mortar bond.

    a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

        1) Cheney Flashing Company;
        2) Keystone Flashing Company, Inc.
        3) Sandell Manufacturing Co., Inc.

5. Fabricate through-wall flashing with snaplock receiver on exterior face where indicated to receive counterflashing.
6. Fabricate through-wall flashing with drip edge unless otherwise indicated. Fabricate by extending flashing 1/2 inch out from wall, with outer edge bent down 30 degrees and hemmed.
7. Fabricate metal drip edges for ribbed metal flashing from plain metal flashing of same metal as ribbed flashing and extending at least 3 inches into wall with hemmed inner edge to receive ribbed flashing and form a hooked seam. Form hem on upper surface of metal so that completed seam will shed water.
8. Metal Drip Edge: Fabricate from stainless steel. Extend at least 3 inches into wall and 1/2 inch out from wall, with outer edge bent down 30 degrees and hemmed.
9. Metal Sealant Stop: Fabricate from stainless steel. Extend at least 3 inches into wall and out to exterior face of wall. At exterior face of wall, bend metal back on itself for 3/4 inch and down into joint 1/4 inch to form a stop for retaining sealant backer rod.
10. Metal Expansion-Joint Strips: Fabricate from stainless steel or copper to shapes indicated.

B. Flexible Flashing: Use one of the following unless otherwise indicated:

1. Copper-Laminated Flashing: 7-oz./sq. ft. copper sheet bonded between 2 layers of glass-fiber cloth. Use only where flashing is fully concealed in masonry.

    a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

        1) Advanced Building Products Inc.; Copper Fabric Flashing.
        2) Dayton Superior Corporation, Dur-O-Wal Division; Copper Fabric Thru-Wall Flashing.
        3) Sandell Manufacturing Co., Inc.; Copper Fabric Flashing.

2. EPDM Flashing: Sheet flashing product made from ethylene-propylene-diene terpolymer, complying with ASTM D 4637, 0.040 inch thick.

    a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

        1) Carlisle Coatings & Waterproofing; Pre-Kleened EPDM Thru-Wall Flashing.
        2) Firestone Specialty Products; FlashGuard.
        3) Sandell Manufacturing Co., Inc.; EPDM Flashing.

C. Application: Unless otherwise indicated, use the following:

1. Where flashing is indicated to receive counterflashing, use metal flashing.
2. Where flashing is indicated to be turned down at or beyond the wall face, use metal flashing.
3. Where flashing is partly exposed and is indicated to terminate at the wall face, use metal flashing with a drip edge or flexible flashing with a metal drip edge.
4. Where flashing is fully concealed, use metal flashing or flexible flashing.

D. Solder and Sealants for Sheet Metal Flashings:

1. Solder for Stainless Steel: ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer.
2. Solder for Copper: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead.
3. Elastomeric Sealant: ASTM C 920, chemically curing urethane sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

E. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.8 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene, urethane or PVC.

B. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

C. Weep/Vent Products: Use one of the following unless otherwise indicated:

1. Wicking Material: Absorbent rope, made from UV-resistant synthetic fiber, 1/4 to 3/8 inch in diameter, in length required to produce 2-inch exposure on exterior and 18 inches in cavity. Use only for weeps.
2. Round Plastic Weep/Vent Tubing: Medium-density polyethylene, 3/8-inch OD by 4 inches long.
3. Rectangular Plastic Weep/Vent Tubing: Clear butyrate, 3/8 by 1-1/2 by 3-1/2 inches long.
4. Cellular Plastic Weep/Vent: One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, full height and width of head joint and depth 1/8 inch less than depth of outer wythe, in color selected from manufacturer's standard.

   a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

      1) Advanced Building Products Inc.; Mortar Maze weep vent.
      2) Blok-Lok Limited; Cell-Vent.
      3) Dayton Superior Corporation, Dur-O-Wal Division; Cell Vents.

4) Heckmann Building Products Inc.; No. 85 Cell Vent.
5) Hohmann & Barnard, Inc.; Quadro-Vent.
6) Wire-Bond; Cell Vent.

5. Mesh Weep/Vent: Free-draining mesh; made from polyethylene strands, full height and width of head joint and depth 1/8 inch less than depth of outer wythe; in color selected from manufacturer's standard.

a. 1375: Subject to compliance with requirements, provide the following, or approved equal:

1) Mortar Net USA, Ltd.; Mortar Net Weep Vents.

D. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.

1. Products: Subject to compliance with requirements, provide one of the following, or approved equal:

a. Advanced Building Products Inc.; Mortar Break II.
b. Dayton Superior Corporation, Dur-O-Wal Division; Polytite MortarStop.
c. Mortar Net USA, Ltd.; Mortar Net.

2. Provide one of the following configurations:

a. Strips, full-depth of cavity and 10 inches high, with dovetail shaped notches 7 inches deep that prevent clogging with mortar droppings.

2.9 MASONRY CLEANERS

A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Diedrich Technologies, Inc.
b. EaCo Chem, Inc.
c. ProSoCo, Inc.

2.10 MORTAR MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.

1. Do not use calcium chloride in mortar.

2. Use portland cement-lime mortar unless otherwise indicated.
3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide Type N unless another type is indicated.

D. Pigmented Mortar: Use colored cement product.

1. Pigments shall not exceed 10 percent of portland cement by weight.
2. Mix to match Architect's sample.
3. Application: Use pigmented mortar for exposed mortar joints with the following units:
   a. Face brick.
   b. Cast stone trim units.

E. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates and natural color or white cement as necessary to produce required mortar color.

1. Mix to match Architect's sample.
2. Application: Use colored aggregate mortar for exposed mortar joints with the following units:
   a. Face brick.
   b. Cast stone trim units.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.

B. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

C. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.

1. Mix units from several pallets or cubes as they are placed.

D. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.

3.3 TOLERANCES

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation do not vary by more than plus 1/2 inch or minus 1/4 inch.
2. For location of elements in plan do not vary from that indicated by more than plus or minus 1/2 inch.
3. For location of elements in elevation do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls do not vary from level by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
5. For lines and surfaces do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch; do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
2. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.
3. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch from one masonry unit to the next.

3.4 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

C. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

D. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

E. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

3.5 MORTAR BEDDING AND JOINTING

A. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

B. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

3.6 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

A. Anchor masonry to structural steel and concrete where masonry abuts or faces structural steel or concrete to comply with the following:

1. Provide an open space not less than 1/2 inch wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.

3.7 ANCHORING MASONRY VENEERS

A. Anchor masonry veneers to wall framing with masonry-veneer anchors to comply with the following requirements:

1. Fasten screw-attached anchors through sheathing to wall framing with metal fasteners of type indicated. Use two fasteners unless anchor design only uses one fastener.

2. Insert slip-in anchors in metal studs as sheathing is installed. Provide one anchor at each stud in each horizontal joint between sheathing boards.
3. Embed tie sections in masonry joints. Provide air space between back of masonry veneer and face of sheathing as shown on the drawings.
4. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
5. Space anchors as indicated, but not more than 18 inches o.c. vertically and 24 inches o.c. horizontally, with not less than 1 anchor for each 2 sq. ft. of wall area. Install additional anchors within 12 inches of openings and at intervals, not exceeding 8 inches, around perimeter.

3.8 EXPANSION JOINTS

A. General: Install expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span expansion joints without provision to allow for in-plane wall or partition movement.

B. Form expansion joints in brick as follows:
1. Build in compressible joint fillers where indicated.
2. Form open joint full depth of brick wythe and of width indicated, but not less than 3/8 inch for installation of sealant and backer rod specified in Section 079200 "Joint Sealants."

C. Provide horizontal, pressure-relieving joints by either leaving an air space or inserting a compressible filler of width required for installing sealant and backer rod specified in Section 079200 "Joint Sealants," but not less than 3/8 inch.

1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry.

3.9 LINTELS

A. Install steel lintels where indicated.

B. Provide minimum bearing of 8 inches at each jamb unless otherwise indicated.

3.10 FLASHING, WEEP HOLES, CAVITY DRAINAGE, AND VENTS

A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated. Install vents at shelf angles, ledges, and other obstructions to upward flow of air in cavities, and where indicated.

B. Install flashing as follows unless otherwise indicated:

1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal

2. At masonry-veneer walls, extend flashing through veneer, across air space behind veneer, and up face of sheathing at least 8 inches; with upper edge tucked under building paper or building wrap, lapping at least 4 inches.
3. At lintels and shelf angles, extend flashing a minimum of 6 inches into masonry at each end. At heads and sills, extend flashing 6 inches at ends and turn up not less than 2 inches to form end dams.
4. Interlock end joints of ribbed sheet metal flashing by overlapping ribs not less than 1-1/2 inches or as recommended by flashing manufacturer, and seal lap with elastomeric sealant complying with requirements in Section 079200 "Joint Sealants" for application indicated.
5. Install metal drip edges and sealant stops with ribbed sheet metal flashing by interlocking hemmed edges to form hooked seam. Seal seam with elastomeric sealant complying with requirements in Section 079200 "Joint Sealants" for application indicated.
6. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall and adhere flexible flashing to top of metal drip edge.

C. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.

D. Install weep holes in head joints in exterior wythes of first course of masonry immediately above embedded flashing and as follows:

1. Use specified weep/vent products to form weep holes.
2. Use wicking material to form weep holes above flashing under brick sills. Turn wicking down at lip of sill to be as inconspicuous as possible.
3. Space weep holes 24 inches o.c. unless otherwise indicated.
4. Space weep holes formed from plastic tubing or wicking material 16 inches o.c.
5. Trim wicking material flush with outside face of wall after mortar has set.

E. Place pea gravel in cavities as soon as practical to a height equal to height of first course above top of flashing, but not less than 2 inches, to maintain drainage.

F. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in "Miscellaneous Masonry Accessories" Article.

G. Install vents in head joints in exterior wythes at spacing indicated. Use specified weep/vent products or open head joints to form vents.

1. Close cavities off vertically and horizontally with blocking in manner indicated. Install through-wall flashing and weep holes above horizontal blocking.

3.11 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform tests and inspections. Retesting of materials that fail to meet specified requirements shall be done at Contractor's expense.

B. Inspections: Level 1 special inspections according to the "International Building Code."

1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.

C. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.

3.12 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
5. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
6. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.
7. Clean stone trim to comply with stone supplier's written instructions.
8. Clean limestone units to comply with recommendations in ILI's "Indiana Limestone Handbook."

3.13 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

END OF SECTION 042113

SECTION 044313.16 - ADHERED STONE MASONRY VENEER

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions of Division 1, State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, and Incidental Construction, Form 816 - 2004 and supplemental specifications thereto, shall be a part of this specification.

B. Work included in this section may require coordination with Amtrak regarding track outages, flagmen, or other issues related to work around railroad facilities. The Contractor shall pay special attention to the specification entitled "SAFETY AND PROTECTION OF RAILROAD TRAFFIC AND PROPERTY" and other Amtrak Specifications contained in the Contract.

SUMMARY

C. Section Includes:

1. Stone masonry veneer adhered to concrete backup.
2. Mortar materials
3. Rainscreen, cavity weep and flashing
4. Expanded metal lath and lath anchorage.

1.2 ACTION SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS:
1. Product Data: For each variety of rainscreen, cavity weep, stone, stone, and mortar mix.
2. Samples for Verification:
   a. For each stone type indicated. Include at least four samples in each set and show the full range of color and other visual characteristics in completed Work.

1.3 INFORMATIONAL SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS:
1. Qualification Data: For Installer.
2. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, supply sources, and other information as required to identify materials used. Include mix proportions for mortar and source of aggregates.

a. Neither receipt of list nor approval of mockups constitutes approval of deviations from the Contract Documents contained in mockups unless Architect approves such deviations in writing.

3. Material Test Reports: For mortar mix and bonding agent

4. Stone Test Reports: For stone variety proposed for use on Project, by a qualified testing agency, indicating compliance with required physical properties, other than abrasion resistance, according to referenced ASTM standards. Base reports on testing done within previous five years.

5. Manufacturer Certification Letter in accordance with NOTICE TO CONTRACTOR – POTENTIAL FOR ASBESTOS CONTAINING MATERIALS.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

B. Installer Qualifications: A qualified installer who employs experienced stonemasons and stone fitters.

C. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for materials and execution.

1. Build mockup of typical wall area as shown on Drawings.
   a. Build mockups in sizes approximately 60 inches long by full height.
   b. Include all backup materials.

2. Protect accepted mockups from the elements with weather-resistant membrane.
3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
5. Rebuild mock-up area as required to produce acceptable work

1.5 DELIVERY, STORAGE, AND HANDLING

A. Refer to Form 816 Article 1.06.03 and Form 816 Article 1.20-1.06.03 for additional information.

B. Store stone on pallets. Pallet shall be shrink-wrapped, banded wood crates.

C. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

D. Deliver preblended, dry mortar mix in moisture-resistant containers designed for use with dispensing silos. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, in a dry location, or in covered weatherproof dispensing silos.

1.6 FIELD CONDITIONS

A. Protection of Stone Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed stone masonry when construction is not in progress.

1. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.

B. Stain Prevention: Immediately remove mortar and soil to prevent them from staining stone masonry face.

1. Protect base of walls from rain-splashed mud and mortar splatter using coverings spread on the ground and over the wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Turn scaffold boards near the wall on edge at end of each day to prevent rain from splashing mortar and dirt on completed stone masonry.

C. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace stone masonry damaged by frost or freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until masonry has dried, but not less than seven days after completing cleaning.

D. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

1.7 COORDINATION

A. Advise installers of other work about specific requirements for placement of flashing and similar items to be built into stone masonry.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Stone: Obtain stone, from single source with resources to provide materials of consistent quality in appearance and physical properties.

B. Source Limitations for Mortar Materials: Obtain mortar ingredients of uniform quality for each cementitious component from single manufacturer and each aggregate from single source or producer.

2.2 NATURAL VENEER STONE

A. Products: Subject to compliance with requirements, available stone varieties that may be incorporated into the Work include, but are not limited to, the following:

   a. New England Fieldstone Boston Blend natural stone thin veneer in 'round' by Stoneyard.com; 2 Spectacle Pond Rd.; Littleton, MA 01460. ASD. Toll Free: 800-231-2200. Phone: 978-742-9800 Fax: 978-428-0450. E-mail: info@stoneyard.com. Web Site: www.Stoneyard.com, (Local distributers in CT).

   b. Approved Equal.

B. New England Fieldstone, Physical Characteristics:
   1. Fieldstone: Collected stone from farms and fields in Massachusetts, Connecticut, Rhode Island, New Hampshire, Vermont, and Maine.
   2. Color and Veining Range: Earth tones of brown, tan, gray, buff, pink, yellow, white, and black.
   3. Density: 153.0 lb/cubic foot.
   4. Bulk Specific Gravity: 2.46.
   5. Water Absorption: 0.54 percent.
   6. Modulus of Rupture Perpendicular: 1,854 psi.
   7. Modulus of Rupture Parallel: 2,692 psi.
   8. Compressive Strength Perpendicular: 19,958 psi.
   9. Compressive Strength Parallel: 17,307 psi.

C. Sizes and Shapes:
   1. Natural Stone Veneer: Broad range of colors including brown, tan, gray, buff, pink, yellow, white and black.
   2. Naturally-Aged and Split Faces: Commonly used as an architectural stone siding for interior and exterior veneer applications.
   3. Adhered Thin Veneer: 1.0 inch thick, plus or minus 0.5 inches. Lightweight, less than 14 lbs per square foot, natural stone, does not require a supporting masonry shelf:
      a. Type: New England Fieldstone Boston Blend Round Thin Veneer.
         1) Naturally weathered faces.
         2) Thickness: 1.0 inch thick, plus or minus 0.5 inches.
         3) Facing Area: 0.25 sf. to 1.25 sf.
         4) Pre-cut corners present full size stone shape in a thin veneer.

2.3 MORTAR MATERIALS

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.

   1. Do not use calcium chloride.
   2. Use masonry cement mortar unless otherwise indicated.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in the form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Mortar for Stone Masonry: Comply with ASTM C 270, Property Specification.

1. Mortar for scratch coat, setting Stone and pointing stone: Type S.

D. Masonry Sand

E. Bonding Agent: Non-reemulsifiable, acrylic, latex cement bonding agent and admixture for exterior applications, used as an admixture to enhance the performance properties of mortar. Comply with ASTM C-1059, TYPE II.
1. Products: Subject to compliance with requirements, available bonding agents that may be incorporated into the Work include, but are not limited to, the following:

a. AcrylCoat by US MIX Co., 112 South Santa Fe Drive, Denver, CO 80223, 800-397-9903, www.usspec.com.
b. Approved Equal

F. Water: Potable.

2.4 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene.

B. Rainscreen Drainage System:
1. Overall Thickness: Approximately 3/8”
2. Sheet Width: Minimum 15-in.-width rolls.
3. Facing Material: 0.024-in.-thick black corrugated high impact polystyrene sheet facing material which shall extend beyond the channelized layer to form a skirt for the bottom of the wall.
4. Channelized Layer: Spun-boned polypropylene fabric with vertical channels to promote drainage, glued to facing layer.
5. Products: Subject to compliance with requirements, available rainscreen products that may be incorporated into the Work include, but are not limited to, the following:
a. “10mm Sure Cavity” by Masonry Technology, Inc. (MTI), 24235 Electric Street, PO Box 214, Cresco, Iowa 52136. Toll Free (800) 879-3348. Phone (563) 547-1122. Fax (563) 547-1133. Website www.mtidry.com
b. Approved Equal.

C. Stone Cavity Weep: Provide a corrugated-type cavity weep for installation between the bottom flashing and the mortar/stone assembly for release to moisture behind the stone veneer.
1. Size: Full rolls in widths adequate to span under the entire rainscreen/mortar/stone assembly.
2. Products: Subject to compliance with requirements, available rainscreen products that may be incorporated into the Work include, but are not limited to, the following:
a. “Cavity Weep” by Masonry Technology, Inc. (MTI), 24235 Electric Street, PO Box 214, Cresco, Iowa 52136. Toll Free (800) 879-3348. Phone (563) 547-1122. Fax (563) 547-1133. Website www.mtidry.com
b. Approved Equal.

D. Expanded Metal Lath: 3.4 lb/sq. yd., self-furring, diamond-mesh lath complying with ASTM C 847. Fabricate from structural-quality, zinc-coated (galvanized) steel sheet complying with ASTM A 653, G60.

E. Metal Flashing: Provide metal flashing complying with SMACNA's "Architectural Sheet Metal Manual" and as follows:

1. Stainless Steel: ASTM A 240, Type 304, 0.016 inch thick.
2. Fabricate continuous flashings in sections 96 inches long minimum, but not exceeding 12 feet. Provide splice plates at joints of formed, smooth metal flashing.
3. Metal Drip Edge: Fabricate from stainless steel. Extend at least 3 inches up wall and 1/2 inch out from wall, with outer edge bent down 30 degrees.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces indicated to receive stone masonry, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of stone masonry.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean dirty or stained stone surfaces by removing soil, stains, and foreign materials before setting. Clean stone by thoroughly scrubbing with fiber brushes and then drenching with clear water. Use only mild cleaning compounds that contain no caustic or harsh materials or abrasives.

3.3 SETTING OF STONE MASONRY, GENERAL

A. Install thin veneer stone and mortar in accordance with manufacturer's instructions and ACI 530.1/ASCE 6/TMS 602.

B. Perform necessary field cutting and trimming as stone is set.
1. Use hammer and chisel to split stone that is fabricated with split surfaces. Make edges straight and true, matching similar surfaces that were shop or quarry fabricated.
2. Pitch face at field-split edges as needed to match stones that are not field split.

C. Sort stone before it is placed in wall to remove stone that does not comply with requirements relating to aesthetic effects, physical properties, or fabrication that is otherwise unsuitable for intended use.

D. Arrange stones in polygonal (mosaic) pattern with uniform joint widths. Maintain masonry courses to uniform dimensions. Form vertical and horizontal joints of uniform thickness.

E. Arrange stones in advance with color and size variations uniformly dispersed for an evenly blended appearance. Take care to avoid concentration of any one color to any one wall surface.

F. Set stone to comply with requirements indicated on Drawings. Install supports, fasteners, and other attachments indicated or necessary to secure stone masonry in place. Set stone accurately in locations indicated with edges and faces aligned according to established relationships and indicated tolerances.

G. Maintain uniform joint widths except for variations due to different stone sizes and where minor variations are required to maintain bond alignment if any. Lay walls with joints not less than 3/8 inch at narrowest points or more than 1 1/2 inches at widest points, maintaining an approximate joint with of ½: as stone allows. Do not use stacked vertical joints. Use only non-corrosive stone shims as required to maintain uniform joint thickness.

H. Provide sealant joints of widths and at locations where expansion is required.

1. Keep sealant joints free of mortar and other rigid materials.
2. Sealing joints is specified in Section 079200 "Joint Sealants."

3.4 INSTALLATION OF ADHERED STONE MASONRY VENEER

A. Follow manufacturer’s instruction for installation of the rainscreen panel and weep cavity. Install the rainscreen fabric panel with the fabric facing the exterior, channels pointed vertically, with the fabric skirt material facing the bottom. Turn the skirt up behind the panel to provide an insect screen. Install the weep cavity above the flashing to permit drainage of moisture from behind the mortar and stone assembly.

B. Install lath over unit masonry and concrete to comply with ASTM C 1063. Fasten lathe at 16” horizontally and 6” vertically on center vertically and horizontally, directly through rainscreen into concrete with stainless steel or galvanized fasteners.

C. Install scratch coat over metal lath 3/8 inch thick to comply with ASTM C 926. Ensure scratch coat is grooved horizontally.

D. Dampen substrate as required to reduce excessive suction.

E. Apply mortar in accordance with PCA Plaster (Stucco) Manual to thickness of 1/2 inch to 3/4 inch. Do not spread more than workable area of 5 to 10 square feet so mortar will not set before stone is applied.

F. Lay back-buttered thin veneer stone in full bed of mortar. Use sufficient setting mortar so a slight excess will be forced out the edges of stone units as they are set. Tap units into place, completely filling space between units and scratch coat. Do not shift or tap veneer stone after mortar has achieved initial set. Where adjustment is required, remove mortar and replace. Work from bottom up, laying corner pieces first. Remove excessive mortar as work progresses. During progress of the work, cover top of unfinished stone masonry work for protection from weather.

G. Isolate top of veneer stone from horizontal structural framing members and slabs or decks with compressible joint filler and sealant as specified in Section 079200 “Joint Sealants”.

H. Control and Expansion Joints: Maintain clear width of expansion joints as indicated in the drawings. Keep joints open and free of debris.

I. Coordinate control joints as specified in Section 07900 for sealant performance.

J. Cutting and Fitting: Cut and fit thin veneer stone for chases, pipes, conduit, sleeves, grounds, and other penetrations and adjacent materials. Coordinate with other work to provide correct size, shape, and location.

K. Joining Work: Where fresh masonry joins partially set masonry. Remove loose stone and mortar. Clean and lightly wet surface of set masonry. To avoid horizontal run of masonry, rake back 1/2 the length of stone in each course. Toothing is not permitted.

L. Flush cut joints to be finished with soft brush only. Re-tempering of mortar is not permitted.

3.5 POINTING

A. Prepare stone-joint surfaces for pointing with mortar by removing dust and mortar particles.

B. Partially fill a grout bag with mortar mix. Squeeze the grout bag to fill joints around each stone.

C. Once the material has become thumbprint hard, use a jointing tool to consolidate, smooth and seal the joints.

1. Joint Profile: Smooth, flat face recessed 1/4 inch below edges of stone (raked joint).

D. Use a stiff brush to reveal the edges of the stone.

3.6 ADJUSTING AND CLEANING AND FINISHING

A. Remove and replace stone masonry of the following description:

1. Broken, chipped, stained, or otherwise damaged stone. Stone may be repaired if methods and results are approved by Engineer.
2. Defective joints.
3. Stone masonry not matching approved samples and mockups.
4. Stone masonry not complying with other requirements indicated.

B. Replace in a manner that results in stone masonry matching approved samples and mockups, complying with other requirements, and showing no evidence of replacement.

C. In-Progress Cleaning: Clean stone masonry as work progresses. Remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean stone masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. When work is completed and mortar has set for 2 to 3 days, clean surface from top to bottom using mild masonry detergent acceptable to natural stone manufacturer.

3. Do not use harsh cleaning materials or methods that could damage stone.
4. Do not use metal brushes or acids for cleaning.
5. Test cleaning methods on mockup; leave one-half of panel un-cleaned for comparison purposes. Obtain Engineer's approval of sample cleaning before cleaning stone masonry.
6. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.
7. Wet wall surfaces with water before applying cleaner; remove cleaner promptly by rinsing thoroughly with clear water.
8. Clean stone masonry by bucket and brush hand-cleaning method described in BIA Technical Note No. 20, Revised II, using job-mixed detergent solution.

E. Install compressible filler and sealant to top of wall and at any other areas requiring expansion.

F. Cut weep cavity material flush with face of finished stone.

END OF SECTION 044313.16

SECTION 047200 - CAST STONE MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions of Division 1, State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, and Incidental Construction, Form 816 - 2004 and supplemental specifications thereto, shall be a part of this specification.

B. Work included in this section may require coordination with Amtrak regarding track outages, flagmen, or other issues related to work around railroad facilities. The Contractor shall pay special attention to the specification entitled “SAFETY AND PROTECTION OF RAILROAD TRAFFIC AND PROPERTY” and other Amtrak Specifications contained in the Contract.

1.2 SUMMARY

A. Section Includes:

1. Cast stone trim.

B. Related Sections:
1. Section 042000 "Unit Masonry" for installing cast stone units in unit masonry.

1.3 ACTION SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Product Data: For each type of product indicated.

1. For cast stone units, include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

C. Shop Drawings: Show fabrication and installation details for cast stone units. Include dimensions, details of reinforcement and anchorages if any, and indication of finished faces.

1. Include building elevations showing layout of units and locations of joints and anchors.

1.4 INFORMATIONAL SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Qualification Data: For manufacturer.

C. Material Test Reports: For each mix required to produce cast stone, based on testing according to ASTM C 1364, including test for resistance to freezing and thawing.

1. Provide test reports based on testing within previous two years.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

B. Manufacturer Qualifications: A qualified manufacturer of cast stone units similar to those indicated for this Project, that has sufficient production capacity to manufacture required units, and is a plant certified by the Architectural Precast Association or the Precast/Prestressed Concrete Institute for Group A, Category AT.

C. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

D. Source Limitations for Cast Stone: Obtain cast stone units through single source from single manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Refer to Form 816 Article 1.06.03 and Form 816 Article 1.20-1.06.03 for additional information.

B. Coordinate delivery of cast stone with unit masonry work to avoid delaying the Work and to minimize the need for on-site storage.

C. Pack, handle, and ship cast stone units in suitable packs or pallets.

1. Lift with wide-belt slings; do not use wire rope or ropes that might cause staining. Move cast stone units, if required, using dollies with wood supports.
2. Store cast stone units on wood skids or pallets with nonstaining, waterproof covers, securely tied. Arrange to distribute weight evenly and to prevent damage to units. Ventilate under covers to prevent condensation.

1.7 PROJECT CONDITIONS

A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Comply with cold-weather construction requirements in ACI 530.1/ASCE 6/TMS 602.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until cast stone has dried, but no fewer than seven days after completing cleaning.

B. Hot-Weather Requirements: Comply with hot-weather construction requirements in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 CAST STONE MATERIALS

A. General: Comply with ASTM C 1364 and the following:

B. Portland Cement: ASTM C 150, Type I or Type III, containing not more than 0.60 percent total alkali when tested according to ASTM C 114. Provide natural color or white cement as required to produce cast stone color indicated.

C. Coarse Aggregates: Granite, quartz, or limestone complying with ASTM C 33; gradation and colors as needed to produce required cast stone textures and colors.

D. Fine Aggregates: Natural sand or crushed stone complying with ASTM C 33, gradation and colors as needed to produce required cast stone textures and colors.

E. Color Pigment: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, nonfading, and resistant to lime and other alkalis.

F. Admixtures: Use only admixtures specified or approved in writing by Architect.

1. Do not use admixtures that contain more than 0.1 percent water-soluble chloride ions by mass of cementitious materials. Do not use admixtures containing calcium chloride.
2. Use only admixtures that are certified by manufacturer to be compatible with cement and other admixtures used.
3. Air-Entraining Admixture: ASTM C 260. Add to mixes for units exposed to the exterior at manufacturer's prescribed rate to result in an air content of 4 to 6 percent, except do not add to zero-slump concrete mixes.
4. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
5. Water-Reducing, Retarding Admixture: ASTM C 494/C 494M, Type D.
6. Water-Reducing, Accelerating Admixture: ASTM C 494/C 494M, Type E.

G. Reinforcement: Deformed steel bars complying with ASTM A 615/A 615M, Grade 60. Use galvanized or epoxy-coated reinforcement when covered with less than 1-1/2 inches of cast stone material.

1. Epoxy Coating: ASTM A 775/A 775M.
2. Galvanized Coating: ASTM A 767/A 767M.

H. Embedded Anchors and Other Inserts: Fabricated from stainless steel complying with ASTM A 240/A 240M, ASTM A 276, or ASTM A 666, Type 304.

2.2 CAST STONE UNITS

A. Provide cast stone units complying with ASTM C 1364 using either the vibrant dry tamp or wet-cast method.

1. Provide units that are resistant to freezing and thawing as determined by laboratory testing according to ASTM C 666/C 666M, Procedure A, as modified by ASTM C 1364.

B. Fabricate units with sharp arris and accurately reproduced details, with indicated texture on all exposed surfaces unless otherwise indicated.

1. Slope exposed horizontal surfaces 1:12 to drain unless otherwise indicated.
2. Provide raised fillets at backs of sills and at ends indicated to be built into jambs.
3. Provide drips on projecting elements unless otherwise indicated.

C. Fabrication Tolerances:

1. Variation in Cross Section: Do not vary from indicated dimensions by more than 1/8 inch.
2. Variation in Length: Do not vary from indicated dimensions by more than 1/360 of the length of unit or 1/8 inch, whichever is greater, but in no case by more than 1/4 inch.
3. Warp, Bow, and Twist: Not to exceed 1/360 of the length of unit or 1/8 inch, whichever is greater.
4. Location of Grooves, False Joints, Holes, Anchorages, and Similar Features: Do not vary from indicated position by more than 1/8 inch on formed surfaces of units and 3/8 inch on unformed surfaces.

D. Cure units as follows:

1. Cure units in enclosed moist curing room at 95 to 100 percent relative humidity and temperature of 100 deg F for 12 hours or 70 deg F for 16 hours.
2. Keep units damp and continue curing to comply with one of the following:

a. No fewer than five days at mean daily temperature of 70 deg F or above.
b. No fewer than six days at mean daily temperature of 60 deg F or above.
c. No fewer than seven days at mean daily temperature of 50 deg F or above.
d. No fewer than eight days at mean daily temperature of 45 deg F or above.

E. Acid etch units after curing to remove cement film from surfaces to be exposed to view.

F. Colors and Textures: As selected by Architect from manufacturer's full range.

2.3 MORTAR MATERIALS

A. Provide mortar materials that comply with Section 042000 "Unit Masonry."

2.4 ACCESSORIES

A. Anchors: Type and size indicated, fabricated from Type 304 stainless steel complying with ASTM A 240/A 240M, ASTM A 276, or ASTM A 666.

B. Dowels: 1/2-inch- diameter, round bars, fabricated from Type 304 stainless steel complying with ASTM A 240/A 240M, ASTM A 276, or ASTM A 666.

2.5 MORTAR MIXES

A. Comply with requirements in Section 042000 "Unit Masonry" for mortar mixes.

2.6 SOURCE QUALITY CONTROL

A. Engage a qualified independent testing agency to sample and test cast stone units according to ASTM C 1364.

1. Include one test for resistance to freezing and thawing.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SETTING CAST STONE IN MORTAR

A. Install cast stone units to comply with requirements in Section 042000 "Unit Masonry."

B. Set cast stone as indicated on Drawings. Set units accurately in locations indicated with edges and faces aligned according to established relationships and indicated tolerances.

1. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure units in place.
2. Coordinate installation of cast stone with installation of flashing specified in other Sections.

3.3 SETTING ANCHORED CAST STONE WITH SEALANT-FILLED JOINTS

A. Set cast stone as indicated on Drawings. Set units accurately in locations indicated with edges and faces aligned according to established relationships and indicated tolerances.

1. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure units in place.
2. Shim and adjust anchors, supports, and accessories to set cast stone in locations indicated with uniform joints.

B. Keep cavities open where unfilled space is indicated between back of cast stone units and backup wall; do not fill cavities with mortar or grout.

C. Fill anchor holes with sealant.

1. Where dowel holes occur at pressure-relieving joints, provide compressible material at ends of dowels.

D. Set cast stone supported on clip or continuous angles on resilient setting shims. Use material of thickness required to maintain uniform joint widths. Hold shims back from face of cast stone a distance at least equal to width of joint.

E. Keep joints free of mortar and other rigid materials. Remove temporary shims and spacers from joints after anchors and supports are secured in place and cast stone units are anchored. Do not begin sealant installation until temporary shims and spacers are removed.

1. Form open joint of width indicated, but not less than 3/8 inch.

F. Prime cast stone surfaces to receive sealant and install compressible backer rod in joints before applying sealant unless otherwise indicated.

G. Prepare and apply sealant of type and at locations indicated to comply with applicable requirements in Section 079200 "Joint Sealants."

3.4 INSTALLATION TOLERANCES

A. Variation from Plumb: Do not exceed 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.

B. Variation from Level: Do not exceed 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.

C. Variation in Joint Width: Do not vary joint thickness more than 1/8 inch in 36 inches or one-fourth of nominal joint width, whichever is less.

D. Variation in Plane between Adjacent Surfaces (Lipping): Do not vary from flush alignment with adjacent units or adjacent surfaces indicated to be flush with units by more than 1/16 inch, except where variation is due to warpage of units within tolerances specified.

3.5 ADJUSTING

A. Remove and replace stained and otherwise damaged units and units not matching approved Samples. Cast stone may be repaired if methods and results are approved by Architect.

B. Replace units in a manner that results in cast stone matching approved Samples, complying with other requirements, and showing no evidence of replacement.

END OF SECTION 047200

SECTION 0503100 – THERMAL SPRAY METALLIZING AND SEALER COATS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions of Division 1, State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, and Incidental Construction, Form 816 - 2004 and supplemental specifications thereto, shall be a part of this specification.

B. Work included in this section may require coordination with Amtrak regarding track outages, flagmen, or other issues related to work around railroad facilities. The Contractor shall pay special attention to the specification entitled "SAFETY AND PROTECTION OF RAILROAD TRAFFIC AND PROPERTY" and other Amtrak Specifications contained in the Contract.

1.2 PURPOSE:

A. This section provides the workmanship requirements for surface preparation, the shop application of a thermal spray (metallizing) coating and a seal coat of urethane. All work shall be done in the shop unless otherwise noted.

B. Unless otherwise directed by CTDOT, the coatings to be applied are as follows:

1. Application: Metalize and seal all exterior exposed bridge overpass structural steel systems – vertical window wall members and floor framing including deck.
2. The feedstock material used for metallizing must be one of the following: aluminum, zinc, 85/15 (Zn/Al) or 90/10 MMC.
3. The sealer coat to be applied over the metallizing is an acrylic urethane coating.

C. The General Contractor is responsible for coordinating the work to assure that the products of only one metallizing supplier and one sealer/paint manufacturer are utilized on the entire structure, including the necessary field touch-up work.

D. The Contractor(s) are required to implement and maintain programs and procedures which comply with the requirements of the specifications and all applicable Federal, state, and local OSHA and EPA standards and regulations. The Contractor is cautioned that it must comply with all applicable regulations even if the regulation is not specifically referenced herein. If a state or local regulation is more restrictive than the requirements of this specification, the more restrictive requirements prevail.

1.3 PRE-METALLIZING MEETING

A. A mandatory pre-metallizing meeting will be held prior to the beginning of any metallizing work. This meeting will be held separately from other general construction meetings for the overall project.

B. The following parties are required to attend this meeting: General Contractor, Metallizing Contractor, Coating Contractor, Thermal Spray Feedstock and Paint Manufacturer, Metallizing Equipment Manufacturer, Project Engineer, Paint Inspector, Test Laboratory, CTDOT Personnel and other parties as deemed appropriate by the Engineer.

1.4 REFERENCE STANDARDS

A. The latest edition of the following standards and regulations form a part of this specification.

1. American Society for Testing and Materials (ASTM)

   a. ASTM D1400, Standard Test Method for Non-Destructive Measurement of Dry Film Thickness of Non-Conductive Coatings Applied to a Non-ferrous Metal Base
   b. ASTM D3359, Standard Test Methods for Measuring Adhesion by Tape Test
   c. ASTM D4138, Standard Test Method for Measurement of Dry Paint Thickness of Protective Coating Systems by Destructive Means
   d. ASTM D4285, Standard Test Method for Indicating Oil or Water in Compressed Air
   e. ASTM D4414, Standard Practice for Measurement of Wet Film Thickness by Notch Gages
   f. ASTM D4417, Standard Test Methods for field Measurement of Surface Profile of Blast Cleaned Steel
   g. ASTM D 4940, Standard Test Method for Conductmetric Analysis of Water-Soluble Ionic Contamination of Blasting Abrasive

2. American Welding Society

   a. ANSI/AWS C2.18-93 Guide for the Protection of Steel with Thermal Sprayed Coatings of Aluminum and Zinc and Their Alloys and Composites.
   b. ANSI/AWS A5.33, “Specification for Solid and Ceramic Wires and Ceramic Rods for Thermal Spraying.”

3. Code of Federal Regulations (CFR)

   a. 29 CFR 1926, Occupational Safety and Health Regulations for the Construction Industry
   b. 29 CFR 1926.104, Safety Belts, Lifelines, and Lanyards
   c. 29 CFR 1926.105, Safety Nets
   d. 29 CFR 1926.451, Scaffolding
   e. Society for Protective Coatings (SSPC)
   f. SSPC-SP 1, Solvent Cleaning
   g. SSPC-SP 2, Hand Tool Cleaning
   h. SSPC-SP 3, Power Tool Cleaning
   i. SSPC-SP 10, Near White Metal Blast Cleaning
   j. SSPC-PA 2, Measurement of Dry Film Thickness with Magnetic Gages
   k. SSPC-VIS 1, Visual Standard for Abrasive Blast Cleaned Steel
   l. SSPC-VIS 3, Visual Standard for Hand and Power Tool Cleaned Steel
   m. SSPC-AB1, Abrasive Specification No. 1
   n. SSPC-AB2, Specification for Cleanliness of Recycled Ferrous Metal Abrasives

o. SSPC-AB4, Newly Manufactured or Re-Manufactured Steel Abrasives
p. SSPC-QP1, Standard Procedure for Evaluating Qualifications of Painting Contractors: Shop Applicators
q. SSPC-CS 23.00, Guide for Thermal Spray Metallic Coating Systems

4. Equipment and Metallizing Material and Coating Manufacturers' Published Instructions

1.5 SUBMITTALS

A. Submit the following plans and programs to CTDOT for review and acceptance a minimum of fifteen (15) days prior to metallizing.

B. Surface Preparation/Metallizing and Sealing/Painting Plan

1. Provide written procedures for the preparation of surfaces and the application of the metallizing and the urethane sealer. Also include a procedure for the repair and touch up of any damage that occurs to the newly applied metallizing or coatings.
2. Provide a written QA/QC plan. Include quality control checkpoints for surface preparation, metalize application, adhesion testing of metallizing application and coating thickness measurements.
3. Identify the metallizing and coating materials to be applied. Include manufacturer's name, product names, and product numbers. Provide Product Data Sheets, VOC levels for liquid coatings, MSD sheets, and written application instructions including mixing requirements, specified thinners, and thinner amounts for liquid coatings.
4. Identify the type and brand name of the abrasive proposed for use.
5. In the event of a conflict between the manufacturer's technical data and this section, this section will govern unless the manufacturer's requirements are more restrictive.
6. Identify the thermal spray equipment to be used to apply the feedstock.

C. Work Schedule - Provide a schedule for surface preparation, metallizing and sealing/painting. CTDOT shall be notified a minimum of one week prior to starting work.

D. CTDOT Review

1. Do not construe CTDOT acceptance of Contractor submittals to imply approval of any particular method or sequence for conducting the work, or for addressing health and safety. Acceptance of the programs does not relieve the Contractor from the responsibility to conduct the work in strict accordance with the requirements of this section, or to adequately protect the health and safety of all workers involved in the project including any members of the public who may be affected by the project.
2. The Contractor remains solely responsible for the adequacy and completeness of the programs and work practices and adherence to them.

1.6 SUPERINTENDENCE BY THE METALLIZING AND PAINTING CONTRACTORS

A. The Metallizing and Painting Contractors are responsible for supervising and directing the coating work efficiently using the best skills and attention, and are solely responsible for the means, methods, techniques, sequences, and procedures of construction.

B. Keep an experienced, competent, resident superintendent acceptable to CTDOT on the project at all times. Do not replace the superintendent except under extraordinary circumstances, and only upon approval of the CTDOT.

C. The superintendent is the Metallizing and Painting Contractors' representative and must have the authority to act on behalf of the Contractor. All communications given to the superintendents are binding upon the Contractor.

1.7 CONTRACTOR/WORKER QUALIFICATIONS

A. The Metallizing Contractor shall be 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 <u>or</u> be certified in the American Institute of Steel Construction (AISC) Sophisticated Paint Endorsement (SPE) category – *enclosed shop* P1 or *covered shop* P2. A list of approved contractors can be found on the AISC website at www.AISC.org. The Metallizing Contractor shall be fully certified, including endorsements, for the duration of the time they are doing surface preparation and coating application.

B. 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 form work 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 and/or blowing dust.

C. All metallizing and coating work shall be performed by a Contractor with at least two years of experience performing metallizing of structural steel. Prior to the pre-metallizing meeting as per 1.02 A., the Contractor shall submit written documentation of at least three successful metallizing projects in the last three years. Information shall include the name of owner of each metallizing project, number and location of each job and year each job was completed. The Contractor shall possess knowledge and experience in all areas of the surface preparation and metallizing work. This documentation will be reviewed and verified by CTDOT prior to beginning work on this project.

D. Each spray operator shall be qualified to metalize according to ANSI/AWS C2.18-93. Any operator who does not show evidence of qualification shall not be allowed to spray.

E. <u>Technical Advisors:</u> It is mandatory that the Contractor obtains the services of qualified technical advisors that represent the coating manufacturer, the thermal spray feedstock manufacturer, and the metallizing application equipment manufacturer. The Contractor shall make all necessary arrangements for technical advisor site visits. The technical advisors shall assist the Engineer and the Contractor in establishing the correct application methods for the metallizing and painting.

1.8 WARRANTY:

A. Refer to Form 816 Article 1.20-1.06.08 and <u>NOTICE TO CONTRACTOR – WARRANTIES</u> for additional information.

1. Warranty Period: Manufacturer's standard, but not less than 5-years from the issuance of the Certificate of Compliance.

PART 2 - PRODUCTS

2.1 ABRASIVES

A. Provide abrasives that are clean, dry, and sized properly to provide the surface profile required by this section.

B. Use abrasives that are acceptable to CTDOT. Abrasives shall be hard and sharp in order to produce an angular surface profile. Acceptable abrasives include, but are not limited to, angular aluminum oxide, angular steel grit and angular crushed slag. Silica sand shall not be used. Steel shot and other abrasives that produce a rounded surface profile shall not be used.

C. Abrasives shall conform to the following:

1. SSPC AB 1 for mineral slag abrasives
2. SSPC AB 2 for recycled ferrous metal abrasives
3. SSPC AB 3 for new steel abrasives

2.2 COATING MATERIALS

A. Thermal Spray Feedstock - Provide the type and quantity of thermal spray feedstock needed to metalize all carbon steel surfaces in the field and then seal those surfaces.

1. The zinc, aluminum, alloy or metal matrix composite (MMC) shall be manufactured for thermal arc spraying and shall have a chemical composition that meets the requirements that meets ANSI/AWS A5.33, "Specification for Solid and Ceramic Wires and Ceramic Rods for Thermal Spraying."
2. The Contractor shall provide a certificate of the chemical composition of the feedstock from the feedstock supplier.

B. Urethane Sealer – Provide the type and quantity of urethane sealer needed to seal all surfaces of the metallizing.

1. The seal coat shall be a urethane applied over all metallizing in accordance with the manufacturer's requirements. The products of Carboline Company and Sherwin Williams Company listed below are examples of the standard of quality to be achieved. Equivalent products of other manufacturers may be submitted to CTDOT for consideration:

a. Carboline: *Carbothane 133 Series, LH*
b. Sherwin Williams: *High Solid Polyurethane B65*
c. Devoe: *Devthane 379UVA*
d. Designer Approved Equal subject to compliance with specifications.

2. Use a single manufacturer to supply all thermal spray feedstock, and a single manufacturer to supply the coating materials and including thinners, additives, and touch-up coatings. Do not co-mix coating products or components produced by different manufacturers under any circumstances.

3. Only use materials that are packaged and sealed, original, labeled containers bearing manufacturer's name, type of material, brand name, shelf life, batch number, and instruc-

4. Colors: As specified in the Contract Drawings.

2.3 CAULKING MATERIALS - When caulking is required, provide 100% solids material that is recommended by the coating manufacturer.

2.4 SURFACE PREPARATION, THERMAL SPRAYING, AND PAINTING EQUIPMENT

A. Provide thermal spray metallizing, and surface preparation and painting equipment in accordance with the requirements of this section.

B. Use equipment and materials that are clean and sized properly to accomplish the work, including the required surface profile and finish as required by this section.

C. The thermal spray equipment shall be gas or electric arc equipment set up, calibrated, and operated in accordance with the manufacturer's written instructions. Proper set up and functioning of equipment shall be verified by performing tests in accordance with Part 3.02 F.3. of this section.

2.5 PERSONAL PROTECTIVE EQUIPMENT

A. Provide all of the necessary personal protective equipment (PPE) for the project to assure that workers are protected from hazards during surface preparation, metallizing, coating application, and clean-up activities.

B. Furnish and have available to the Engineer, two new NIOSH/MESA approved thermal spray air respirators and other safety equipment needed to permit the inspection of ongoing metallizing/coating work.

C. Repair or replace PPE as required to assure that it continues to provide its' intended purpose.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

A. Weld Spatter, Sharp Edges, and Holes

1. Remove slag, flux deposits, and weld spatter and steel irregularities such as fins, tears and slivers. Grind any resulting burrs smooth, including burrs around holes.
2. All corners and edges shall be rounded to a 1/16-inch radius or chamfered to a 1/16-inch chamfer.
3. 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.

B. Pre-Surface Preparation Cleaning of Steel

1. Prior to surface preparation, remove visible grease and oil, etc. from bridge surfaces in accordance with SSPC-SP 1 using only solvents or detergents acceptable to the coating manufacturer and CTDOT. The use of pressurized water for this cleaning is also acceptable.
2. Use clean cloths for the final wiping.

C. Compressed Air Cleanliness

1. Provide compressed air that is free from moisture and oil contamination.
2. Verify the cleanliness of the compressed air by the white blotter test in accordance with ASTM D4285 at least once per shift for each compressor system. Sufficient freedom from oil and moisture is confirmed if soiling or discoloration are not visible on the paper.
3. If air contamination is evident, change filters, clean traps, add moisture separators or filters, or make adjustments as necessary to achieve clean, dry air.

D. Ambient Conditions: Do not conduct final surface preparation which exposes bare steel under damp environmental conditions or when the surface temperature is less than 5° F greater than the dew point temperature of the surrounding air.

E. Abrasives/Profile

1. Use clean, dry, uniformly graded recyclable steel or disposable abrasives for blast cleaning that are free of oil, soluble salts and other similar substances that could contaminate the blast cleaned surface.
2. Provide abrasive that is sized to produce a sharp, angular, uniform surface profile to a minimum height of 3.0 mils, unless the requirements of the metallizing products are otherwise. Measure the profile using the Keane-Tator Surface Profile Comparator or Testex Replica Tape in accordance with ASTM D4417.

F. Pre-Production Test Sections

1. Prior to proceeding with production surface preparation operations, blast clean and metalize at least 9 square feet of steel surface.
2. Use the same metallizing equipment, set up, materials, and calibration and operating procedures in the test section(s) that will be used for the production operations.
3. Spray parameters should be set for spraying the submitted feedstock and at a minimum, be validated by passing a bend test as follows:

    a. Spray five carbon steel coupons with approximate dimensions of 2 x 4 to 8 x 0.050 inches. The surface of the coupons should be prepared to the same degree as specified for the project. Bolt, bracket or otherwise fasten the coupons to larger pieces of stock during the blast cleaning and metallizing operations.
    b. Spray metallizing 8 to 10 mils thick in a right angle cross hatch spray passes laying down approximately 3 to 4 mils per pass.

4. Metalographic analysis of additional coupons may be required by CTDOT to establish the suitability of the surface preparation and the thermal spray coating. Supply, prepare, and thermal spray coat these panels using the same materials, equipment and process parameters for the contract work at no additional cost to CTDOT.

5. Provide safe access for close visual inspection and testing.
6. Do not proceed with production surface preparation activities until CTDOT agrees that the surfaces of the test section has been prepared to conform with the requirements.

3.2 SEALER/PAINT AND METALLIZING MATERIAL STORAGE, MIXING, AND HANDLING

A. Sealer/Paint and Metallizing Material Storage

1. Keep all containers unopened until required for use.
2. Store all sealer/paint, metallizing materials (i.e. feedstock wire), thinners, and solvents in accordance with OSHA regulations and the requirements of the manufacturer. Store the materials under cover, out of direct sunlight. Maintain the temperature between 40°F and 90°F, unless the requirements of the manufacturer are more restrictive.
3. Provide the size and number of fire extinguishers in proper proportion to the quantity of sealer/paint stored.
4. Do not permit smoking in sealer/paint storage, mixing, and application areas.
5. Do not open or mix sealer/paint in the storage area.
6. Do not return mixed sealer/paint to the storage area.
7. Bulk containers for solvents and thinners must be equipped with spring-loaded, self- closing, dispensing nozzles. Use Underwriter's Laboratories approved containers for transporting paint to mixing areas.
8. Use explosion-proof lighting fixtures.
9. Do not permit the accumulation of empty sealer/paint cans, combustibles, and other debris.
10. Maintain MSDS for all materials.

B. Mixing and Thinning of Sealer/Paint Materials

1. Verify that the sealer/paint to be mixed has not exceeded its' shelf life. When required by the manufacturer, warm paints stored at less than 40°F to above 50°F prior to mixing.
2. Utilize proper ventilation in the mixing area to prevent injury to workmen or the accumulation of volatile gases.
3. Mix all sealer/paint coatings in accordance with the requirements of the coating manufacturer.
4. Mix only complete kits of material. Mixing of partial kits is not allowed.
5. Do not use two component materials beyond the pot life established by the manufacturer's written instructions.
6. Thin sealer/paint in strict accordance with the coating manufacturer’s written instructions. Use only those types, brands, and amounts of thinner recommended by the coating manufacturer. Limit the thinning to the minimum amount necessary to facilitate application except for the mist coat of urethane sealer applied over metallizing. Unless directed otherwise by the coating manufacturer, thin the sealer coating approximately 25% and first apply as a mist coat to seal the surface. When the mist coat has penetrated the metallizing, follow with the full coat with proper thinning.

3.3 COATING APPLICATION

A. Quality of Surface Preparation

1. Verify that the surface exhibits the specified SSPC-SP10 degree of cleaning immediately prior to metallizing.

B. Surface Cleanliness - Thoroughly clean the surface of each coat prior to the application of the next to remove overspray, spent abrasive, dirt, dust, and other interference material.

C. Grease/Oil - If grease or oil have become deposited on the bare steel or on the surface of any of the applied coats, remove by solvent cleaning in accordance with SSPC-SP1 prior to the application of the next coat.

D. Ambient Conditions -Apply metallizing and sealer/paint under the following conditions unless the requirements of the coating manufacturer are more restrictive.

1. Relative Humidity - Less than 85%.
2. Frost/Rain - Do not apply coatings to surfaces containing frost or during rain, fog, or similar conditions.
3. Remove and replace any coating that is damaged or marred from exposure to unacceptable conditions (e.g. rain or dew) prior to adequate curing.

E. Metallizing Application

1. The coating shall be applied in a neat and workmanlike manner and shall be applied uniformly and shall be free of ridges or other defects. The coating shall be applied by thermal spray employing multiple passes to achieve a thickness of 0.008 to 0.010 inches (8-10 mils). No single pass shall deposit more than 0.004 inches.
2. A cut test shall be performed at the end of each shift to confirm that metallizing is being properly applied. The cut test consists of a single cut 1.5 inches long through the thermal spray coating to the substrate without severely cutting the substrate. A cut shall be made with a hammer and sharp chisel. The chisel cut should be made at a shallow angle. The bond of the metallizing is considered unsatisfactory if any part of the metallizing lifts from the substrate along the cut.
3. Spraying shall be performed in a block pattern, typically 2 square feet or as per the equipment manufacturer's written recommendation. Overlapping spray passes to ensure uniform coverage, and produce the required thickness and uniformity. A minimum of two passes are required, overlapping and at right angles to each other. The gun shall be held at such a distance from the work surfaces so that the metal is still plastic on impact, typically 5 to 8 inches from the surface. The coating shall be firmly adherent and free from uncoated spots, lumps or blisters, and have a fine sprayed texture.
4. Special care shall be exercised to avoid contamination of surrounding areas or property by over spraying. Containment tarps should be used when spray application is performed.
5. The work area shall be properly ventilated to assure proper worker protection.

F. Metallizing Adhesion: Adhesion strength of the metallizing shall be 700 psi minimum as measured with approved equipment as per ASTM D4541 using apparatus under Annex A4. All adhesion test locations shall be re-metalized in accordance with this specification at no additional cost. Measurements shall be taken every 500 square feet. If adhesion is less than 700 psi but greater than 560 psi, four additional adhesion tests shall be made. If any of the additional adhesion tests are less than 700 psi, the coating shall be removed and re-applied at the Contractor's expense. Any adhesion test result less than 560 psi, will be grounds for the Contractor to re-

G. Sealer/Paint Application

1. Apply all sealer/paint by the methods shown below unless the methods recommended by the sealer/paint manufacturer are more restrictive. Apply the sealer/paint to all previously metalized surfaces. In no cases shall the seal coat be applied over visible oxidation of the metallizing.
2. Apply the sealer/paint in a two-coat operation, a mist coat and a full coat. Thin the mist coat up to the manufacturer's written maximum amount using the recommended thinner in order to penetrate the metallizing layer. Apply the full finish sealer/paint coat without thinning.
3. Airless or conventional spray application - If conventional spray is used, verify that the compressed air supply is clean and dry as determined by the blotter test. When spraying, use extreme care to avoid contamination of surrounding areas or property by overspray.
4. Brush or roller application - Brushes or rollers may be used to control overspray, or for localized application such as touch-up, in areas of limited accessibility for spraying, or for stripe coating.

H. Recoat Times For Liquid Coatings

1. Apply each coat only after the previous coat has been allowed to dry as required by the manufacturer's written instructions, but as soon as possible to minimize the length of time that the coating is exposed to dust and contamination.
2. Do not allow any coat to remain exposed for longer than fourteen (14) calendar days prior to overcoating.

I. Coverage and Continuity

1. Apply each coat to assure thorough wetting of the substrate or underlying coat, and to achieve a smooth, streamline surface relatively free of dryspray, overspray, and orange peel. Shadow-through, pinholes, bubbles, skips, misses, lap marks between applications, or other visible discontinuities in any coat are unacceptable. Runs or sags in liquid coatings may be brushed out while the material remains wet. If the discontinuities remain in the film after drying, remove and replace the defective coating as described later in the "Repair" section of this specification.
2. Thoroughly coat all surfaces with special attention to hard-to-reach areas, and irregular surfaces. Some configurations may require spraying from multiple directions to assure complete coverage.

J. Tint - Tint successive coats (if approved by the manufacturer), or use materials of sufficiently different color to facilitate proper coverage and to provide a visual distinction between coats.

K. Sealer/Paint Adhesion

1. Apply sealer/paint in such a manner to assure that they are well-adherent to each other and to the underlying surface. If the application of any coat causes lifting of an underlying coat, or there is poor adhesion between coats or to the substrate, remove the coating in the affected area to adjacent sound, adherent, coating, and reapply the material.
2. If sealer/paint adhesion is suspect, conduct adhesion tests in accordance with ASTM D3359 or ASTM D4541 as directed by CTDOT and repair all test areas. The acceptance

criteria for the testing will be established by CTDOT and the coating manufacturer. Replace all defective coating that is revealed by the testing.

L. Wet Film Thickness - Use wet film thickness gages in accordance with ASTM D4414 to verify the thickness of each liquid coat at the time of application.

M. Dry Film Thickness

1. Apply each coat to the thicknesses specified below:

Metallizing	8 to 10 mils
Urethane Sealer	2 to 4 mils
TOTAL SYSTEM	10 to 14 mils

2. Measure the thickness of each coat using nondestructive magnetic dry film thickness gages. Comply with SSPC-PA2 for the calibration and use of the gages, and the frequency of thickness measurements. Spot readings both 20% above and 20% below the thicknesses shown above are permitted, provided the average thicknesses are within the specified tolerances.
3. If there are questions regarding the non-destructive measurements of coating thickness, a Tooke Gage (destructive scratch gage) may be used when authorized by CTDOT. Conduct measurements in accordance with ASTM D4138, but limit its' use to a minimum of locations. Mark and repair all damage caused by the destructive testing, whether created by CTDOT or the Contractor.
4. Apply additional coating to areas of insufficient thickness with care to assure that all repairs blend in with the surrounding material.
5. Unless directed otherwise by CTDOT, remove excessive coating thickness and reapply the affected coat(s).

3.4 REPAIR OF FILM DISCONTINUITIES AND DAMAGE TO COATING SYSTEM AFTER ERECTION

A. Surface Preparation of Film Discontinuities or Damage

1. Remove localized film discontinuities (e.g., runs, sags, shadow-through, etc.) or damage and corrosion by solvent cleaning in accordance with SSPC-SP 1 followed by sanding or power tool cleaning.
2. In damaged metalized areas, if the repair operation exposes the substrate, remove all loose material and prepare the steel in accordance with SSPC-SP 5 and achieve a uniform and dense surface profile of 2 to 4 mils.
3. If the substrate is not exposed, remove all loose material and prepare the surface in accordance with SSPC-SP 3.

B. Feathering of Repair Areas

1. Feather the existing material surrounding each repair location. Feather for a distance of 1 to 2 inches to provide a smooth, tapered transition into the existing intact coating.
2. Verify that the edges of coating around the periphery of the prepared areas is tight and intact by probing with a putty knife in accordance with the requirements of SSPC-SP3.

Roughen the existing coating in the feathered area to assure proper adhesion of the repair coats.

C. Coating Application

1. When the bare substrate is exposed in the repaired area, apply the metallizing and urethane sealer/paint.
2. When the repair does not extend to the bare substrate, apply only the seal coats.
3. Maintain the thickness of the system in overlap areas within the specified total thickness tolerances.

3.5 INSPECTION

A. CTDOT may inspect any or all phases of the Work to verify that it is in accordance with the requirements of this section. Facilitate this inspection as required, including allowing ample time for the inspections and access to the work. Inspections may include, but are not limited to, surface preparation, pre-painting cleanliness, paint application, dry film thickness, film appearance and continuity, and adhesion.

B. The presence or activity of CTDOT inspections in no way relieves the Contractor of the responsibility to comply with all requirements of this Section and to provide adequate inspections of its' own.

C. Furnish, until final acceptance of the coating system, all equipment and instrumentation needed to inspect all phases of the work.

3.6 ONE-YEAR ANNIVERSARY INSPECTION

A. A one-year anniversary inspection will be conducted approximately twelve months after the structure has been erected. Provide for all aspects of this inspection (i.e. access, rigging, safety traffic control, etc.) and participate in this inspection with CTDOT. All at no additional cost to CTDOT.

B. Repair, at no cost to CTDOT, all locations where the coating exhibits disbonding, cracking, rusting, or other such defects. Perform all repairs in accordance with this Section and the coating manufacturer's written instructions.

END OF SECTION 050310

SECTION 051200 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions of Division 1, State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, and Incidental Construction, Form 816 - 2004 and supplemental specifications thereto, shall be a part of this specification.

B. Work included in this section may require coordination with Amtrak regarding track outages, flagmen, or other issues related to work around railroad facilities. The Contractor shall pay special attention to the specification entitled “SAFETY AND PROTECTION OF RAILROAD TRAFFIC AND PROPERTY” and other Amtrak Specifications contained in the Contract.

1.2 SUMMARY

A. Section Includes:

1. Structural steel.
2. Grout.

B. Related Sections:
1. Section 051213 "Architecturally Exposed Structural Steel Framing" for additional requirements applicable to AESS. (All canopy framing members are to be considered Architecturally Exposed Structural Steel).
2. Section 055000 "Metal Fabrications" for miscellaneous steel fabrications and other metal items not defined as structural steel.
3. Section 099600 "High-Performance Coatings" for surface preparation and priming requirements.

1.3 DEFINITIONS

A. Structural Steel: Elements of structural-steel frame, as classified by AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

1.4 PERFORMANCE REQUIREMENTS

A. Connections: Provide details of simple shear connections required by the Contract Documents to be selected or completed by structural-steel fabricator to withstand loads indicated and comply with other information and restrictions indicated.

1. Select and complete connections using AISC 360
2. Use LFRD.

B. Moment Connections: Type FR, fully restrained.

C. Construction: Combined system of moment frame and braced frame

1.5 ACTION SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Product Data: For each type of product indicated.

C. Shop Drawings: Show fabrication of structural-steel components.

1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
2. Include embedment drawings.
3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections.
5. For structural-steel connections indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.6 INFORMATIONAL SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Qualification Data: For qualified Installer, fabricator, professional engineer and testing agency.

C. Welding certificates.

D. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

E. Mill test reports for structural steel, including chemical and physical properties.

F. Product Test Reports: For the following:

1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
2. Direct-tension indicators.
3. Tension-control, high-strength bolt-nut-washer assemblies.
4. Shear stud connectors.
5. Shop primers.
6. Nonshrink grout.

G. Source quality-control reports.

1.7 QUALITY ASSURANCE

A. Source Limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

B. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD.

C. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category ACSE.

D. Shop-Painting Applicators: Qualified according to AISC's Sophisticated Paint Endorsement P1, P2, P3 or SSPC-QP 3, "Standard Procedure for Evaluating Qualifications of Shop Painting Applicators."

E. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

F. Comply with applicable provisions of the following specifications and documents:

1. AISC 303.
2. AISC 360.
3. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

G. Preinstallation Conference: Conduct conference at Project site.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Refer to Form 816 Article 1.06.03 and Form 816 Article 1.20-1.06.03 for additional information.

B. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.

1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

C. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.

1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
2. Clean and relubricate bolts and nuts that become dry or rusty before use.
3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

1.9 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

A. W-Shapes: ASTM A 992/A 992M

B. Channels, Angles S-Shapes: ASTM A 36/A 36M.

C. Plate and Bar: ASTM A 36/A 36M.

D. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B, structural tubing.

E. Steel Castings: ASTM A 216/A 216M, Grade WCB with supplementary requirement S11.

F. Steel Forgings: ASTM A 668/A 668M.

G. Welding Electrodes: Comply with AWS requirements.

2.2 BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers; all with plain finish.

1. Direct-Tension Indicators: ASTM F 959, Type 325, compressible-washer type with plain finish.

B. High-Strength Bolts, Nuts, and Washers: ASTM A 490, Type 1, heavy-hex steel structural bolts or tension-control, bolt-nut-washer assemblies with splined ends; ASTM A 563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers with plain finish.

1. Direct-Tension Indicators: ASTM F 959, Type 490, compressible-washer type with plain finish.

C. Zinc-Coated High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade DH heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers.

1. Finish: Hot-dip zinc coating.
2. Direct-Tension Indicators: ASTM F 959, Type 325, compressible-washer type with mechanically deposited zinc coating, baked epoxy-coated finish.

D. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, heavy-hex head assemblies consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.

1. Finish: Plain.

E. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.

F. Unheaded Anchor Rods: ASTM F 1554, Grade 36.

1. Configuration: Straight.
2. Nuts: ASTM A 563 heavy-hex carbon steel.
3. Plate Washers: ASTM A 36/A 36M carbon steel.
4. Washers: ASTM F 436, Type 1, hardened carbon steel.
5. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.

G. Headed Anchor Rods: ASTM F 1554, Grade 36, straight.

1. Nuts: ASTM A 563 heavy-hex carbon steel.
2. Plate Washers: ASTM A 36/A 36M carbon steel.
3. Washers: ASTM F 436, Type 1, hardened carbon steel.
4. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.

H. Threaded Rods: ASTM A 36/A 36M.

1. Nuts: ASTM A 563 heavy-hex carbon steel.
2. Washers: ASTM F 436, Type 1, hardened carbon steel.
3. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.

I. Clevises and Turnbuckles: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1035.

J. Eye Bolts and Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1030.

K. Sleeve Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1018.

L. Structural Slide Bearings: Low-friction assemblies, of configuration indicated, that provide vertical transfer of loads and allow horizontal movement perpendicular to plane of expansion joint while resisting movement within plane of expansion joint.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Amscot Structural Products Corp.
b. Fluorocarbon Company Limited.

c. R.J. Watson Bridge & Structural Engineered Systems.
d. Seismic Energy Products, L.P.

2. Mating Surfaces: PTFE and PTFE.
3. Coefficient of Friction: Not more than 0.05.
4. Design Load: Not less than 5,000 psi.
5. Total Movement Capability: 2 inches.

2.3 PRIMER

A. Primer: Comply with Section 099600 "High-Performance Coatings

B. Galvanizing Repair Paint: MPI#18, MPI#19, or SSPC-Paint 20.

2.4 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.5 SCHEDULE OF FINISHES

A. Schedule of Finishes: The Steel Fabricator shall finish structural steel components as specified below:
1. Exterior Exposed Structural Steel including the following components and systems are to receive a 3-coat finishing system per Section 099600 – "High Performance Coatings". These systems are to receive a shop-applied primer as defined in 09960.
   a. Platform canopy steel systems, all members including columns, beams, purlins, roof framing components and accessories including base plates.
   b. Exterior platform railings and incorporated systems, gates, sign frames, brackets and fasteners. Refer to Specification Section 055213 – "Pipe and Tube Railings" for additional details.
2. The following items are hot-dipped galvanized:
   a. Structural framing members supporting the precast platform planks.
   b. Platform fold-up edge steel system (not including aluminum components). No paint applied over these components.
   c. Surfaces embedded in concrete or mortar.
   d. Any remaining exterior exposed to weather steel labeled in the contract drawings as "galvanized".

2.6 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC 360.

1. Camber structural-steel members where indicated.

2. Fabricate beams with rolling camber up.
3. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.
4. Mark and match-mark materials for field assembly.
5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.

B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.

1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.

C. Bolt Holes: Cut, drill, mechanically thermal cut or punch standard bolt holes perpendicular to metal surfaces.

D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

E. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

F. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel framing members.

1. Cut, drill, or punch holes perpendicular to steel surfaces.
2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.7 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Snug tightened, Pretensioned or Slip critical.

2.8 SHOP PRIMING

A. Shop prime steel surfaces except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
2. Surfaces to be field welded.
3. Surfaces to be high-strength bolted with slip-critical connections.
4. Galvanized surfaces.

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:

1. Surface Preparation for Exterior Exposed Structural Steel: SSPC-SP 10/NACE No. 2 "Near White Blast Cleaning," and to the requirements listed in Section 099600 – “High Performance Coatings”.

2. Surface Preparation for structural framing members supporting the precast platform planks: SSPC-SP 6 "Commercial Blast Cleaning."

C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

2.9 GALVANIZING

A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/A 123M.

1. Fill vent and drain holes that will be exposed in the finished Work unless they will function as weep holes, by plugging with zinc solder and filing off smooth.

2.10 FINISHING

A. Restrictions: Train schedules and site conditions will not allow for field painting of major structural components. All fabricated steel components must be supplied as a finish item, limiting touch-up to connections and minor abrasions due to erection.

2.11 SOURCE QUALITY CONTROL

A. Testing Agency: Owner will engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports.

1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.

B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

C. Bolted Connections: Shop-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

D. Welded Connections: In addition to visual inspection, shop-welded connections will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:

1. Liquid Penetrant Inspection: ASTM E 165.

2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
3. Ultrasonic Inspection: ASTM E 164.
4. Radiographic Inspection: ASTM E 94.

E. In addition to visual inspection, shop-welded shear connectors will be tested and inspected according to requirements in AWS D1.1/D1.1M for stud welding and as follows:

1. Bend tests will be performed if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
2. Tests will be conducted on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1/D1.1M.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify, with steel Erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.

1. Prepare a certified survey of bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.

3.3 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.

B. Base Bearing and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.

1. Set plates for structural members on wedges, shims, or setting nuts as required.
2. Weld plate washers to top of baseplate.
3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.

4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

C. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.
2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.

E. Splice members only where indicated.

F. Do not use thermal cutting during erection unless approved by Structural Engineer of Record.

G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

H. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

3.4 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Snug tightened, Pretensioned or Slip critical as applicable.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.

B. Bolted Connections: Bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

C. Welded Connections: Field welds will be visually inspected according to AWS D1.1/D1.1M.

1. In addition to visual inspection, field welds will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:

a. Liquid Penetrant Inspection: ASTM E 165.

b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
c. Ultrasonic Inspection: ASTM E 164.
d. Radiographic Inspection: ASTM E 94.

D. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

3.6 REPAIRS AND PROTECTION

A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780.

B. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

END OF SECTION 051200

SECTION 051213 - ARCHITECTURALLY EXPOSED STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions of Division 1, State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, and Incidental Construction, Form 816 - 2004 and supplemental specifications thereto, shall be a part of this specification.

B. Work included in this section may require coordination with Amtrak regarding track outages, flagmen, or other issues related to work around railroad facilities. The Contractor shall pay special attention to the specification entitled “SAFETY AND PROTECTION OF RAILROAD TRAFFIC AND PROPERTY” and other Amtrak Specifications contained in the Contract.

1.2 SUMMARY

A. Section includes architecturally exposed structural-steel framing.

1. Requirements in Section 051200 "Structural Steel Framing" also apply to AESS framing.

2. All canopy framing members are to be considered Architecturally Exposed Structural Steel.

B. Related Sections:
1. Section 051200 "Structural Steel Framing" for additional requirements applicable to AESS.
2. Section 055000 "Metal Fabrications" for miscellaneous steel fabrications and other metal items not defined as structural steel.
3. Section 099600 "High-Performance Coatings" for surface preparation and priming requirements.

1.3 DEFINITIONS

A. Architecturally Exposed Structural Steel: Structural steel designated as "architecturally exposed structural steel" or "AESS" in the Contract Documents. All canopy framing members are to be considered Architecturally Exposed Structural Steel.

B. Category 1 AESS: AESS that is within 96 inches vertically and 36 inches horizontally of a walking surface and is visible to a person standing on that walking surface or is designated as "Category 1 architecturally exposed structural steel" or "AESS-1" in the Contract Documents.

1.4 ACTION SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Refer to Section 051200 "Structural Steel Framing" and Section 055000 "Metal Fabrications" for submittal requirements applicable to AESS.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

B. Refer to Section 051200 "Structural Steel Framing" and Section 055000 "Metal Fabrications" for quality assurance requirements applicable to AESS.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Refer to Form 816 Article 1.06.03 and Form 816 Article 1.20-1.06.03 for additional information.

B. Use special care in handling to prevent twisting, warping, nicking, and other damage. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.

1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

1.7 PROJECT CONDITIONS

A. Field Measurements: Where AESS is indicated to fit against other construction, verify actual dimensions by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 Refer to Section 051200 "Structural Steel Framing" and Section 055000 "Metal Fabrications" for product requirements applicable to AESS.

2.2 FABRICATION

A. Shop fabricate and assemble AESS to the maximum extent possible. Locate field joints at concealed locations if possible. Detail assemblies to minimize handling and to expedite erection.

B. In addition to special care used to handle and fabricate AESS, comply with the following:

1. Fabricate with exposed surfaces smooth, square, and free of surface blemishes including pitting, rust, scale, and roughness.
2. Grind sheared, punched, and flame-cut edges of AESS to remove burrs and provide smooth surfaces and edges.
3. Fabricate AESS with exposed surfaces free of mill marks, including rolled trade names and stamped or raised identification.
4. Fabricate AESS with exposed surfaces free of seams to maximum extent possible.
5. Remove blemishes by filling or grinding or by welding and grinding, before cleaning, treating, and shop priming.
6. Fabricate with piece marks fully hidden in the completed structure or made with media that permits full removal after erection.
7. Fabricate AESS to the tolerances specified in AISC 303 for steel that is designated AESS.
8. Seal-weld open ends of hollow structural sections with 3/8-inch closure plates for AESS.

C. Coping, Blocking, and Joint Gaps: Maintain uniform gaps of 1/8 inch with a tolerance of 1/32 inch for AESS.

D. Bolt Holes: Cut, drill, mechanically thermal cut, or punch standard bolt holes perpendicular to metal surfaces.

2.3 SHOP CONNECTIONS

A. Weld Connections: Comply with AWS D1.1 and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work, and comply with the following:

1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding specified tolerances.
2. Use weld sizes, fabrication sequence, and equipment for AESS that limit distortions to allowable tolerances.
3. Provide continuous, sealed welds at angle to gusset-plate connections and similar locations where AESS is exposed to weather.
4. Provide continuous welds of uniform size and profile where AESS is welded.
5. Make butt and groove welds flush to adjacent surfaces within tolerance of plus 1/16 inch, minus 0 inch for AESS. Do not grind unless required for clearances or for fitting other components, or unless directed to correct unacceptable work.
6. Remove backing bars or runoff tabs; back-gouge and grind steel smooth for AESS.
7. At locations where welding on the far side of an exposed connection of AESS occurs, grind distortions and marking of the steel to a smooth profile aligned with adjacent material.
8. Make fillet welds for AESS of uniform size and profile with exposed face smooth and slightly concave. Do not grind unless directed to correct unacceptable work.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify, with steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.

1. Prepare a certified survey of bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.

B. Examine AESS for twists, kinks, warping, gouges, and other imperfections before erecting.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep AESS secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.

1. If possible, locate welded tabs for attaching temporary bracing and safety cabling where they will be concealed from view in the completed Work.

3.3 ERECTION

A. Set AESS accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.

1. Erect AESS to the tolerances specified in AISC 303 for steel that is designated AESS.

3.4 FIELD CONNECTIONS

A. Weld Connections: Comply with requirements in "Weld Connections" Paragraph in "Shop Connections" Article.

1. Remove backing bars or runoff tabs; back-gouge and grind steel smooth for AESS.
2. Remove erection bolts in AESS, fill holes, and grind smooth.
3. Fill weld access holes in AESS and grind smooth.

3.5 FIELD QUALITY CONTROL

A. Engineer will observe AESS in place to determine acceptability relating to aesthetic effect.

3.6 REPAIRS AND PROTECTION

A. Remove welded tabs that were used for attaching temporary bracing and safety cabling and that are exposed to view in the completed Work. Grind steel smooth.

END OF SECTION 051213

SECTION 053100 - STEEL DECKING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions of Division 1, State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, and Incidental Construction, Form 816 - 2004 and supplemental specifications thereto, shall be a part of this specification.

B. Work included in this section may require coordination with Amtrak regarding track outages, flagmen, or other issues related to work around railroad facilities. The Contractor shall pay special attention to the specification entitled “SAFETY AND PROTECTION OF RAILROAD TRAFFIC AND PROPERTY” and other Amtrak Specifications contained in the Contract.

1.2 SUMMARY

A. Section Includes:

1. Composite floor deck.

B. Related Requirements:

1. Section 033000 "Cast-in-Place Concrete" for normal-weight and lightweight structural concrete fill over steel deck.
2. Section 051200 "Structural Steel Framing" for shop- and field-welded shear connectors.
3. Section 055000 "Metal Fabrications" for framing deck openings with miscellaneous steel shapes.
4. Section 099600 "High-Performance Coatings" for repair painting of primed deck and finish painting of deck.

1.3 ACTION SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Product Data: For each type of deck, accessory, and product indicated.

C. Shop Drawings:

1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

1.4 INFORMATIONAL SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Welding certificates.

C. Product Certificates: For each type of steel deck.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Refer to Form 816 Article 1.06.03 and Form 816 Article 1.20-1.06.03 for additional information.

B. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.

C. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."

B. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.2 COMPOSITE FLOOR DECK

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Canam United States; Canam Group Inc.
2. CMC Joist & Deck.
3. Nucor Corp.; Vulcraft Group.
4. Verco Manufacturing Co.
5. Wheeling Corrugating Company; Div. of Wheeling-Pittsburgh Steel Corporation.

B. Composite Floor Deck: Fabricate panels, with integrally embossed or raised pattern ribs and interlocking side laps, to comply with "SDI Specifications and Commentary for Composite Steel Floor Deck," in SDI Publication No. 31, with the minimum section properties indicated, and with the following:
1. Galvanized-Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33, G60 zinc coating.
2. Profile Depth: As indicated.
3. Design Uncoated-Steel Thickness: As indicated.
4. Span Condition: As indicated.

2.3 ACCESSORIES

A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.

B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.

C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.

D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.

E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.

F. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi, of same material and finish as deck, and of thickness and profile recommended by SDI Publication No. 31 for overhang and slab depth.

G. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck unless otherwise indicated.

H. Galvanizing Repair Paint: ASTM A 780.

I. Repair Paint: Apply coatings as specified in Section 099600 "High-Performance Coatings”.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 31, manufacturer's written instructions, and requirements in this Section.

B. Locate deck bundles to prevent overloading of supporting members.

C. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.

D. Place deck panels flat and square and fasten to supporting frame without warp or deflection.

E. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.

F. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.

G. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

H. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

3.3 FLOOR-DECK INSTALLATION

A. Fasten floor-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated and as follows:

1. Weld Diameter: 5/8 inch, nominal.
2. Weld Spacing: Weld edge ribs of panels at each support. Space additional welds an average of 12 inches apart, but not more than 18 inches apart.

B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of half of the span or 36 inches, and as follows:

1. Fasten with a minimum of 1-1/2-inch- long welds.

C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches, with end joints as follows:

1. End Joints: Lapped or butted at Contractor's option.

D. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations unless otherwise indicated.

E. Floor-Deck Closures: Weld steel sheet column closures, cell closures, and Z-closures to deck, according to SDI recommendations, to provide tight-fitting closures at open ends of ribs and sides of deck.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Field welds will be subject to inspection.

C. Remove and replace work that does not comply with specified requirements.

D. Additional inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

3.5 PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Repair Painting: Wire brushing, cleaning, and repair painting of rust spots, welds, and abraded areas of both deck surfaces are included in 099600 "High-Performance Coatings."

C. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

END OF SECTION 053100

SECTION 054000 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions of Division 1, State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, and Incidental Construction, Form 816 - 2004 and supplemental specifications thereto, shall be a part of this specification.

B. Work included in this section may require coordination with Amtrak regarding track outages, flagmen, or other issues related to work around railroad facilities. The Contractor shall pay special attention to the specification entitled “SAFETY AND PROTECTION OF RAILROAD TRAFFIC AND PROPERTY” and other Amtrak Specifications contained in the Contract.

1.2 SUMMARY

A. Section Includes:

1. Load-bearing wall framing for framing behind brick masonry and metal wall panel.
2. Non-load-bearing wall framing for miscellaneous framing inside elevator towers.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for masonry shelf angles and connections.

1.3 ACTION SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Product Data: For each type of cold-formed steel framing product and accessory.

C. Shop Drawings:

1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.

D. Delegated-Design Submittal: For cold-formed steel framing.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Welding certificates.

C. Product Test Reports: For each listed product, for tests performed by a qualified testing agency.

1. Steel sheet.
2. Expansion anchors.
3. Power-actuated anchors.
4. Mechanical fasteners.
5. Vertical deflection clips.
6. Horizontal drift deflection clips
7. Miscellaneous structural clips and accessories.

D. Research Reports: For non-standard cold-formed steel framing, from ICC-ES.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

B. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

C. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Refer to Form 816 Article 1.06.03 and Form 816 Article 1.20-1.06.03 for additional information.

B. Protect cold-formed steel framing from corrosion, moisture staining, deformation, and other damage during delivery, storage, and handling.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. AllSteel & Gypsum Products, Inc.
2. Craco Mfg., Inc.
3. Dietrich Metal Framing; a Worthington Industries Company.
4. Nuconsteel; a Nucor Company.

5. State Building Products, Inc.
6. Steel Construction Systems.
7. Steel Structural Systems.
8. Super Stud Building Products, Inc.
9. United Metal Products, Inc.

2.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design cold-formed steel framing.

B. Structural Performance: Provide cold-formed steel framing capable of withstanding design loads within limits and under conditions indicated.

1. Design Loads: As indicated.
2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:

   a. Exterior Load-Bearing Wall Framing: Horizontal deflection of 1/720 of the wall height.
   b. Interior Load-Bearing Wall Framing: Horizontal deflection of 1/360 of the wall height under a horizontal load of 5 lbf/sq. ft..

3. Design framing systems to provide for movement of framing members located outside the insulated building envelope without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F.
4. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:

   a. Upward and downward movement of 1/2 inch.

5. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.

C. Cold-Formed Steel Framing Design Standards:

1. Floor and Roof Systems: AISI S210.
2. Wall Studs: AISI S211.
3. Headers: AISI S212.
4. Lateral Design: AISI S213.

D. AISI Specifications and Standards: Unless more stringent requirements are indicated, comply with AISI S100 and AISI S200.

E. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.3 COLD-FORMED STEEL FRAMING, GENERAL

A. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:

1. Grade: As required by structural performance.
2. Coating: G90 or equivalent.

2.4 LOAD-BEARING WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0538 inch.
2. Flange Width: 2 inches.

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with straight flanges, and as follows:

1. Minimum Base-Metal Thickness: Matching steel studs.
2. Flange Width: 1-1/4 inches.

C. Steel Box or Back-to-Back Headers: Manufacturer's standard C-shapes used to form header beams, of web depths indicated, unpunched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0538 inch.
2. Flange Width: 2 inches.

D. Steel Single- or Double-L Headers: Manufacturer's standard L-shapes used to form header beams, of web depths indicated, and as follows:

1. Minimum Base-Metal Thickness: 0.0538 inch.
2. Top Flange Width: 2 inches.

2.5 NON-LOAD-BEARING WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0428 inch.
2. Flange Width: 2 inches.

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0428 inch.

2. Flange Width: 1-1/4 inches.

C. Vertical Deflection Clips: Manufacturer's standard head clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. AllSteel & Gypsum Products, Inc.
b. Dietrich Metal Framing; a Worthington Industries company.
c. SCAFCO Corporation.
d. Steel Network, Inc. (The).

D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:

1. Minimum Base-Metal Thickness: 0.0428 inch.
2. Flange Width: 1 inch plus the design gap for one-story structures.

E. Double Deflection Tracks: Manufacturer's double, deep-leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with unstiffened flanges.

1. Outer Track: Of web depth to allow free vertical movement of inner track, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:

a. Minimum Base-Metal Thickness: 0.0428 inch.
b. Flange Width: 1 inch plus the design gap for one-story structures.

2. Inner Track: Of web depth indicated, and as follows:

a. Minimum Base-Metal Thickness: 0.0428 inch 0.0538 inch.
b. Flange Width: equal to sum of outer deflection track flange width plus 1 inch.

F. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure through positive mechanical attachment to stud web and structure.

2.6 SOFFIT FRAMING

A. Exterior Soffit Frame: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0538 inch.
2. Flange Width: 2 inches, minimum.

2.7 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.

B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:

1. Supplementary framing.
2. Bracing, bridging, and solid blocking.
3. Web stiffeners.
4. Anchor clips.
5. End clips.
6. Foundation clips.
7. Gusset plates.
8. Stud kickers and knee braces.
9. Joist hangers and end closures.
10. Hole reinforcing plates.
11. Backer plates.

2.8 ANCHORS, CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.

B. Anchor Bolts: ASTM F 1554, Grade 36, threaded carbon-steel hex-headed bolts and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C.

C. Expansion Anchors: Fabricated from corrosion-resistant materials, with allowable load or strength design capacities calculated according to ICC-ES AC193 and ACI 318 greater than or equal to the design load, as determined by testing per ASTM E 488 conducted by a qualified testing agency.

D. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.

1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.

E. Welding Electrodes: Comply with AWS standards.

2.9 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: SSPC-Paint 20 or MIL-P-21035B.

B. Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents, complying with ASTM C 1107/C 1107M, with fluid consistency and 30-minute working time.

C. Shims: Load bearing, high-density multimonomer plastic, and nonleaching; or of cold-formed steel of same grade and coating as framing members supported by shims.

D. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

2.10 FABRICATION

A. Fabricate cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.

1. Fabricate framing assemblies using jigs or templates.
2. Cut framing members by sawing or shearing; do not torch cut.
3. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.

    a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
    b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by no fewer than three exposed screw threads.

4. Fasten other materials to cold-formed steel framing by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.

B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.

C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:

1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
2. Squareness: Fabricate each cold-formed steel framing assembly to a maximum out-of-square tolerance of 1/8 inch.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Install load bearing shims or grout between the underside of load-bearing wall bottom track and the top of foundation wall or slab at locations with a gap larger than 1/4 inch to ensure a uniform bearing surface on supporting concrete or masonry construction.

3.3 INSTALLATION, GENERAL

A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.

B. Install cold-formed steel framing according to AISI S200 and to manufacturer's written instructions unless more stringent requirements are indicated.

C. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.

1. Cut framing members by sawing or shearing; do not torch cut.
2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.

   a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
   b. Locate mechanical fasteners and install according to Shop Drawings, and complying with requirements for spacing, edge distances, and screw penetration.

D. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.

E. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

F. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.

G. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.

H. Erection Tolerances: Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:

1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.4 LOAD-BEARING WALL INSTALLATION

A. Install continuous top and bottom tracks sized to match studs. Align tracks accurately and securely anchor at corners and ends, and at spacings as follows:

1. Anchor Spacing: 24 inches.

B. Squarely seat studs against top and bottom tracks with gap not exceeding of 1/8 inch between the end of wall framing member and the web of track. Fasten both flanges of studs to top and bottom tracks. Space studs as follows:

1. Stud Spacing: 16 inches.

C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar configurations.

D. Align studs vertically where floor framing interrupts wall-framing continuity. Where studs cannot be aligned, continuously reinforce track to transfer loads.

E. Align floor and roof framing over studs according to AISI S200, Section C1. Where framing cannot be aligned, continuously reinforce track to transfer loads.

F. Anchor studs abutting structural columns or walls, including masonry walls, to supporting structure as indicated.

G. Install headers over wall openings wider than stud spacing. Locate headers above openings as indicated. Fabricate headers of compound shapes indicated or required to transfer load to supporting studs, complete with clip-angle connectors, web stiffeners, or gusset plates.

1. Frame wall openings with not less than a double stud at each jamb of frame as indicated on Shop Drawings. Fasten jamb members together to uniformly distribute loads.
2. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with clip angles or by welding, and space jack studs same as full-height wall studs.

H. Install supplementary framing, blocking, and bracing in stud framing indicated to support fixtures, equipment, services, casework, heavy trim, furnishings, and similar work requiring attachment to framing.

1. If type of supplementary support is not indicated, comply with stud manufacturer's written recommendations and industry standards in each case, considering weight or load resulting from item supported.

I. Install horizontal bridging in stud system, spaced vertically 48 inches. Fasten at each stud intersection.
1. Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

J. Install miscellaneous framing and connections, including supplementary framing, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.5 NON-LOAD-BEARING WALL INSTALLATION

A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.

B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as follows:

1. Stud Spacing: 16 inches.

C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.

D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.

1. Install single deep-leg deflection tracks and anchor to building structure.
2. Install double deep-leg deflection tracks and anchor outer track to building structure.
3. Connect vertical deflection clips to bypassing studs and anchor to building structure.
4. Connect drift clips to cold-formed metal framing and anchor to building structure.

E. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.

1. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 18 inches of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.

   a. Install solid blocking at 96-inch centers.
2. Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.6 FIELD QUALITY CONTROL

A. Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports

B. Field and shop welds will be subject to testing and inspecting.

C. Remove and replace work where test results indicate that it does not comply with specified requirements.

D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.7 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 054000

SECTION 055000 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions of Division 1, State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, and Incidental Construction, Form 816 - 2004 and supplemental specifications thereto, shall be a part of this specification.

B. Work included in this section may require coordination with Amtrak regarding track outages, flagmen, or other issues related to work around railroad facilities. The Contractor shall pay special attention to the specification entitled "SAFETY AND PROTECTION OF RAILROAD TRAFFIC AND PROPERTY" and other Amtrak Specifications contained in the Contract.

1.2 SUMMARY

A. Section Includes:
   1. Steel framing and supports for electrical equipment.
   2. Steel framing and supports for applications where framing and supports are not specified in other Sections.

1.3 PERFORMANCE REQUIREMENTS

A. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

   1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

1.4 ACTION SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Shop Drawings: Show fabrication and installation details for metal fabrications.

   1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.

1.5 INFORMATIONAL SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Qualification Data: For qualified professional engineer.

C. Mill Certificates: Signed by manufacturers of stainless-steel certifying that products furnished comply with requirements.

D. Welding certificates.

1.6 QUALITY ASSURANCE

A. Source Limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

B. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.6, "Structural Welding Code - Stainless Steel."

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication. When shop drawings are submitted based on field measurements those field measurements shall also be submitted for the Engineer’s use.

1.8 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorages and steel weld plates and angles for casting into concrete. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.9 DELIVERY, STORAGE AND HANDLING

A. Refer to Form 816 Article 1.06.03 and Form 816 Article 1.20-1.06.03 for additional information.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.2 FERROUS METALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Stainless-Steel Sheet, Strip, and Plate: ASTM A 240/A 240M or ASTM A 666, Type 316L.

C. Stainless-Steel Bars and Shapes: ASTM A 276, Type 316L.

D. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.

E. Rolled-Stainless-Steel Floor Plate: ASTM A 793.

F. Steel Tubing: ASTM A 500, cold-formed steel tubing.

G. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40) unless otherwise indicated.

2.3 FASTENERS

A. General: Unless otherwise indicated, provide Type 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
   1. Provide stainless-steel fasteners for fastening stainless steel.

B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.

C. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 325, Type 3; with hex nuts, ASTM A 563, Grade C3; and, where indicated, flat washers.

D. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, ASTM F 593; with hex nuts, ASTM F 594; and, where indicated, flat washers; Alloy Group 2.

E. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563; and, where indicated, flat washers.

   1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.

F. Eyebolts: ASTM A 489.

G. Machine Screws: ASME B18.6.3.

H. Lag Screws: ASME B18.2.1.

I. Wood Screws: Flat head, ASME B18.6.1.

J. Plain Washers: Round, ASME B18.22.1.

K. Lock Washers: Helical, spring type, ASME B18.21.1.

L. Anchors, General: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

M. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.

N. Post-Installed Anchors: chemical anchors.
   1. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy Group 2 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.

2.4 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Shop Primers: Provide primers that comply with Section 099600 "High-Performance Coatings."

C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

E. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.5 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

D. Form exposed work with accurate angles and surfaces and straight edges.

E. Weld corners and seams continuously to comply with the following:

   1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   2. Obtain fusion without undercut or overlap.

3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.

G. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

1. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.

2.6 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.

B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
1. Furnish inserts for units installed after concrete is placed.

C. Galvanize miscellaneous framing and supports where indicated.

D. Prime miscellaneous framing and supports with primer specified in Section 099600 "High-Performance Coatings" where indicated.

2.7 MISCELLANEOUS STEEL TRIM

A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.

B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.

1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.

C. Galvanize exterior miscellaneous steel trim where indicated.

D. Prime miscellaneous steel trim with primer specified in Section 099600 "High-Performance Coatings."

2.8 LOOSE BEARING AND LEVELING PLATES

A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.

B. Galvanize plates where indicated.

C. Prime plates with primer specified in Section 099600 "High-Performance Coatings."

2.9 LOOSE STEEL LINTELS

A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Fabricate in single lengths for each opening unless otherwise indicated. Weld adjoining members together to form a single unit where indicated.

B. Size loose lintels to provide bearing length at each side of openings equal to 1/12 of clear span but not less than 8 inches unless otherwise indicated.

C. Galvanize loose steel lintels located in exterior walls.

D. Prime loose steel lintels located in exterior walls with primer specified in Section 099600 "High-Performance Coatings."

2.10 STEEL WELD PLATES AND ANGLES

A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

2.11 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish metal fabrications after assembly.

C. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.12 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.

B. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.

   1. Shop prime with primers specified in Section 099600 "High-Performance Coatings".

C. Preparation for Shop Priming: Prepare surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

C. Field Welding: Comply with the following requirements:

   1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   2. Obtain fusion without undercut or overlap.
   3. Remove welding flux immediately.
   4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

3.3 ADJUSTING AND CLEANING

A. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 099600 "High-Performance Coatings".

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 055000

SECTION 055100 - METAL STAIRS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions of Division 1, State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, and Incidental Construction, Form 816 - 2004 and supplemental specifications thereto, shall be a part of this specification.

B. Work included in this section may require coordination with Amtrak regarding track outages, flagmen, or other issues related to work around railroad facilities. The Contractor shall pay special attention to the specification entitled “SAFETY AND PROTECTION OF RAILROAD TRAFFIC AND PROPERTY” and other Amtrak Specifications contained in the Contract.

1.2 SUMMARY

A. Section Includes:

1. Preassembled steel stairs with abrasive-coating-finished formed-metal treads.
2. Industrial-type stairs with steel grating treads.
3. Abrasive metal nosing.

B. Related Sections:
1. Section 055000 "Metal Fabrications" for metal treads and nosings installed at locations other than in metal stairs.
2. Section 055213 "Pipe and Tube Railings" for pipe and tube railings.
3. Section 099600 “High Performance Coatings” for steel prep and paint coatings on metal stairs.
4. Section 55300 “Metal Gratings” for egress stair gratings.

1.3 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design metal stairs, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Structural Performance of Stairs: Metal stairs shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.

1. Uniform Load: 100 lbf/sq. ft..
2. Concentrated Load: 300 lbf applied on an area of 4 sq. in..
3. Uniform and concentrated loads need not be assumed to act concurrently.
4. Stair Framing: Capable of withstanding stresses resulting from railing loads in addition to loads specified above.
5. Limit deflection of treads, platforms, and framing members to L/360 or 1/4 inch, whichever is less.

C. Structural Performance of Railings: Railings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.

1. Handrails and Top Rails of Guards:

a. Uniform load of 50 lbf/ ft. applied in any direction.
b. Concentrated load of 200 lbf applied in any direction.
c. Uniform and concentrated loads need not be assumed to act concurrently.

2. Infill of Guards:

a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft..
b. Infill load and other loads need not be assumed to act concurrently.

D. Seismic Performance: Metal stairs shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. Component Importance Factor is 1.5.

1.4 ACTION SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Product Data: For metal stairs and the following:
1. Abrasive nosings
2. Metal floor plate treads.

C. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

D. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Qualification Data: For qualified professional engineer.

C. Welding certificates.

D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for stairs.

1. Test railings according ASTM E 894 and ASTM E 935.

1.6 QUALITY ASSURANCE

A. Source Limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

B. Installer Qualifications: Fabricator of products.

C. NAAMM Stair Standard: Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM AMP 510, "Metal Stairs Manual," for class of stair designated, unless more stringent requirements are indicated.
   1. Ornamental Stairs: Architectural class.

D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.7 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorages for metal stairs. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

C. Coordinate locations of hanger rods and struts with other work so that they will not encroach on required stair width and will be within the fire-resistance-rated stair enclosure.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For components exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.2 FERROUS METALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Steel Tubing: ASTM A 500 (cold formed) or ASTM A 513.

C. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.

D. Steel Bars for Grating Treads: ASTM A 36/A 36M or steel strip, ASTM A 1011/A 1011M or ASTM A 1018/A 1018M.

E. Wire Rod for Grating Crossbars: ASTM A 510.

F. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M, unless otherwise indicated.

G. Uncoated, Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, structural steel, Grade 30, unless another grade is required by design loads.

H. Galvanized-Steel Sheet: ASTM A 653/A 653M, G90 coating, structural steel, Grade 33, unless another grade is required by design loads.

2.3 NONFERROUS MATERIALS

A. Aluminum Casings: ASTM B 26/B 26M, Alloy 443.0-F.

2.4 ABRASIVE NOSINGS

A. Cast-Metal Units: Cast aluminum, with an integral abrasive, as-cast finish consisting of aluminum oxide, silicon carbide, or a combination of both. Fabricate units in lengths necessary to accurately fit openings or conditions.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   a. American Safety Tread Co., Inc.
   b. Balco Inc.
   c. Barry Pattern & Foundry Co., Inc.
   d. Granite State Casting Co.
   e. Safe-T-Metal Company, Inc.
   f. Wooster Products Inc.

2. Configuration (embedded units in concrete): Cross-hatched units, 4 inches wide without lip.
3. Configuration (units attached to bar grating): Cross-hatched angle-shaped units, same depth as bar-grating treads and 1 to 1-1/2 inches wide.

B. Provide anchors for embedding units in concrete, either integral or applied to units, as standard with manufacturer.

C. Apply bituminous paint to concealed surfaces of cast-metal units set into concrete.

D. Apply clear lacquer to concealed surfaces of extruded units set into concrete.

2.5 FASTENERS

A. General: Provide zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 12 for exterior use, and Class Fe/Zn 5 where built into exterior walls. Select fasteners for type, grade, and class required.

B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.

C. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563; and, where indicated, flat washers.

1. Provide mechanically deposited or hot-dip, zinc-coated anchor bolts or stainless steel for all stairs.

D. Machine Screws: ASME B18.6.3.

E. Lag Screws: ASME B18.2.1.

F. Plain Washers: Round, ASME B18.22.1.

G. Lock Washers: Helical, spring type, ASME B18.21.1.

H. Post-Installed Anchors: chemical anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

1. Material for all Exterior Locations and Where Stainless Steel is Indicated: Alloy Group 2 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.

2.6 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

C. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

D. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.7 FABRICATION, GENERAL

A. Provide complete stair assemblies, including metal framing, hangers, struts, railings, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.

1. Join components by welding unless otherwise indicated.
2. Use connections that maintain structural value of joined pieces.

B. Preassembled Stairs: Assemble stairs in shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

D. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

E. Form exposed work with accurate angles and surfaces and straight edges.

F. Weld connections to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Weld exposed corners and seams continuously unless otherwise indicated.
5. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 1 welds: no evidence of a welded joint.

G. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts unless otherwise indicated. Locate joints where least conspicuous.

H. Fabricate joints that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

2.8 STEEL-FRAMED STAIRS

A. Stair Framing:

1. Fabricate stringers of steel as indicated in the drawings.

   a. Provide closures for exposed ends of tube stringers.

2. Construct platforms of steel as indicated in the drawings. Headers and miscellaneous framing members as indicated in the drawings.
3. Weld or bolt stringers to headers; weld or bolt framing members to stringers and headers. If using bolts, fabricate and join so bolts are not exposed on finished surfaces.

B. Abrasive-Coating-Finished, Formed-Metal Stairs: Form risers, treads, and platforms to configurations shown from steel sheet of thickness indicated.

1. Steel Sheet: Uncoated hot-rolled steel sheet unless otherwise indicated.
2. Directly weld risers and treads to stringers; locate welds on underside of stairs.
3. Provide platforms of configuration indicated or, if not indicated, the same as treads. Weld platforms to platform framing.
4. Finish tread and platform surfaces with manufacturer's standard epoxy-bonded abrasive finish.

C. Metal Floor Plate Stairs: Form treads and platforms to configurations shown from abrasive-surface floor plate of thickness needed to comply with performance requirements, but not less than ¼ inch.

1. Form treads with integral nosing and back edge stiffener. Form risers from steel sheet not less than thickness indicated in drawings, welded to tread nosings and stiffeners and to platforms.
2. Weld steel supporting brackets to stringers and weld treads to brackets.
3. Fabricate platforms with integral nosings matching treads and weld to platform framing.

D. Metal Bar-Grating Stairs: Form treads and platforms to configurations shown from metal bar grating; fabricate to comply with NAAMM MBG 531, "Metal Bar Grating Manual." Information below is supplemental to tread and platform fabrication requirements indicated in Section 055300 “Metal Gratings”.

1. Riser Plates: Rolled-steel (painted), thickness as indicated on drawings.
2. Fabricate grating treads with cast abrasive nosing and with steel angle or steel plate carrier at each end for stringer connections. Secure treads to stringers with bolts.
3. Fabricate grating platforms with nosing matching that on grating treads. Provide toeplates at open-sided edges of grating platforms. Weld grating to platform framing.

2.9 STAIR RAILINGS

A. Comply with applicable requirements in Section 055213 "Pipe and Tube Railings."
1. Rails may be bent at corners, rail returns, and wall returns, instead of using prefabricated fittings.
2. Connect posts to stair framing by direct welding unless otherwise indicated.

2.10 FINISHES

A. Prep, prime and finish metal stairs per Section 099600 “High Performance Coatings”.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.

C. Install metal stairs by welding stair framing to steel structure or to weld plates cast into concrete unless otherwise indicated.

D. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

E. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

F. Field Welding: Comply with requirements for welding in "Fabrication, General" Article.

3.2 INSTALLING METAL STAIRS WITH GROUTED BASEPLATES

A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of baseplates.

B. Set steel stair baseplates on wedges, shims, or leveling nuts. After stairs have been positioned and aligned, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.

1. Use nonmetallic, nonshrink grout unless otherwise indicated.
2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.3 ADJUSTING AND CLEANING

A. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 099600 "High-Performance Coatings."

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 055100

SECTION 055213 - PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions of Division 1, State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, and Incidental Construction, Form 816 - 2004 and supplemental specifications thereto, shall be a part of this specification.

B. Work included in this section may require coordination with Amtrak regarding track outages, flagmen, or other issues related to work around railroad facilities. The Contractor shall pay special attention to the specification entitled "SAFETY AND PROTECTION OF RAILROAD TRAFFIC AND PROPERTY" and other Amtrak Specifications contained in the Contract.

1.2 SUMMARY

A. Section Includes:

1. Steel railings.
2. Stainless-steel pipe railings.
3. Incorporated systems, gates, sign frames, brackets and fasteners

1.3 PERFORMANCE REQUIREMENTS

A. General: In engineering railings to withstand structural loads indicated, determine allowable design working stresses of railing materials based on the following:

1. Steel: 60 percent of minimum yield strength.
2. Stainless Steel: 60 percent of minimum yield strength.

B. Structural Performance: Railings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Handrails and Top Rails of Guards:

a. Uniform load of 50 lbf/ ft. applied in any direction.
b. Concentrated load of 200 lbf applied in any direction.
c. Uniform and concentrated loads need not be assumed to act concurrently.

2. Infill of Guards:

a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft..
b. Infill load and other loads need not be assumed to act concurrently.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

D. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.4 ACTION SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Product Data: For the following:

1. Manufacturer's product lines of mechanically connected railings.
2. Railing brackets.
3. Grout, anchoring cement, and paint products.

C. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

D. Samples for Verification: For each type of exposed finish required.

1. Sections of each distinctly different linear railing member, including handrails, top rails, posts, and balusters.
2. Fittings and brackets.
3. Assembled Sample of railing system, made from full-size components, including top rail, post, handrail, and infill. Sample need not be full height.

1.5 INFORMATIONAL SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Mill Certificates: Signed by manufacturers of stainless-steel products certifying that products furnished comply with requirements.

C. Welding certificates.

D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, according to ASTM E 894 and ASTM E 935.

1.6 QUALITY ASSURANCE

A. Source Limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

B. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.6, "Structural Welding Code - Stainless Steel."

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

1.8 COORDINATION AND SCHEDULING

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

C. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not satisfy structural performance requirements.

1.9 DELIVERY, STORAGE AND HANDLING

A. Refer to Form 816 Article 1.06.03 and Form 816 Article 1.20-1.06.03 for additional information.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.

2.2 STEEL AND IRON

A. Tubing: ASTM A 500 (cold formed) or ASTM A 513.

B. Pipe: ASTM A 53/A 53M, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.

C. Plates, Shapes, and Bars: ASTM A 36/A 36M.

2.3 STAINLESS STEEL

A. Tubing: ASTM A 554, Grade MT 316L.

B. Pipe: ASTM A 312/A 312M, Grade TP 316L Extra Strong.

C. Castings: ASTM A 743/A 743M, Grade CF 8M or CF 3M.

D. Plate and Sheet: ASTM A 240/A 240M or ASTM A 666, Type 316L.

E. Handrail Brackets: Provide stainless steel post-mount handrail brackets capable of mechanical attachment to posts.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Wagner, R & B, Inc.; a division of the Wagner Companies (Model # MB3302P)
      b. Approved Equal.

2.4 FASTENERS

A. General: Provide the following:
   1. Steel Railings: Plated steel fasteners complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5 for zinc coating.
   2. Stainless-Steel Railings: Type 316 stainless-steel fasteners.

B. Post-Installed Anchors: chemical anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
   1. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy Group 2 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.

2.5 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

   1. For stainless-steel railings, provide type and alloy as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.

B. Shop Primers: Provide primers that comply with Section 099600 "High-Performance Coatings."

C. Intermediate Coats and Topcoats: Provide products that comply with Section 099600 "High-Performance Coatings."

D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

E. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

F. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.

1. Water-Resistant Product: Provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

2.6 FABRICATION

A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.

B. Assemble railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

D. Form work true to line and level with accurate angles and surfaces.

E. Fabricate connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.

G. Connections: Fabricate railings with welded connections unless otherwise indicated.

H. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove flux immediately.
4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.

I. Nonwelded Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.

J. Form changes in direction as follows:

1. As detailed.

K. Bend members in jigs to produce uniform curvature for each configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

L. Close exposed ends of railing members with prefabricated end fittings.

M. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.

N. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.

O. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.

2.7 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

2.8 STEEL AND IRON FINISHES

A. For nongalvanized steel railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves, except galvanize anchors to be embedded in exterior concrete or masonry, unless otherwise noted on drawings.

1. Preparation for Shop Priming: Surface Preparation for Exterior Exposed Structural Steel: Systems include exterior platform railings and incorporated systems, gates, sign frames, brackets and fasteners. Prepare steel to SSPC-SP 10 "Near White Blast Cleaning," and to the requirements listed in Section 099600 – “High Performance Coatings”.

B. Primer Application: Apply shop primer to prepared surfaces of railings unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.

1. Shop prime uncoated railings with primers specified in Section 099600 "High-Performance Coatings”.

C. Shop-Painted Finish: Comply with Section 099600 "High-Performance Coatings."

1. High-Performance Coating: Apply coatings as specified in Section 099600 "High-Performance Coatings”.

2.9 STAINLESS-STEEL FINISHES

A. Remove tool and die marks and stretch lines, or blend into finish.

B. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.

C. Directional Satin Finish: No. 4.

D. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Fit exposed connections together to form tight, hairline joints.

B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.

1. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.

C. Adjust railings before anchoring to ensure matching alignment at abutting joints.

D. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.2 RAILING CONNECTIONS

A. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.

B. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 inches beyond joint on either side, fasten internal sleeve securely to one side, and locate joint within 6 inches of post.

3.3 ANCHORING POSTS

A. Anchor posts to surfaces with flanges connected to posts and to supporting members as follows:
1. For stainless-steel pipe railings, weld flanges to post and bolt to supporting surfaces.

2. For steel pipe railings, weld flanges to post and bolt to supporting surfaces.

3.4 ADJUSTING AND CLEANING

A. Clean stainless steel by washing thoroughly with clean water and soap and rinsing with clean water.

B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 099600 "High-Performance Coatings."

3.5 PROTECTION

A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

END OF SECTION 055213

SECTION 055300 - METAL GRATINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions of Division 1, State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, and Incidental Construction, Form 816 - 2004 and supplemental specifications thereto, shall be a part of this specification.

B. Work included in this section may require coordination with Amtrak regarding track outages, flagmen, or other issues related to work around railroad facilities. The Contractor shall pay special attention to the specification entitled “SAFETY AND PROTECTION OF RAILROAD TRAFFIC AND PROPERTY” and other Amtrak Specifications contained in the Contract.

1.2 SUMMARY

A. Section Includes:

1. Metal bar gratings.
2. Metal frames and supports for gratings.

B. Related Sections:

1. Section 051200 "Structural Steel Framing" for structural-steel framing system components.
2. Section 055100 "Metal Stairs" for grating treads and landings of steel-framed stairs.

1.3 PERFORMANCE REQUIREMENTS

A. Structural Performance: Gratings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.

1. Floors: Uniform load of 125 lbf/sq. ft. or concentrated load of 2000 lbf, whichever produces the greater stress.
2. Limit deflection to L/240 or 1/4 inch, whichever is less.

B. Seismic Performance: Provide gratings capable of withstanding the effects of earthquake motions determined according to ASCE/SEI 7.

1.4 ACTION SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Product Data: For the following:

1. Formed-metal plank gratings.
2. Clips and anchorage devices for gratings.

C. Shop Drawings: Include plans, sections, details, and attachments to other work.

1.5 INFORMATIONAL SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Mill Certificates: Signed by manufacturers of stainless-steel sheet certifying that products furnished comply with requirements.

C. Welding certificates.

1.6 QUALITY ASSURANCE

A. Source Limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

B. Metal Bar Grating Standards: Comply with NAAMM MBG 531, "Metal Bar Grating Manual."

C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

D. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
3. AWS D1.3, "Structural Welding Code - Sheet Steel."
4. AWS D1.6, "Structural Welding Code - Stainless Steel."

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with gratings by field measurements before fabrication.

1.8 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorages for gratings, grating frames, and supports. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete

PART 2 - PRODUCTS

2.1 FERROUS METALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Steel Bars for Bar Gratings: ASTM A 36/A 36M or steel strip, ASTM A 1011/A 1011M or ASTM A 1018/A 1018M.

C. Wire Rod for Bar Grating Crossbars: ASTM A 510.

D. Uncoated Steel Sheet: ASTM A 1011/A 1011M, structural steel, Grade 30.

E. Galvanized-Steel Sheet: ASTM A 653/A 653M, structural quality, Grade 33, with G90 coating.

F. Expanded-Metal Carbon Steel: ASTM F 1267, Class 1.

G. Expanded-Metal Galvanized Steel: ASTM F 1267, Class 2, Grade A.

2.2 FASTENERS

A. General: Unless otherwise indicated, provide Type 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.

1. Provide stainless-steel fasteners for fastening aluminum.
2. Provide stainless steel fasteners for fastening stainless steel.

2.3 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy that is welded.

B. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

C. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.4 FABRICATION

A. Shop Assembly: Fabricate grating sections in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch material cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form from materials of size, thickness, and shapes indicated, but not less than that needed to support indicated loads.

D. Fit exposed connections accurately together to form hairline joints.

E. Welding: Comply with AWS recommendations and the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.

F. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space the anchoring devices to secure gratings, frames, and supports rigidly in place and to support indicated loads.

2.5 METAL BAR GRATINGS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. All American Grating, Inc.
2. Tru-Weld.
3. McNichols Co. – Wheels and Heals (Basis of Design)

B. Welded Steel Grating:

1. Bearing Bar Spacing: 1/2 inch.
2. Bearing Bar Depth: 2 inches
3. Bearing Bar Thickness: 1/4 inch.
4. Crossbar Spacing: 4 inches
5. Traffic Surface: Applied abrasive finish consisting of aluminum-oxide aggregate in an epoxy-resin adhesive.
6. Steel Finish: Hot-dip galvanized with a coating weight of not less than 1.8 oz./sq. ft. of coated surface.

2.6 GRATING FRAMES AND SUPPORTS

A. Frames and Supports for Metal Gratings: Fabricate from metal shapes, plates, and bars of welded construction to sizes, shapes, and profiles indicated and as necessary to receive gratings. Miter and weld connections for perimeter angle frames. Cut, drill, and tap units to receive hardware and similar items.

1. Unless otherwise indicated, fabricate from same basic metal as gratings.
2. Equip units indicated to be cast into concrete or built into masonry with integrally welded anchors. Unless otherwise indicated, space anchors 24 inches o.c. and provide minimum

anchor units in the form of steel straps 1-1/4 inches wide by 1/4 inch thick by 8 inches long.

B. Galvanize all steel frames and supports.

2.7 STEEL FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish gratings, frames, and supports after assembly.

C. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing gratings to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing gratings. Set units accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.

C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete or masonry.

D. Fit exposed connections accurately together to form hairline joints.

E. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.

3.2 INSTALLING METAL BAR GRATINGS

A. General: Install gratings to comply with recommendations of referenced metal bar grating standards that apply to grating types and bar sizes indicated, including installation clearances and standard anchoring details.

3.3 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 requirements for touching up shop-painted surfaces.

1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 055300

SECTION 061063 - EXTERIOR ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions of Division 1, State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, and Incidental Construction, Form 816 - 2004 and supplemental specifications thereto, shall be a part of this specification.

B. Work included in this section may require coordination with Amtrak regarding track outages, flagmen, or other issues related to work around railroad facilities. The Contractor shall pay special attention to the specification entitled “SAFETY AND PROTECTION OF RAILROAD TRAFFIC AND PROPERTY” and other Amtrak Specifications contained in the Contract.

1.2 SUMMARY

A. Section Includes:

1. Fire-Retardant Treaded Wood rafters, fascias and soffits.

2. Fire-Retardant Treaded Wood roof decking.

3. Miscellaneous wood nailers, furring and blocking

4. Platform rub edge.

1.3 DEFINITIONS

A. Boards: Lumber of less than 2 inches nominal in thickness and 2 inches nominal or greater width.

B. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.

C. Timber: Lumber of 5 inches nominal or greater in least dimension.

D. Lumber grading agencies, and the abbreviations used to reference them, include the following:

1. NeLMA: Northeastern Lumber Manufacturers' Association.
2. NLGA: National Lumber Grades Authority.
3. RIS: Redwood Inspection Service.
4. SPIB: The Southern Pine Inspection Bureau.
5. WCLIB: West Coast Lumber Inspection Bureau.
6. WWPA: Western Wood Products Association.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Included data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
2. Indicate datat for fire-retardant treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
3. For fire retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.
4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to project site.
5. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

1.5 INFORMATIONAL SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Material Certificates:
1. For preservative-treated wood products. Indicate type of preservative used and net amount of preservative retained.

C. Certificates of Inspection: Issued by lumber grading agency for exposed wood products not marked with grade stamp.

1.6 QUALITY ASSURANCE

A. Source Limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Refer to Form 816 Article 1.06.03 and Form 816 Article 1.20-1.06.03 for additional information.

B. Store materials under cover and protected from weather and contact with damp or wet surfaces. Stack lumber flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

C. Handle and store plastic lumber to comply with manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 LUMBER, GENERAL

A. Lumber: Comply with DOC PS 20 and with applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by ALSC's Board of Review. Provide lumber graded by an agency certified by ALSC's Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each item with grade stamp of grading agency.
2. For items that are exposed to view in the completed Work, mark grade stamp on end or back of each piece or omit grade stamp and provide certificates of grade compliance issued by grading agency.
3. Provide dressed lumber, S4S, unless otherwise indicated.

2.2 DIMENSION LUMBER AND WOOD RAFTERS

A. Provide Fire-Retardant Treaded dimensional lumber and wood rafters to meet the following.

B. Maximum Moisture Content: 19 percent for 2-inch nominal thickness or less; 19 percent for more than 2-inch nominal thickness.

C. Unexposed Framing, including roof and wall partitions around shelter: Provide framing of the following grade, species, and sizes:

1. Grade: No. 2.
2. Species: Spruce-pine-fir north; NLGA.
3. Sizes; as indicated on plans.

D. Platform Rub Rails: Provide framing of the following grade, species, and sizes:

1. Grade: No. 1.
2. Species: Spruce-pine-fir north; NLGA.
3. Sizes; as indicated on plans.

E. Exposed roof framing, fascia, and other roof components : Provide material hand selected for freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot holes, shake, splits, torn grain, and wane, the following grade, species, and sizes:

1. Grade; Select Structural.
2. Southern pine; SPIB.
3. Sizes; as indicated on plans.

2.3 ROOF DECK BOARDS AND SOFFITS

A. Provide Fire-Retardant Treaded roof deck boards to meet the following.

B. Maximum Moisture Content: 19 percent.

C. Provide boards hand selected for freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot holes, shake, splits, torn grain, and wane.

D. Roof Deck Boards: Tongue and groove V-groove roof deck boards, sized as shown on plans. Provide material hand selected for freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot holes, shake, splits, torn grain, and wane, the following grade, species, and sizes:

1. Grade; B&B.
2. Southern pine; SPIB.
3. Sizes; as indicated on plans.

2.4 PRESERVATIVE TREATMENT

A. Pressure treat boards and dimension lumber with waterborne preservative according to AWPA C2.

B. Pressure treat timber with waterborne preservative according to AWPA C15 requirements for "sawn building poles and posts as structural members."

C. Preservative Chemicals: Acceptable to authorities having jurisdiction.

1. Do not use chemicals containing arsenic or chromium.

D. Use process that includes water-repellent treatment.

E. Use process that does not include water repellents or other substances that might interfere with application of indicated finishes.

F. After treatment, redry dimension lumber to 19 percent maximum moisture content.

G. Mark treated wood with treatment quality mark of an inspection agency approved by ALSC's Board of Review.

1. For items indicated to receive a stained or natural finish, mark each piece on surface that will not be exposed or omit marking and provide certificates of treatment compliance issued by inspection agency.

H. Application: Treat items indicated on Drawings and the following:

1. Platform rub rails.
2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.

2.5 FIRE-RETARDANT-TREATED MATERIALS

A. Fire-Retardant-Treated Materials, General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

1. Use treated materials that comply with requirements of referenced woodworking standard. Do not use materials that are warped, discolored, or otherwise defective.
2. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.
3. Identify fire-retardant-treated materials with appropriate classification marking of qualified testing agency in the form of removable paper label or imprint on surfaces that will be concealed from view after installation.

B. Fire-Retardant-Treated Lumber: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

1. Use treatment that does not promote corrosion of metal fasteners.
2. Treated materials shall comply with requirements specified above for fire-retardant treated lumber after being subjected to accelerated weathering according to ASTM D 2898.
3. Kiln dry lumber after treatment to a maximum moisture content of 19 percent.
4. All wood items are to receive a stained or natural finish. Use organic resin chemical formulation on all wood.
5. Mill lumber after treatment within limits set for wood removal that do not affect listed fire-test-response characteristics, using a woodworking shop certified by testing and inspecting agency.
6. Mill lumber before treatment and implement special procedures during treatment and drying processes that prevent lumber from warping and developing discolorations from drying sticks or other causes, marring, and other defects affecting appearance of treated woodwork.

2.6 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture. Provide nails or screws, in sufficient length, to penetrate not less than 1-1/2 inches into wood substrate.

1. Use stainless steel unless otherwise indicated.
2. For pressure-preservative-treated wood, use stainless-steel fasteners.

B. Wood Screws: ASME B18.6.1.

C. Stainless-Steel Bolts: ASTM F 593, Alloy Group 1 or 2; with ASTM F 594, Alloy Group 1 or 2 hex nuts and, where indicated, flat washers.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of projections and substances detrimental to application.

B. Prime lumber to be painted, including both faces and edges. Cut to required lengths and prime ends. Comply with requirements in Section 099113 "Exterior Painting."

3.3 INSTALLATION, GENERAL

A. Set exterior rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit exterior rough carpentry to other construction; scribe and cope as needed for accurate fit.

B. Framing Standard: Comply with AF&PA's "Details for Conventional Wood Frame Construction" unless otherwise indicated.

C. Install wood rafters with crown up.

D. Fire-Retardant-Treated Wood: Handle, store, and install fire-retardant-treated wood to comply with chemical treatment manufacturer's written instructions, including those for adhesives used to install woodwork.

E. Secure decking to framing in a manner which conceals fasteners.

F. Do not splice structural members between supports unless otherwise indicated.

G. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.

H. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

I. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

1. Use inorganic boron (SBX) for items that are continuously protected from liquid water.
2. Use copper naphthenate for items not continuously protected from liquid water.

J. Securely attach exterior rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
   1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.

K. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.

END OF SECTION 061063

SECTION 071113 - BITUMINOUS DAMPPROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions of Division 1, State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, and Incidental Construction, Form 816 - 2004 and supplemental specifications thereto, shall be a part of this specification.

B. Work included in this section may require coordination with Amtrak regarding track outages, flagmen, or other issues related to work around railroad facilities. The Contractor shall pay special attention to the specification entitled "SAFETY AND PROTECTION OF RAILROAD TRAFFIC AND PROPERTY" and other Amtrak Specifications contained in the Contract.

1.2 SUMMARY

A. Section Includes:

1. Hot-applied asphalt dampproofing.
2. Cold-applied, cut-back-asphalt dampproofing.
3. Cold-applied, emulsified-asphalt dampproofing.

1.3 ACTION SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Product Data: For each type of product.

1.4 INFORMATION SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Manufacturer Certification Letter in accordance with NOTICE TO CONTRACTOR – POTENTIAL FOR ASBESTOS CONTAINING MATERIALS.

1.5 FIELD CONDITIONS

A. Weather Limitations: Proceed with application only when existing and forecasted weather conditions permit dampproofing to be performed according to manufacturers' written instructions.

1.6 QUALITY ASSURANCE

A. Source Limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

1.7 DELIVERY, STORAGE AND HANDLING

A. Refer to Form 816 Article 1.06.03 and Form 816 Article 1.20-1.06.03 for additional information.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Source Limitations: Obtain primary dampproofing materials and primers from single source from single manufacturer. Provide protection course molded-sheet drainage panels and auxiliary materials recommended in writing by manufacturer of primary materials.

B. VOC Content: Products shall comply with VOC content limits of authorities having jurisdiction unless otherwise required.

2.2 HOT-APPLIED ASPHALT DAMPPROOFING

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Owens Corning Roofing and Asphalt, LLC; Trumbull Division.

B. Hot-Applied Asphalt: ASTM D 449, Type II.

2.3 COLD-APPLIED, CUT-BACK-ASPHALT DAMPPROOFING

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. APOC, Inc.; a division of Gardner-Gibson.
2. BASF Construction Chemicals - Building Systems; Sonneborn Brand Products.
3. Brewer Company (The).
4. ChemMasters, Inc.
5. Euclid Chemical Company (The); an RPM company.
6. Henry Company.
7. Karnak Corporation.
8. Koppers Inc.
9. Malarkey Roofing Products.
10. Meadows, W. R., Inc.

B. Trowel Coats: ASTM D 4586, Type I, Class 1, fibered.

C. Brush and Spray Coats: ASTM D 4479, Type I, fibered or nonfibered.

2.4 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. APOC, Inc.; a division of Gardner-Gibson.
2. BASF Construction Chemicals - Building Systems; Sonneborn Brand Products.
3. Brewer Company (The).
4. ChemMasters, Inc.
5. Euclid Chemical Company (The); an RPM company.
6. Gardner-Gibson, Inc.
7. Henry Company.
8. Karnak Corporation.
9. Koppers Inc.
10. Malarkey Roofing Products.
11. Meadows, W. R., Inc.

B. Trowel Coats: ASTM D 1227, Type II, Class 1.

C. Fibered Brush and Spray Coats: ASTM D 1227, Type II, Class 1.

D. Brush and Spray Coats: ASTM D 1227, Type III, Class 1.

2.5 AUXILIARY MATERIALS

A. General: Furnish auxiliary materials recommended in writing by dampproofing manufacturer for intended use and compatible with bituminous dampproofing.

B. Cut-Back-Asphalt Primer: ASTM D 41.

C. Emulsified-Asphalt Primer: ASTM D 1227, Type III, Class 1, except diluted with water as recommended in writing by manufacturer.

D. Asphalt-Coated Glass Fabric: ASTM D 1668, Type I.

E. Patching Compound: Epoxy or latex-modified repair mortar of type recommended in writing by dampproofing manufacturer.

F. Protection Course: ASTM D 6506, 1/8-inch- thick, semirigid sheets of fiberglass or mineral-reinforced-asphaltic core, pressure laminated between two asphalt-saturated fibrous liners.

G. Protection Course: Extruded-polystyrene board insulation, unfaced, ASTM C 578, Type X, 1/2 inch thick.

2.6 MOLDED-SHEET DRAINAGE PANELS

A. Molded-Sheet Drainage Panel: Comply with Section 334600 "Subdrainage."

B. Nonwoven-Geotextile-Faced, Molded-Sheet Drainage Panel: Composite subsurface drainage panel consisting of a studded, nonbiodegradable, molded-plastic-sheet drainage core; with a nonwoven, needle-punched geotextile facing with an apparent opening size not exceeding No. 70 sieve laminated to one side of the core; and with a vertical flow rate of 9 to 15 gpm per ft..

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. American Hydrotech, Inc.
b. Carlisle Coatings & Waterproofing Inc.
c. Grace, W. R., & Co. - Conn.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions with Applicator present, for compliance with requirements for surface smoothness, surface moisture, and other conditions affecting performance of bituminous dampproofing work.

1. Test for surface moisture according to ASTM D 4263.

B. Proceed with application only after substrate construction and penetrating work have been completed and unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Mask or otherwise protect adjoining exposed surfaces from being stained, spotted, or coated with dampproofing. Prevent dampproofing materials from entering and clogging weep holes and drains.

B. Clean substrates of projections and substances detrimental to the dampproofing work; fill voids, seal joints, and remove bond breakers if any, as recommended in writing by prime material manufacturer.

C. Apply patching compound to patch and fill tie holes, honeycombs, reveals, and other imperfections; cover with asphalt-coated glass fabric.

3.3 APPLICATION, GENERAL

A. Comply with manufacturer's written instructions for dampproofing application, cure time between coats, and drying time before backfilling unless more stringent requirements are indicated.

1. Apply dampproofing to provide continuous plane of protection.
2. Apply additional coats if recommended in writing by manufacturer or to achieve a smooth surface and uninterrupted coverage.

B. Where dampproofing footings and foundation walls, apply from finished-grade line to top of footing; extend over top of footing and down a minimum of 6 inches over outside face of footing.

1. Extend dampproofing 12 inches onto intersecting walls and footings, but do not extend onto surfaces exposed to view when Project is completed.
2. Install flashings and corner protection stripping at internal and external corners, changes in plane, construction joints, cracks, and where shown as "reinforced," by embedding an 8-inch- wide strip of asphalt-coated glass fabric in a heavy coat of dampproofing. Dampproofing coat for embedding fabric is in addition to other coats required.

C. Where dampproofing exterior face of inner wythe of exterior masonry cavity walls, lap dampproofing at least 1/4 inch onto flashing, masonry reinforcement, veneer ties, and other items that penetrate inner wythe.

3.4 HOT-APPLIED ASPHALT DAMPPROOFING

A. Do not apply hot asphalt when substrate condition causes foaming.

B. Kettle Temperature: Comply with dampproofing-material manufacturer's written instructions, and keep at least 25 deg F below the flash point.

C. Prime masonry and other porous substrates.

D. Apply a uniform coat of hot asphalt by mopping or spraying at not less than 20 lb or 2.5 gal./100 sq. ft..

1. Apply a second coat to below-grade foundation walls and where first application has failed to produce a smooth surface and uninterrupted coverage. Apply second coat at the rate specified for first coat.

3.5 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

A. Concrete Foundations: Apply two brush or spray coats at not less than 1.5 gal./100 sq. ft. for first coat and 1 gal./100 sq. ft. for second coat.

B. Interior Face of Exterior Concrete Walls: Where above grade and indicated to be furred and finished, apply one brush or spray coat at not less than 1 gal./100 sq. ft..

3.6 INSTALLATION OF PROTECTION COURSE

A. Where indicated, install protection course over completed-and-cured dampproofing. Comply with dampproofing-material and protection-course manufacturers' written instructions for attaching protection course.
1. Install protection course on same day of installation of dampproofing (while coating is tacky) to ensure adhesion.

3.7 INSTALLATION OF MOLDED-SHEET DRAINAGE PANELS

A. Place and secure molded-sheet drainage panels, with geotextile facing away from wall substrate, according to manufacturer's written instructions. Use adhesives or other methods that do not penetrate dampproofing. Lap edges and ends of geotextile to maintain continuity. Protect installed molded-sheet drainage panels during subsequent construction.

1. Install protection course before installing drainage panels.

3.8 CLEANING

A. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended in writing by manufacturer of affected construction.

END OF SECTION 071113

SECTION 074113.16 - STANDING-SEAM METAL ROOF PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions of Division 1, State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, and Incidental Construction, Form 816 - 2004 and supplemental specifications thereto, shall be a part of this specification.

B. Work included in this section may require coordination with Amtrak regarding track outages, flagmen, or other issues related to work around railroad facilities. The Contractor shall pay special attention to the specification entitled “SAFETY AND PROTECTION OF RAILROAD TRAFFIC AND PROPERTY” and other Amtrak Specifications contained in the Contract.

1.2 SUMMARY

A. Section includes:
1. Standing-seam metal roof panels and accessories for attachment
2. Flashing and Trim
3. Self-Adhering, High-Temperature Underlayment

B. Related Sections:
1. Section 077253 "Snow Guards" for prefabricated devices designed to hold snow on the roof surface, allowing it to melt and drain off slowly.
2. Section 077100 “Roof Specialties” for roof edge drainage systems (gutters and downspouts).

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site**.**

1. Meet with Engineer, Designer, Amtrak, metal panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects metal panels, including installers of roof accessories.
2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
3. Review methods and procedures related to metal panel installation, including manufacturer's written instructions.
4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
5. Review flashings, special details, drainage, penetrations, equipment curbs, and condition of other construction that affect metal panels.
6. Review temporary protection requirements for metal panel systems during and after installation.

7. Review procedures for repair of metal panels damaged after installation.
8. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.4 ACTION SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.

C. Shop Drawings:

1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
2. Accessories: Include details of the flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches per 12 inches.

D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.

1. Metal Panels: 12 inches long by actual panel width. Include clips, fasteners, closures, and other metal panel accessories.

1.5 INFORMATIONAL SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Qualification Data: For Installer.

C. Product Test Reports: For each product for tests performed by a qualified testing agency.

D. Field quality-control reports.

E. Sample Warranties: For special warranties.

F. Manufacturer Certification Letter in accordance with NOTICE TO CONTRACTOR – POTENTIAL FOR ASBESTOS CONTAINING MATERIALS.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For metal panels to include in maintenance manuals. Refer to NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information.

1.7 QUALITY ASSURANCE

A. Source Limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

B. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

C. UL-Certified, Portable Roll-Forming Equipment: UL-certified, portable roll-forming equipment capable of producing metal panels warranted by manufacturer to be the same as factory-formed products. Maintain UL certification of portable roll-forming equipment for duration of work.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Refer to Form 816 Article 1.06.03 and Form 816 Article 1.20-1.06.03 for additional information.

B. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.

C. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.

D. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.

E. Retain strippable protective covering on metal panels during installation.

1.9 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.10 COORDINATION

A. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.

B. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.11 WARRANTY

A. Refer to Form 816 Article 1.20-1.06.08 and NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information.

B. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including rupturing, cracking, or puncturing.
b. Deterioration of metals and other materials beyond normal weathering.

2. Warranty Period: Two years from date of Substantial Completion.

C. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

D. Special Weathertightness Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that fail to remain weathertight, including leaks, within specified warranty period.

1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. FM Approvals' Listing: Manufacture and install roof-edge flashings that are listed in FM Approvals' "RoofNav" and approved for windstorm classification, Class 1-120. Identify materials with FM Approvals' markings.

B. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E 1592:

1. Wind Loads: As indicated on Drawings.
2. Other Design Loads: As indicated on Drawings.
3. Deflection Limits: For wind loads, no greater than 1/240 of the span.

4. Section Deleted

5. Section Deleted

C. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated.

1. Uplift Rating: UL 90.

D. FM Global Listing: Provide metal roof panels and component materials that comply with requirements in FM Global 4471 as part of a panel roofing system and that are listed in FM Global's "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Global markings.

1. Fire/Windstorm Classification: Class 1A- 120.
2. Hail Resistance: SH.

E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

2.2 STANDING-SEAM METAL ROOF PANELS

A. General: Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.
1. Aluminum Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E 1637.

B. Vertical-Rib, Snap-Joint, Standing-Seam Metal Roof Panels: Formed with vertical ribs at panel edges and a flat pan between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels, engaging opposite edge of adjacent panels, and snapping panels together.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. CENTRIA Architectural Systems.
   b. Garland Company, Inc. (The)
   c. IMETCO.

2. Aluminum Sheet: Coil-coated sheet, ASTM B 209, alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.

   a. Thickness: 0.040 inch.
   b. Surface: Smooth, flat finish.
   c. Exterior Finish: Three-coat fluoropolymer.
   d. Color: Custom Color as specified in the Finish Scheule.

3. Clips: One-piece fixed to accommodate thermal movement.
   a. Material: 0.062-inch- thick, stainless-steel sheet.

4. Panel Coverage: 16 inches.
5. Panel Height: As indicated on the drawings.

2.3 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Underlayment: Provide self-adhering, cold-applied, sheet underlayment, a minimum of 30 mils thick, consisting of slip-resistant, polyethylene-film top surface laminated to a layer of butyl or SBS-modified asphalt adhesive, with release-paper backing. Provide primer when recommended by underlayment manufacturer.

1. Thermal Stability: Stable after testing at 240 deg F; ASTM D 1970.
2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F; ASTM D 1970.
3. Products: Subject to compliance with requirements, provide one of the following:

   a. Carlisle Residential, a division of Carlisle Construction Materials; WIP 300HT.
   b. Grace Construction Products, a unit of W. R. Grace & Co.; Grace Ice and Water Shield HT Ultra.
   c. Owens Corning; WeatherLock Metal High Temperature Underlayment.

B. Slip Sheet: Manufacturer's recommended slip sheet, of type required for application.

2.4 MISCELLANEOUS MATERIALS

A. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.

1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal panels.
2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

B. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.

C. Panel Fasteners: Self-tapping screws designed to withstand design loads.

D. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.

1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
2. Joint Sealant: ASTM C 920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.
3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

2.5 FABRICATION

A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. On-Site Fabrication: Subject to compliance with requirements of this Section, metal panels may be fabricated on-site using UL-certified, portable roll-forming equipment if panels are of same profile and warranted by manufacturer to be equal to factory-formed panels. Fabricate according to equipment manufacturer's written instructions and to comply with details shown.

C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

D. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
4. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.

    a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal panel manufacturer for application, but not less than thickness of metal being secured.

2.6 FINISHES

A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are unacceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Aluminum Panels and Accessories:
   1. Three-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.
   1. Examine solid roof sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal roof panel manufacturer.

      a. Verify that air- or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.

3.3 UNDERLAYMENT INSTALLATION

A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply at locations indicated below, wrinkle free, in shingle fashion to shed water, and with end laps of not less

1. Apply over the entire roof surface.

B. Flashings: Install flashings to cover underlayment to comply with requirements specified in Section 076200 "Sheet Metal Flashing and Trim."

3.4 METAL PANEL INSTALLATION

A. General: Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Shim or otherwise plumb substrates receiving metal panels.
2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
3. Install screw fasteners in predrilled holes.
4. Locate and space fastenings in uniform vertical and horizontal alignment.
5. Install flashing and trim as metal panel work proceeds.
6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
7. Align bottoms of metal panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.

B. Fasteners:
1. Aluminum Panels: Use aluminum or stainless-steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.

C. Anchor Clips: Anchor metal roof panels and other components of the Work securely in place, using manufacturer's approved fasteners according to manufacturers' written instructions.

D. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.

E. Standing-Seam Metal Roof Panel Installation: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended in writing by manufacturer.

1. Install clips to supports with self-tapping fasteners.
2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
3. Snap Joint: Nest standing seams and fasten together by interlocking and completely engaging factory-applied sealant.
4. Watertight Installation:

a. Apply a continuous ribbon of sealant or tape to seal joints of metal panels, using sealant or tape as recommend in writing by manufacturer as needed to make panels watertight.
b. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
c. At panel splices, nest panels with minimum 6-inch end lap, sealed with sealant and fastened together by interlocking clamping plates.

F. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal roof panel manufacturers; or, if not indicated, types recommended by metal roof panel manufacturer.

G. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

1. Install exposed flashing and trim that is without buckling and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and achieve waterproof and weather-resistant performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

H. Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to metal roof panels as recommended by manufacturer.

3.5 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect metal roof panel installation, including accessories. Report results in writing.

B. Remove and replace applications of metal roof panels where tests and inspections indicate that they do not comply with specified requirements.

C. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.

D. Prepare test and inspection reports.

3.6 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

B. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 074113.16

SECTION 074243 - COMPOSITE WALL PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions of Division 1, State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, and Incidental Construction, Form 816 - 2004 and supplemental specifications thereto, shall be a part of this specification.

B. Work included in this section may require coordination with Amtrak regarding track outages, flagmen, or other issues related to work around railroad facilities. The Contractor shall pay special attention to the specification entitled “SAFETY AND PROTECTION OF RAILROAD TRAFFIC AND PROPERTY” and other Amtrak Specifications contained in the Contract.

1.2 SUMMARY

A. Section includes metal-faced composite wall panels.

B. Related Sections:

1. Section 054000 "Cold-Formed Metal Framing" for cold-formed metal framing supporting metal-faced composite wall panels.
2. Section 076200 "Sheet Metal Flashing and Trim" for field-formed flashings and other sheet metal work not part of metal-faced composite wall panel assemblies.

1.3 DEFINITION

A. Metal-Faced Composite Wall Panel Assembly: Metal-faced composite wall panels, attachment system components, miscellaneous metal framing, and accessories necessary for a complete weathertight wall system.

1.4 PERFORMANCE REQUIREMENTS

A. General Performance: Metal-faced composite wall panel assemblies shall comply with performance requirements without failure due to defective manufacture, fabrication, installation, or other defects in construction.

B. Delegated Design: Design metal-faced composite wall panel assembly, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

C. Air Infiltration: Air leakage through assembly of not more than 0.06 cfm/sq. ft. of wall area when tested according to ASTM E 283 at the following test-pressure difference:

1. Test-Pressure Difference: 1.57 lbf/sq. ft..

D. Water Penetration Under Static Pressure: No water penetration when tested according to ASTM E 331 at the following test-pressure difference:

1. Test-Pressure Difference: 6.24 lbf/sq. ft..

E. Structural Performance: Provide metal-faced composite wall panel assemblies capable of withstanding the effects of the following loads and stresses within limits and under conditions indicated, based on testing according to ASTM E 330:

1. Wind Loads: Determine loads based on the following minimum design wind pressures:

a. Uniform pressure of 20 lbf/sq. ft., acting inward or outward.
b. Uniform pressure as indicated on Drawings.

2. Deflection Limits: Metal-faced composite wall panel assemblies shall withstand wind loads with horizontal deflections no greater than 1/175 of the span at the perimeter and 1/60 of the span anywhere in the panel.

F. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.5 ACTION SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of metal-faced composite wall panel and accessory.

C. Shop Drawings: Show fabrication and installation layouts of metal-faced composite wall panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details. Distinguish among factory-, shop-, and field-assembled work.

1. Accessories: Include details of the following items, at a scale of not less than 1-1/2 inches per 12 inches:

a. Flashing and trim.
b. Anchorage systems.

D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:

1. Metal-Faced Composite Wall Panels: Minimum 12 x 12 inches. Include fasteners, closures, and other metal-faced composite wall panel accessories.

    a. Composite Panels: Include four-way joint.

2. Trim and Closures: 12 inches long. Include fasteners and other exposed accessories.
3. Accessories: 12-inch- long Samples for each type of accessory.
4. Exposed Gaskets: 12 inches long.
5. Exposed Sealants: For each type and color of joint sealant required. Install joint sealants in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of metal-faced composite wall panels adjacent to joint sealants.

E. Delegated-Design Submittal: For metal-faced composite wall panel assembly indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.6 INFORMATIONAL SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Manufacturer Certification Letter in accordance with NOTICE TO CONTRACTOR – POTENTIAL FOR ASBESTOS CONTAINING MATERIALS.

C. Coordination Drawings: Exterior elevations, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Wall panels and attachments.
2. Stud framing.
3. Wall-mounted items including doors, windows, louvers, and lighting fixtures.
4. Penetrations of wall by pipes and utilities.

D. Qualification Data: For professional engineer.

E. Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:

1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.

G. Warranties: Samples of special warranties.

1.7 CLOSEOUT SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS.

B. Maintenance Data: For metal wall panels to include in maintenance manuals.

1.8 QUALITY ASSURANCE

A. Source Limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

B. Preinstallation Conference: Conduct conference at Project site.

1. Meet with Owner, Engineer, Designer, Owner's insurer if applicable, testing and inspecting agency representative, metal-faced composite wall panel Installer, metal-faced composite wall panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects metal-faced composite wall panels including installers of doors, windows, and louvers.
2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
3. Review methods and procedures related to metal-faced composite wall panel installation, including manufacturer's written instructions.
4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
5. Review flashings, special siding details, wall penetrations, openings, and condition of other construction that will affect metal-faced composite wall panels.
6. Review governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.
7. Review temporary protection requirements for metal-faced composite wall panel assembly during and after installation.
8. Review wall panel observation and repair procedures after metal-faced composite wall panel installation.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Refer to Form 816 Article 1.06.03 and Form 816 Article 1.20-1.06.03 for additional information.

B. Deliver components, sheets, metal-faced composite wall panels, and other manufactured items so as not to be damaged or deformed. Package metal-faced composite wall panels for protection during transportation and handling.

C. Unload, store, and erect metal-faced composite wall panels in a manner to prevent bending, warping, twisting, and surface damage.

D. Store metal-faced composite wall panels vertically, covered with suitable weathertight and ventilated covering. Store metal-faced composite wall panels to ensure dryness, with positive slope for drainage of water. Do not store metal-faced composite wall panels in contact with other materials that might cause staining, denting, or other surface damage. Do not allow storage space to exceed 120 deg F.

E. Retain strippable protective covering on metal-faced composite wall panel for period of panel installation.

1.10 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal-faced composite wall panels to be performed according to manufacturer's written instructions and warranty requirements.

B. Field Measurements: Verify locations of structural members and wall opening dimensions by field measurements before metal-faced composite wall panel fabrication and indicate measurements on Shop Drawings.

1.11 COORDINATION

A. Coordinate metal-faced composite wall panel assemblies with rain drainage work, flashing, trim, and construction of studs, soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.12 WARRANTY

A. Refer to Form 816 Article 1.20-1.06.08 and NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information.

B. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal-faced composite wall panel assemblies that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures, including rupturing, cracking, or puncturing.
b. Deterioration of metals and other materials beyond normal weathering.

2. Warranty Period: Two years from date of Substantial Completion.

C. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal-faced composite wall panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PANEL MATERIALS

A. Aluminum Sheet: Coil-coated sheet, ASTM B 209, alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.

1. Surface: Smooth, flat finish.
2. Exposed Coil-Coated Finishes:
   a. Three-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
   b. Color: Custom color to match finish schedule.

3. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

B. Panel Sealants:

1. Joint Sealant: ASTM C 920; elastomeric polyurethane; of type, grade, class, and use classifications required to seal joints in metal-faced composite wall panels and remain weathertight; and as recommended in writing by panel manufacturer.

2.2 MISCELLANEOUS METAL FRAMING

A. Miscellaneous Metal Framing, General: ASTM C 645, cold-formed metallic-coated steel sheet, ASTM A 653/A 653M, G60 hot-dip galvanized or coating with equivalent corrosion resistance unless otherwise indicated.

B. Subgirts: Manufacturer's standard C- or Z-shaped sections 0.064-inch nominal thickness.

C. Zee Clips: 0.079-inch nominal thickness.

D. Base or Sill Channels: 0.079-inch nominal thickness.

E. Hat-Shaped, Rigid Furring Channels:

1. Nominal Thickness: As required to meet performance requirements.
2. Depth: 1-1/2 inches.

F. Cold-Rolled Furring Channels: Minimum 1/2-inch- wide flange.

1. Nominal Thickness: As required to meet performance requirements.
2. Depth: 3/4 inch.
3. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with nominal thickness of 0.040 inch.
4. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- diameter wire, or double strand of 0.048-inch- diameter wire.

G. Fasteners for Miscellaneous Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten miscellaneous metal framing members to substrates.

2.3 MISCELLANEOUS MATERIALS

A. Aluminum Extrusions: ASTM B 221, alloy and temper recommended by manufacturer for type of use and finish indicated.

B. Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide exposed fasteners with heads matching color of metal-faced composite wall panels by means of plastic caps or factory-applied coating. Provide EPDM, PVC, or neoprene sealing washers.

2.4 METAL-FACED COMPOSITE WALL PANELS

A. General: Provide factory-formed and -assembled, metal-faced composite wall panels fabricated from two metal facings bonded, using no glues or adhesives, to solid, extruded thermoplastic core; formed into profile for installation method indicated. Include attachment system components and accessories required for weathertight system.

1. Fire-Retardant Core: Noncombustible, with the following surface-burning characteristics as determined by testing identical products per ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

   a. Flame-Spread Index: 25 or less.
   b. Smoke-Developed Index: 450 or less.

2. Products: Subject to compliance with requirements, provide one of the following:

   a. Alcan Composites USA Inc.; Alucobond Plus.
   b. Alcoa Inc.; Reynobond PE.
   c. ALPOLIC, Division of Mitsubishi Chemical America, Inc.; ALPOLIC.
   d. CENTRIA Architectural Systems; Formabond Wall System.

B. Aluminum-Faced Composite Wall Panels: Formed with 0.020-inch- thick, coil-coated aluminum sheet facings.

1. Panel Thickness: 0.197 inch.
2. Core: Fire retardant.
3. Exterior Finish: 3-coat fluoropolymer.

   a. Color: Custom Color to match finish scedule

C. Attachment System Components: Formed from material compatible with panel facing.

1. Include manufacturer's standard perimeter extrusions with integral weather stripping, panel stiffeners, panel clips and anchor channels.

2.5 ACCESSORIES

A. Wall Panel Accessories: Provide components required for a complete metal-faced composite wall panel assembly including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal-faced composite wall panels unless otherwise indicated.

B. Flashing and Trim: Formed from 0.018-inch- minimum thickness, zinc-coated (galvanized) steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal-faced composite wall panels.

2.6 FABRICATION

A. General: Fabricate and finish metal-faced composite wall panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. Fabricate metal-faced composite wall panels in a manner that eliminates condensation on interior side of panel and with joints between panels designed to form weathertight seals.

C. Metal-Faced Composite Wall Panels: Factory form panels in a batch process by laminating each sheet using glues or adhesives between dissimilar materials. Trim and square edges of sheets with no displacement of face sheets or protrusion of core material.

1. Form panel lines, breaks, and angles to be sharp and true, with surfaces free from warp and buckle.
2. Fabricate panels with sharply cut edges, with no displacement of face sheets or protrusion of core material.
3. Fabricate panels with panel stiffeners, as required to comply with deflection limits, attached to back of panels with structural silicone sealant or bond tape.
4. Dimensional Tolerances:

   a. Panel Bow: 0.8 percent maximum of panel length or width.
   b. Squareness: 0.25 inch maximum.

D. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.

4. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended by metal-faced composite wall panel manufacturer.

    a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal-faced composite wall panel manufacturer for application, but not less than thickness of metal being secured.

2.7 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal-faced composite wall panel supports, and other conditions affecting performance of the Work.

1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal-faced composite wall panel manufacturer.
2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal-faced composite wall panel manufacturer.
3. Verify that weather-resistant sheathing paper has been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Examine roughing-in for components and systems penetrating metal-faced composite wall panels to verify actual locations of penetrations relative to seam locations of panels before panel installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Miscellaneous Framing: Install subgirts, base angles, sills, furring, and other miscellaneous wall panel support members and anchorage according to ASTM C 754 and metal-faced composite wall panel manufacturer's written instructions.

3.3 METAL-FACED COMPOSITE WALL PANEL INSTALLATION

A. General: Install metal-faced composite wall panels according to manufacturer's written instructions in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to girts and subgirts unless otherwise indicated. Anchor panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Commence metal-faced composite wall panel installation and install minimum of 100 sq. ft. in presence of factory-authorized representative.
2. Shim or otherwise plumb substrates receiving metal-faced composite wall panels.
3. Flash and seal metal-faced composite wall panels at perimeter of all openings. Do not begin installation until weather barrier and flashings that will be concealed by panels are installed.
4. Install flashing and trim as metal-faced composite wall panel work proceeds.
5. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and elsewhere as indicated or, if not indicated, as necessary for waterproofing.
6. Provide weathertight escutcheons for pipe and conduit penetrating exterior walls.

B. Fasteners:

1. Aluminum Wall Panels: Use aluminum or stainless-steel fasteners for surfaces exposed to the exterior and aluminum or galvanized-steel fasteners for surfaces exposed to the interior.

C. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action as recommended by metal-faced composite wall panel manufacturer.

D. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weathertight performance of metal-faced composite wall panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by panel manufacturer.

1. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

E. Attachment System Installation, General: Install attachment system required to support metal-faced composite wall panels and to provide a complete weathertight wall system, including subgirts, perimeter extrusions, tracks, drainage channels, panel clips, and anchor channels.

1. Include attachment to supports, panel-to-panel joinery, panel-to-dissimilar-material joinery, and panel-system joint seals.

2. Do not begin installation until weather barrier and flashings that will be concealed by composite panels are installed.

F. Clip Installation: Attach panel clips to supports at each metal-faced composite wall panel joint at locations, spacings, and with fasteners recommended by manufacturer. Attach routed-and-returned flanges of wall panels to panel clips with manufacturer's standard fasteners.

1. Seal horizontal and vertical joints between adjacent panels with sealant backing and sealant. Install sealant backing and sealant according to requirements specified in Section 079200 "Joint Sealants."

3.4 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal-faced composite wall panel assembly including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.

B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

1. Install exposed flashing and trim that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

3.5 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align metal-faced composite wall panel units within installed tolerance of 1/4 inch in 20 feet, nonaccumulative, on level, plumb, and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.6 FIELD QUALITY CONTROL

A. Water-Spray Test: After completing the installation of one complete elevator tower assembly of metal-faced composite wall panel, test assembly for water penetration according to AAMA 501.2 in a 2-bay area directed by Architect.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust completed metal-faced composite wall panel installation, including accessories.

C. Metal-faced composite wall panels will be considered defective if they do not pass tests and inspections.

D. Additional tests and inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

E. Prepare test and inspection reports.

3.7 CLEANING

A. Remove temporary protective coverings and strippable films, if any, as metal-faced composite wall panels are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of metal-faced composite wall panel installation, clean finished surfaces as recommended by panel manufacturer. Maintain in a clean condition during construction.

B. After metal-faced composite wall panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

C. Replace metal-faced composite wall panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 074243

SECTION 074600 - SIDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions of Division 1, State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, and Incidental Construction, Form 816 - 2004 and supplemental specifications thereto, shall be a part of this specification.

B. Work included in this section may require coordination with Amtrak regarding track outages, flagmen, or other issues related to work around railroad facilities. The Contractor shall pay special attention to the specification entitled “SAFETY AND PROTECTION OF RAILROAD TRAFFIC AND PROPERTY” and other Amtrak Specifications contained in the Contract.

1.2 SUMMARY

A. Section Includes:

1. Fiber-cement siding.

B. Related Sections:

1. Section 061000 "Rough Carpentry" for wood furring, grounds, nailers, and blocking.
2. Section 062013 "Exterior Finish Carpentry" for wood and wood-based sidings and for exterior trim.

1.3 ACTION SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Product Data: For each type of product indicated.

C. Samples for Verification:

1. 12-inch- long-by-actual-width Sample of siding.
2. 12-inch- long-by-actual-width Samples of trim and accessories.

1.4 INFORMATIONAL SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Manufacturer Certification Letter in accordance with NOTICE TO CONTRACTOR – POTENTIAL FOR ASBESTOS CONTAINING MATERIALS.

C. Qualification Data: For qualified vinyl siding Installer.

D. Product Certificates: For each type of siding, from manufacturer.

E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for fiber-cement siding.

F. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS.

B. Maintenance Data: For each type of siding and related accessories to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Source Limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

B. Labeling: Provide fiber-cement siding that is tested and labeled according to ASTM C 1186 by a qualified testing agency acceptable to authorities having jurisdiction.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Refer to Form 816 Article 1.06.03 and Form 816 Article 1.20-1.06.03 for additional information.

1.8 COORDINATION

A. Coordinate installation with flashings and other adjoining construction to ensure proper sequencing.

1.9 WARRANTY

A. Refer to Form 816 Article 1.20-1.06.08 and NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information.

B. Special Warranty: Standard form in which manufacturer agrees to repair or replace siding that fail(s) in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including cracking, deforming, and fading.
b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Fading is defined as loss of color, after cleaning with product recommended by manufacturer, of more than 4 Hunter color-difference units as measured according to ASTM D 2244.
3. Warranty Period: 25 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 FIBER-CEMENT SIDING

A. General: ASTM C 1186, Type A, Grade II, fiber-cement board, noncombustible when tested according to ASTM E 136; with a flame-spread index of 25 or less when tested according to ASTM E 84.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. CertainTeed Corp.
   b. GAF Materials Corporation.
   c. James Hardie.

2. Horizontal Pattern: Boards 5-1/4 inches wide in plain style.

   a. Texture: Smooth.

2.2 ACCESSORIES

A. Siding Accessories, General: Provide starter strips, edge trim, outside and inside corner caps, and other items as recommended by siding manufacturer for building configuration.

1. Provide accessories made from same material as adjacent siding unless otherwise indicated.

B. Fasteners:

1. For fastening to wood, use ribbed bugle-head screws of sufficient length to penetrate a minimum of 1 inch into substrate.
2. For fastening to metal, use ribbed bugle-head screws of sufficient length to penetrate a minimum of 1/4 inch, or three screw-threads, into substrate.
3. For fastening fiber cement, use stainless-steel fasteners.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of siding and related accessories.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of projections and substances detrimental to application.

3.3 INSTALLATION

A. General: Comply with siding manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.

1. Do not install damaged components.

B. Install fiber-cement siding and related accessories.

1. Install fasteners no more than 24 inches o.c.

C. Install joint sealants as specified in Section 079200 "Joint Sealants" and to produce a weathertight installation.

3.4 ADJUSTING AND CLEANING

A. Remove damaged, improperly installed, or otherwise defective materials and replace with new materials complying with specified requirements.

B. Clean finished surfaces according to manufacturer's written instructions and maintain in a clean condition during construction.

END OF SECTION 074600

SECTION 074650 – CELLULAR PVC TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions of Division 1, State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, and Incidental Construction, Form 816 - 2004 and supplemental specifications thereto, shall be a part of this specification.

B. Work included in this section may require coordination with Amtrak regarding track outages, flagmen, or other issues related to work around railroad facilities. The Contractor shall pay special attention to the specification entitled "SAFETY AND PROTECTION OF RAILROAD TRAFFIC AND PROPERTY" and other Amtrak Specifications contained in the Contract.

1.2 SUMMARY

A. Section Includes:

1. Cellular PVC (Composite) Trim boards and sheathing boards.

1.3 ACTION SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Product Data: For each type of product indicated.

C. Samples for Verification: Samples: Submit three material samples representative of the texture, thickness and widths shown and specified herein.

1.4 INFORMATIONAL SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Manufacturer Certification Letter in accordance with NOTICE TO CONTRACTOR – POTENTIAL FOR ASBESTOS CONTAINING MATERIALS.

C. Product Certificates: For each type of siding, from manufacturer.

D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for fiber-cement siding.

E. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS.

B. Maintenance Data: For each type of siding and related accessories to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Source Limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

B. Allowable Tolerances:
1. Variation in component length: -0.00 / +1.00”
2. Variation in component width: ± 1/16”
3. Variation in component thickness: ± 1/16”
4. Variation in component edge cut: ± 2°
5. Variation in Density -0% + 10%

C. Workmanship, Finish, and Appearance:
1. Free foam cellular pvc that is homogeneous and free of voids, holes, cracks, and foreign inclusions and other defects. Edges must be square, and top and bottom surfaces shall be flat with no convex or concave deviation.
2. Uniform surface free from cupping, warping, and twisting.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Refer to Form 816 Article 1.06.03 and Form 816 Article 1.20-1.06.03 for additional information.

B. Trim materials should be stored on a flat and level surface on a full shipping pallet. Handle materials to prevent damage to product edges and corners. Store materials under a protective covering to prevent jobsite dirt and residue from collecting on the boards.

1.8 COORDINATION

A. Coordinate installation with flashings and other adjoining construction to ensure proper sequencing.

1.9 WARRANTY

A. Refer to Form 816 Article 1.20-1.06.08 and NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information.

B. Special Warranty: Standard form in which manufacturer agrees to repair or replace trim that fail(s) in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including cracking, deforming, and fading.
b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Period: 25 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CELLULAR PVC TRIM

A. General: Freefoam Cellular PVC that is homogenous and free of voids, holes, cracks, and foreign inclusions and other defects. Edges must be square and top and bottom surfaces shall be flat with no convex or concave deviation. Material shall be produced from PVC resins, recycled PVC and have an integral white color.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. AZEK® Trimboards manufactured by Vycom
b. CertainTeed Restoration Millwork Cellular PVC Trim.
c. Kleer Lumber Inc., 866-KLEER70, www.kleerlumber.com

B. Trim Boards:
1. Nominal Thickness: As indicated in the Contract Drawings.
2. Nominal Width: As indicated in the Contract Drawings.
3. Nominal Length: 18 feet minimum.
4. Finish: Woodgrain Natural White.

2.2 ACCESSORIES

A. Siding Accessories, General: Provide starter strips, edge trim, outside and inside corner caps, and other items as recommended by siding manufacturer for building configuration.

1. Provide accessories made from same material as adjacent siding unless otherwise indicated.

B. Fasteners:

2.3 FASTENERS

A. General: Fasteners shall have sufficient tensile strength in the shaft to resist bending during linear expansion and contraction.

1. Type: Provide the following fasteners.
   a. Nails with smooth, thin shanks, blunt tips and full round heads (e.g.: wood siding nails, box nails) long enough to penetrate into the substrate a minimum of 1-1/2 inches (38 mm).
   b. Exterior grade, trim-head screws, minimum #7 gauge long enough to penetrate into the substrate a minimum of 1-1/2 inches (38 mm).
   c. Material: Stainless steel.
   d. For fastening to wood, use ribbed bugle-head screws of sufficient length to penetrate a minimum of 1 inch into substrate.
   e. For fastening to metal, use ribbed bugle-head screws of sufficient length to penetrate a minimum of 1/4 inch, or three screw-threads, into substrate.
   f. For fastening fiber cement, use stainless-steel fasteners.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of siding and related accessories.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of projections and substances detrimental to application.

3.3 INSTALLATION

A. General: Comply with siding manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.

   1. Do not install damaged components.

B. Install in accordance with manufacturer's instructions. Comply with manufacturer guidelines and recommended techniques.
   1. Comply with all terms necessary to maintain warranty coverage.
   2. Use trim details indicated on drawings.
   3. Install horizontal stud blocking, to match material and depth of stud wall, per manufacturer’s recommended spacing.

C. Cutting:
   1. Use conventional woodworking saws.
   2. Use carbide tipped blades designed to cut wood. Do not use fine-tooth metal-cutting blades.
   3. Avoid rough edges from cutting caused by: excessive friction, poor board support, worn saw blades or badly aligned tools.

D. Drilling:

1. Do not use bits made for rigid PVC.
2. Avoid frictional build-up and remove shavings from the drill hole frequently as necessary.
3. Drill with standard woodworking drill bits.

E. Milling:
1. Mill using standard milling machines used to mill lumber.
2. Relief angle 20 to 30 degrees.
3. Do not score material.
4. Cutting speed to be optimized with the number of knives and feed rate.

F. Routing:
1. Rout using standard bits and the same tools used to rout lumber.
2. Carbide tipped router bits recommended.

G. Edge Finishing:
1. Edges can be finished by sanding, grinding, or filling with traditional woodworking tools.

H. Joints:
1. Provide bevel or shiplapped joints for material subject to expansion and contraction. Do not use butt joints.
2. Provide butt joints for corner units or T-joints, only.

I. Heat Forming:
1. Utilize convection air circulating oven, strip heater, or radiant heaters to heat material from both sides.
2. Do not overheat material. Surface temperature shall not exceed 320 degrees F (160 degree C) for more than 10 minutes.
3. Secure pliable material around a template to obtain finished shape during cooling.
4. Cool with natural air circulation, fans or compressed air.

J. Thermal Expansion and Contraction:
1. Expansion and contraction of trim material will occur with changes in temperature. Using the appropriate quantity of the proper fasteners along the entire length of Kleer is essential to help minimize expansion and contraction.
2. Follow manufacturer's guidelines for required gap width between trim pieces.

K. Fastening:
1. Fasteners shall be hand nailed, power nailed, or screwed.
2. Power Nailing: Adjust nail gun to prevent excessive nailing pressure or overdriving the nail. Adjust for ambient and material temperatures.
3. Pre-drill material when installing in low temperatures.
4. Fasteners should be long enough to penetrate into a 1-1/2 inch solid wood substrate a minimum of 1-1/2 inch.
5. Staples, small brads and wire nails must not be used as fastening members.
6. Fasten trim into a flat, solid wood substrate that is a minimum 1-1/2 inches (38 mm) thick. Do not fasten trim into hollow or uneven substrates.

L. Fastener Schedule:
1. Along Length of Board: Fasten at 16 inches (406.4 mm) on center, maximum.
2. Within Width of Board: 4 inches (101.6 mm) on center, maximum.

3. Distance from End of Each Board: Not more than 2 inches (50.8 mm).

M. Bonding:
1. Follow adhesive manufacturer's guidelines.
2. Glue joints shall be secured on each side of the joint to allow adequate bonding time.
3. Surfaces to be glued should be clean and dry and in complete contact with each other. Smooth surfaces shall be sanded and cleaned prior to bonding.
4. Use PVC adhesive when installing short runs of trim.

N. Finishing:
1. Correct dents and gouges before applying final coating.
2. Nail holes should be filled using manufacturers structural sealant or cellular PVC adhesive.
3. Paint as specified in Section 09900.
4. Clean material with a light detergent and warm water. Stubborn stains may be removed rubbing alcohol.

O. Install joint sealants as specified in Section 079200 "Joint Sealants" and to produce a weathertight installation.

3.4 ADJUSTING AND CLEANING

A. Remove damaged, improperly installed, or otherwise defective materials and replace with new materials complying with specified requirements.

B. Clean finished surfaces according to manufacturer's written instructions and maintain in a clean condition during construction.

END OF SECTION 074650

SECTION 077100 - ROOF SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions of Division 1, State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, and Incidental Construction, Form 816 - 2004 and supplemental specifications thereto, shall be a part of this specification.

B. Work included in this section may require coordination with Amtrak regarding track outages, flagmen, or other issues related to work around railroad facilities. The Contractor shall pay special attention to the specification entitled “SAFETY AND PROTECTION OF RAILROAD TRAFFIC AND PROPERTY” and other Amtrak Specifications contained in the Contract.

1.2 SUMMARY

A. Section Includes:
1. Roof-edge flashings.
2. Roof-edge drainage systems.

B. Related Sections:
1. Section 074113.16 "Standing Seam Metal Roof Panels" for metal roof panels and color-matched flashing and trim provided by the metal-roof-panel manufacturer.
2. Section 077253 "Snow Guards" for prefabricated devices designed to hold snow on the roof surface, allowing it to melt and drain off slowly.

1.3 PERFORMANCE REQUIREMENTS

A. General Performance: Roof specialties shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of thermal movements. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.4 ACTION SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

C. Shop Drawings: For roof specialties. Include plans, elevations, expansion-joint locations, keyed details, and attachments to other work. Distinguish between plant- and field-assembled work. Include the following:

1. Details for expansion and contraction; locations of expansion joints, including direction of expansion and contraction.
2. Pattern of seams and layout of fasteners, cleats, clips, and other attachments.
3. Details of termination points and assemblies, including fixed points.
4. Details of special conditions.

D. Samples for Verification: For roof-edge drainage systems made from 12-inch lengths of full-size components including fasteners, cover joints, accessories, and attachments.

1.5 INFORMATIONAL SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Warranty: Sample of special warranty.

1.6 QUALITY ASSURANCE

A. Source Limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

B. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Build mockup of typical roof edge, including fascia gutter and downspout, approximately 10 feet long, including supporting construction, seams, attachments, and accessories.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

C. Preinstallation Conference: Conduct conference at Project site.

1. Meet with Owner, Architect, Owner's insurer if applicable, Installer, and installers whose work interfaces with or affects roof specialties including installers of roofing materials and accessories.
2. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
3. Review special roof details, roof drainage, and condition of other construction that will affect roof specialties.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Refer to Form 816 Article 1.06.03 and Form 816 Article 1.20-1.06.03 for additional information.

B. Do not store roof specialties in contact with other materials that might cause staining, denting, or other surface damage. Store roof specialties away from uncured concrete and masonry.

C. Protect strippable protective covering on roof specialties from exposure to sunlight and high humidity, except to extent necessary for the period of roof specialties installation.

1.8 WARRANTY

A. Refer to Form 816 Article 1.20-1.06.08 and NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information.

B. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace roof specialties that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 EXPOSED METALS

A. Copper Sheet: ASTM B 370, cold-rolled copper sheet, H00 or H01 temper.
1. Pre-Patinated Copper-Sheet Finish: Pre-patinated according to ASTM B 882.

2.2 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.

B. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to meet performance requirements. Furnish the following unless otherwise indicated:

1. Exposed Penetrating Fasteners: Gasketed screws with hex washer heads matching color of sheet metal.
2. Fasteners for Copper Sheet: Copper, hardware bronze, or passivated Series 300 stainless steel.

C. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

D. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

E. Solder for Copper: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead.

2.3 ROOF-EDGE DRAINAGE SYSTEMS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Andreas Renner KG.
2. Architectural Products Company.
3. ATAS International, Inc.
4. Berger Building Products, Inc.
5. Castle Metal Products.
6. Cheney Flashing Company.
7. CopperCraft by FABRAL; a Euramax company.
8. Hickman Company, W. P.
9. Klauer Manufacturing Company.
10. Merchant & Evans, Inc.
11. Metal-Era, Inc.
12. Metal-Fab Manufacturing, LLC.
13. MM Systems Corporation.
14. National Sheet Metal Systems, Inc.
15. Perimeter Systems; a division of Southern Aluminum Finishing Company, Inc.

B. Gutters: Manufactured in uniform section lengths not exceeding 12 feet, with matching corner units, ends, outlet tubes, and other accessories. Elevate back edge at least 1 inch above front edge. Furnish flat-stock gutter straps, gutter brackets, expansion joints, and expansion-joint covers fabricated from same metal as gutters.

1. Fabricate from the following exposed metal:

   a. Copper: 20 oz./sq. ft..

2. Gutter Profile: As indicated according to SMACNA's "Architectural Sheet Metal Manual."
3. Corners: Factory mitered and mechanically clinched and sealed watertight.
4. Gutter Supports: Manufacturer's standard supports as selected by Architect with finish matching the gutters.
5. Special Fabrications: Radiussed sections.
6. Gutter Accessories: Continuous hinged leaf guard of solid metal designed to shed leaves, Bronze wire ball downspout strainer, Bullnose ends for half-round gutter.

C. Downspouts: Plain round complete with smooth-curve elbows, manufactured from the following exposed metal. Furnish with metal hangers, from same material as downspouts, and anchors.

1. Copper: 16 oz./sq. ft..

D. Copper Finish: Pre-patinated verdigris.

2.4 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.

B. Examine walls, roof edges, and parapets for suitable conditions for roof specialties.

C. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. General: Install roof specialties according to manufacturer's written instructions. Anchor roof specialties securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete roof-specialty systems.

1. Install roof specialties level, plumb, true to line and elevation; with limited oil-canning and without warping, jogs in alignment, buckling, or tool marks.
2. Provide uniform, neat seams with minimum exposure of solder and sealant.
3. Install roof specialties to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before manufacture.
4. Torch cutting of roof specialties is not permitted.

B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

C. Expansion Provisions: Allow for thermal expansion of exposed roof specialties.

1. Space movement joints at a maximum of 12 feet with no joints within 18 inches of corners or intersections unless otherwise shown on Drawings.

2. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures.

D. Fastener Sizes: Use fasteners of sizes that will penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

E. Seal joints with butyl sealant as required by roofing-specialty manufacturer.

F. Seal joints as required for watertight construction. Place sealant to be completely concealed in joint. Do not install sealants at temperatures below 40 deg F.

G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches except reduce pre-tinning where pre-tinned surface would show in completed Work. Tin edges of uncoated copper sheets using solder for copper. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.

3.3 ROOF-EDGE DRAINAGE-SYSTEM INSTALLATION

A. General: Install components to produce a complete roof-edge drainage system according to manufacturer's written instructions. Coordinate installation of roof perimeter flashing with installation of roof-edge drainage system.

B. Gutters: Join and seal gutter lengths. Allow for thermal expansion. Attach gutters to firmly anchored gutter supports spaced not more than 24 inches apart. Attach ends with rivets and solder to make watertight. Slope to downspouts.

1. Install gutter with expansion joints at locations indicated but not exceeding 50 feet apart. Install expansion joint caps.
2. Install continuous leaf guards on gutters with noncorrosive fasteners, hinged to swing open for cleaning gutters.
3. Connect downspouts to underground drainage system indicated.

3.4 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder and sealants.

C. Remove temporary protective coverings and strippable films as roof specialties are installed. On completion of installation, clean finished surfaces including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain roof specialties in a clean condition during construction.

D. Replace roof specialties that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 077100

SECTION 077253 - SNOW GUARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions of Division 1, State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, and Incidental Construction, Form 816 - 2004 and supplemental specifications thereto, shall be a part of this specification.

B. Work included in this section may require coordination with Amtrak regarding track outages, flagmen, or other issues related to work around railroad facilities. The Contractor shall pay special attention to the specification entitled "SAFETY AND PROTECTION OF RAILROAD TRAFFIC AND PROPERTY" and other Amtrak Specifications contained in the Contract.

1.2 SUMMARY

A. Section Includes:
1. Snow guards for metal roofs.
2. Non-penetrating attachment system.
3. Color-matched metal strips.

1.3 ACTION SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for snow guards.

C. Shop Drawings: Include roof plans showing layouts and attachment details of snow guards.
1. Include details of rail-type snow guards.
2. Include calculation of number and location of snow guards based on snow load, roof slope, roof type, components, spacings, and finish, tailored to match actual project conditions.

D. Samples: Clamps, cross member and snow and ice clips.

1.4 INFORMATIONAL SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Product Test Reports: For each type of snow guard, for tests performed by manufacturer and witnessed by a qualified testing agency.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

1.6 DELIVERY, STORAGE AND HANDLING

A. Refer to Form 816 Article 1.06.03 and Form 816 Article 1.20-1.06.03 for additional information.

B. Deliver twenty-five (25) spare snow and ice clips to Owner per the NOTICE TO CONTRACTOR – SPARE PARTS.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Performance Requirements: Provide snow guards that withstand exposure to weather and resist thermally induced movement without failure, rattling, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.
   1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

B. Structural Performance:
   1. Snow Loads: As indicated on Structural Drawings.

2.2 RAIL-TYPE SNOW GUARDS

A. Seam-Mounted, Rail-Type Snow Guards:

B. Basis-of-Design Product: Subject to compliance with requirements, provide Colorguard bar #76, Colorguard versaclip #88, S-5 #96 tall snowclip 3, S-5 #S5T2K Clamps, by Alpine Snow Guards, Stowe, VT www.alpinesnowguards.com (888) 766-4273 (Basis of Design) or approved equal.

   1. Description: Snow guard rails fabricated from metal pipes, bars, or extrusions, anchored to brackets and equipped with one rail with color-matching inserts of material and finish used for metal roofing.

      a. Clamps: Manufactured from 6061-T6 aluminum extrusions conforming to ASTM B221 or aluminum castings conforming to ASTM B85 and to AA Aluminum Standards and Data.
      b. Set screws: 300 Series stainless steel, 18-8 alloy, 3/8 inch diameter, with round nose point.
      c. Attachment bolts: 300 Series stainless steel, 18-8 alloy, 10 mm diameter, with flat washers.
      d. Cross members: Manufactured from 6061-T6 alloy and temper aluminum extrusions conforming to ASTM B221 and AA Aluminum Standards and Data.

Receptacle in face to receive color-matched metal strips. Provide splice connectors ensuring alignment and structural continuity at end joints.

e. Color Strips: Same material and finish as roof panels; obtained from roof panel manufacturer.

f. Snow and Ice Clips: Aluminum, with rubber foot, minimum 3 inches wide.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances, snow guard attachment, and other conditions affecting performance of the Work.

1. Verify compatibility with and suitability of substrates including compatibility with existing finishes or primers.
2. Prior to beginning installation, verify that:
   a. Panel seaming is complete.
   b. Panel attachment is sufficient to withstand loads applied by snow guard system.
   c. Installation will not impede roof drainage.
   d. Matching color strips have been procured by the roof panel manufacturer.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean areas to receive attachments; remove loose and foreign matter that could interfere with installation or performance.

3.3 INSTALLATION

A. Attachment for Standing-Seam Metal Roofing:

1. Install snow guards according to manufacturer's written instructions. Space as indicated on drawings.
2. Do not use fasteners that will penetrate metal roofing, or fastening methods that void metal roofing finish warranty.
3. Place clamps in straight, aligned rows.
4. Place both set screws on same side of clamp.
5. Tighten set screws to manufacturer's recommended torque. Randomly test set screw torque using calibrated torque wrench.
6. Insert color-matched metal strips into cross members, staggering strips to cover cross member joints.
7. Attach cross members to clamps; tighten bolts to manufacturer's recommended torque.
8. Install splice connectors at cross member end joints.
9. Do not cantilever cross members more than 3 inches beyond last clamp at ends.

END OF SECTION 077253

SECTION 078413 - PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions of Division 1, State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, and Incidental Construction, Form 816 - 2004 and supplemental specifications thereto, shall be a part of this specification.

B. Work included in this section may require coordination with Amtrak regarding track outages, flagmen, or other issues related to work around railroad facilities. The Contractor shall pay special attention to the specification entitled "SAFETY AND PROTECTION OF RAILROAD TRAFFIC AND PROPERTY" and other Amtrak Specifications contained in the Contract.

1.2 SUMMARY

A. Section Includes:

1. Penetrations in fire-resistance-rated walls.
2. Penetrations in horizontal assemblies.
3. Penetrations in smoke barriers.

1.3 ACTION SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Product Data: For each type of product indicated.

C. Product Schedule: For each penetration firestopping system. Include location and design designation of qualified testing and inspecting agency.

1.4 INFORMATIONAL SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Manufacturer Certification Letter in accordance with NOTICE TO CONTRACTOR – POTENTIAL FOR ASBESTOS CONTAINING MATERIALS.

C. Qualification Data: For qualified Installer.

D. Installer Certificates: From Installer indicating penetration firestopping has been installed in compliance with requirements and manufacturer's written recommendations.

E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for penetration firestopping.

1.5 QUALITY ASSURANCE

A. Limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

B. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements."

C. Fire-Test-Response Characteristics: Penetration firestopping shall comply with the following requirements:

1. Penetration firestopping tests are performed by a qualified testing agency acceptable to authorities having jurisdiction.
2. Penetration firestopping is identical to those tested per testing standard referenced in "Penetration Firestopping" Article. Provide rated systems complying with the following requirements:

a. Penetration firestopping products bear classification marking of qualified testing and inspecting agency.
b. Classification markings on penetration firestopping correspond to designations listed by the following:

1) UL in its "Fire Resistance Directory."
2) FM Global in its "Building Materials Approval Guide."

D. Preinstallation Conference: Conduct conference at Project site.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Refer to Form 816 Article 1.06.03 and Form 816 Article 1.20-1.06.03 for additional information.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not install penetration firestopping when ambient or substrate temperatures are outside limits permitted by penetration firestopping manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.

B. Install and cure penetration firestopping per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.8 COORDINATION

A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping is installed according to specified requirements.

B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Grace Construction Products.
   2. Hilti, Inc.
   3. Johns Manville.
   4. 3M Fire Protection Products.
   5. Tremco, Inc.; Tremco Fire Protection Systems Group.
   6. USG Corporation.

2.2 PENETRATION FIRESTOPPING

A. Provide penetration firestopping that is produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.

B. Penetrations in Fire-Resistance-Rated Walls: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.

   1. Fire-resistance-rated walls include fire-barrier walls.
   2. F-Rating: Not less than the fire-resistance rating of constructions penetrated.

C. Penetrations in Horizontal Assemblies: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.

   1. Horizontal assemblies include floors floor/ceiling assemblies and ceiling membranes of roof/ceiling assemblies.
   2. F-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated.
   3. T-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.

D. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping manufacturer and approved by qualified testing and inspecting agency for firestopping indicated.

1. Permanent forming/damming/backing materials, including the following:

   a. Slag-wool-fiber or rock-wool-fiber insulation.
   b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
   c. Fire-rated form board.
   d. Fillers for sealants.

2. Temporary forming materials.
3. Substrate primers.
4. Collars.
5. Steel sleeves.

2.3 FILL MATERIALS

A. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.

B. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.

C. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.

D. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized-steel sheet.

E. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.

F. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.

G. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.

H. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.

I. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

J. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:

1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces, and nonsag formulation for openings in vertical and sloped surfaces, unless indicated firestopping limits use of nonsag grade for both opening conditions.

2.4 MIXING

A. For those products requiring mixing before application, comply with penetration firestopping manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning: Clean out openings immediately before installing penetration firestopping to comply with manufacturer's written instructions and with the following requirements:

1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping.
2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Priming: Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. Masking Tape: Use masking tape to prevent penetration firestopping from contacting adjoining surfaces that will remain exposed on completion of the Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove stains. Remove tape as soon as possible without disturbing firestopping's seal with substrates.

3.3 INSTALLATION

A. General: Install penetration firestopping to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestopping.

C. Install fill materials for firestopping by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 FIELD QUALITY CONTROL

A. Owner will engage a qualified testing agency to perform tests and inspections.

B. Where deficiencies are found or penetration firestopping is damaged or removed because of testing, repair or replace penetration firestopping to comply with requirements.

C. Proceed with enclosing penetration firestopping with other construction only after inspection reports are issued and installations comply with requirements.

3.5 CLEANING AND PROTECTION

A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping manufacturers and that do not damage materials in which openings occur.

B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping is without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping and install new materials to produce systems complying with specified requirements.

END OF SECTION 078413

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions of Division 1, State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, and Incidental Construction, Form 816 - 2004 and supplemental specifications thereto, shall be a part of this specification.

1.2 SUMMARY

A. Section Includes:
   1. Furnishing and installing a high performance, closed cell, preformed joint seals and adhesive/bonding agent at platform joints in accordance with the details shown on the plans and the requirements of the specifications.

1.3 ACTION SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Product Data: For each joint-sealant product indicated.

1.4 INFORMATIONAL SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Qualification Data: For qualified Installer.

C. Product Certificates: For each kind of joint sealant and accessory, from manufacturer.

D. Warranties: Sample of special warranties.

E. Manufacturer Certification Letter in accordance with NOTICE TO CONTRACTOR – POTENTIAL FOR ASBESTOS CONTAINING MATERIALS.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01

B. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

C. Source Limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

1.6 PROJECT CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer**.**
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.7 DELIVERY, STORAGE AND HANDLING

A. Refer to Form 816 Article 1.06.03 and Form 816 Article 1.20-1.06.03 for additional information.

1.8 WARRANTY

A. Refer to Form 816 Article 1.20-1.06.08 and NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information.

B. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

C. Special Manufacturer's Warranty: Manufacturer's standard form in which joint-sealant manufacturer agrees to furnish joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

D. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:

1. Movement of the structure caused by structural settlement or errors attributable to design or construction resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
2. Disintegration of joint substrates from natural causes exceeding design specifications.
3. Mechanical damage caused by individuals, tools, or other outside agents.

4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

2.2 PREFORMED JOINT MATERIALS

A. Preformed Foam Joint: Manufacturer's standard preformed joint produced from low density closed cell cross linked Ethylene Vinyl Acetate Polyethylene Copolymer nitrogen blown material utilizing hindered amine light stabilizer for U.V. stability exhibiting the physical properties listed in the table below:

PHYSICAL PROPERTIES	**TEST METHOD**	**REQUIREMENT**
Elongation at break	ASTM D3575; Suffix: T	225% avg.
Tensile Strength, psi (kPa)	ASTM D3575; Suffix: T	115 psi +/- 20%
Tear Resistance	ASTM D624	10 – 20 lbs/inch
Density	ASTM D3575; Suffix W, Method A	2.7 – 3.4 lbs/ft³
Water Absorption	ASTM D3575; Suffix L	0.035 lbs/ft² avg.
Compression Deflection	ASTM D3575	25% 6 psi avg. 50% 16 psi avg.
Weather / Deterioration	ASTM G154	3000 hours No Effect
Compression Set 50% compression for 22 hours @ 73° F (23° C) 2 hr recovery 50% compression for 22 hours @ 73° F (23° C) 24 hour recovery	ASTM D3575; Suffix: B	 10% set 9% set
Extrusion (specimen compressed 60% of original thickness with 3 restrained sides)	ASTM D545	Extrusion on free side does not exceed 0.25 inches (6.4mm)
Operating Temperature	In House	160° F (71° C) max.
Movement Range Compression Tension Shear (Horizontal & Vertical)	In House	 50% 25% 50%±

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Ceva 100 System by E-Poxy Industries (Chase Corporation)

b. Approved Equal

2.3 URETHANE JOINT SEALANTS

A. JS-1, JS-2, and JS-3 Multicomponent, Nonsag, Urethane Joint Sealant: ASTM C 920, Type M, Grade NS, Class 25, for Use NT.

1. Products: subject to compliance with requirements, provide one of the following:

a. Bostik, Inc; Chem-Calk 500
b. May National Associates, Inc: Bondaflex PUR 2 NS.
c. Pacific Polymers International, Inc.; Elasto-Thane 227 Type II
d. Pecora Corporation; Dynatred.
e. Sika Corporation, Construction Products Division; Sikaflex – 2c EZ Mix.
f. Tremco Incorporated; Vulkem 227.

2.4 SEALANT/ADHESIVE

A. Joint Adhesive: 100% solids two component moisture insensitive modified epoxy adhesive which meets ASTM C-881 Type I & II Grade 2 Class B & C and the requirements of the properties listed below:

Properties (uncured):

	Part A	**Part B**	**Mixed**
Color (Beige or Gray):	White/White	Carmel/Gray	Beige/Gray
Shelf Life	2 Years	2 Years	
Mixing ratio (By Vol)	3	1	3:1
Specifc Gravity	1.47	1.15	
Density (lbs/gal) @ 77 ^{o} F (25 ^{o} C)	12.0 +/-0.5	9.7 +/-0.2	11.6 +/-0.2
Viscosity (cps) @ 77 ^{o} F (25 ^{o} C)	35,000	33,000	26,000
Pot Life (200 gms)			32-36 minutes
Initial Set @ 77 ^{o} F			1 ½ - 2 Hours
Initial Cure			8-12 hours
Full Chemical Cure			7 days

Properties after Cure:

TEST	**TEST METHOD**	**REQUIREMENT**
Compressive Strength	ASTM D695	7000 psi
Tensile Strength	ASTM D638	3500 psi
Elongation at Break	ASTM D638	3-5%
Shore D hardness	ASTM D2250	85±5
Water Absorption	ASTM D570	0.25%

Bond Strength	ASTM C-882	430 psi min
Lap Shear		2000 psi min

2.5 MISCELLANEOUS MATERIALS

A. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

B. Duct/Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing adhesive/bonding agent and joint materials to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint materials, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:

   a. Concrete.
   b. Masonry.
   c. Cast Stone.

3. Remove laitance and form-release agents from concrete.
4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:

a. Metal.

B. Joint Priming/Application of adhesive/Bonding Agent: Prime joint substrates or apply adhesive/bonding agent where recommended by joint-sealant manufacturer. Apply with joint-sealant manufacturer's written instructions. Confine to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Duct/Masking Tape: Use duct tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT MATERIALS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

D. Installation of Preformed Foam Joints: Install each length of preformed joints immediately after removing protective wrapping. Do not pull or stretch material. Produce seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures, apply heat to sealant in compliance with sealant manufacturer's written instructions.

3.4 CLEANING

A. Clean off excess adhesive/bonding agent, sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint materials during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so joints are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joints immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 079200

SECTION 081119 - STAINLESS-STEEL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions of Division 1, State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, and Incidental Construction, Form 816 - 2004 and supplemental specifications thereto, shall be a part of this specification.

1.2 SUMMARY

A. Section Includes:

1. Stainless-steel, hollow-metal doors.
2. Stainless-steel, hollow-metal frames.

1.3 ACTION SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, fire-resistance rating, and finishes.

C. Shop Drawings: Include the following:

1. Elevations of each door design.
2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
4. Locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.
6. Details of anchorages, joints, field splices, and connections.
7. Details of accessories.
8. Details of moldings, removable stops, and glazing.
9. Details of conduit and preparations for power, signal, and control systems.

D. Samples for Verification:

1. Finishes: For each type of exposed finish required, prepared on Samples of not less than 3 by 5 inches.
2. Doors: Include section of vertical-edge, top, and bottom construction; core construction;and hinge and other applied hardware reinforcement.
3. Frames: Show profile, corner joint, floor and wall anchors, and silencers. Include separate section showing fixed hollow-metal panels and glazing if applicable.

E. Schedule: Provide a schedule of stainless-steel, hollow-metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with a door hardware schedule.

1.4 INFORMATIONAL SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each type of stainless-steel, hollow-metal door and frame assembly.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

B. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.

1. Temperature-Rise Limit: Provide doors that have a maximum transmitted temperature end point of not more than 450 deg F above ambient after 30 minutes of standard fire-test exposure.

C. Smoke- and Draft-Control Door Assemblies: Provide assemblies tested according to UL 1784 and installed in compliance with NFPA 105.

D. Fire-Rated, Borrowed-Light Frame Assemblies: Assemblies that are listed and labeled, by a testing agency, acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257 or UL-9. Label each individual glazed lite. Install in compliance with NFPA 80.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Refer to Form 816 Article 1.06.03 and Form 816 Article 1.20-1.06.03 for additional information.

B. Deliver doors and frames palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

C. Shipping Spreaders: Deliver welded frames with two removable spreader bars across bottom of frames, tack welded or mechanically attached to jambs and mullions.

D. Store doors and frames under cover at Project site. Place units in a vertical position with heads up, spaced by blocking, on minimum 4-inch- high wood blocking. Avoid using nonvented plastic or canvas shelters that could create a humidity chamber.

1. If wrappers on doors become wet, remove cartons immediately. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.8 COORDINATION

A. Coordinate installation of anchorages for stainless-steel frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 STAINLESS-STEEL DOORS AND FRAMES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Ceco Door Products; an ASSA ABLOY Group company.
   2. Gensteel Doors, Incorporated.
   3. Steelcraft; an Ingersoll-Rand company.

2.2 STAINLESS-STEEL DOORS

A. Description: Stainless-steel doors, not less than 1-3/4 inches thick, of seamless, hollow-metal construction. Construct doors with smooth, flush surfaces without visible joints or seams on faces.

   1. Face Sheets: Fabricate from 0.062-inch- thick, stainless-steel sheet.
   2. Core Construction: Fabricate doors with core indicated.

      a. Welded Steel-Stiffened Core: 0.030-inch- nominal thickness uncoated steel vertical stiffeners extending full-door height, spaced not more than 6 inches apart, spot welded to face sheets a maximum of 5 inches o.c. Fill spaces between stiffeners with mineral-fiber insulation.
      b. Laminated Core: Honeycomb of resin-impregnated kraft paper with maximum 1-inch cells or foam-plastic insulation fastened to face sheets with waterproof adhesive.
      c. Laminated Steel-Stiffened Core: 0.030-inch- nominal thickness uncoated steel vertical stiffeners extending full-door height, spaced not more than 6 inches apart, fastened to face sheets with waterproof adhesive. Fill spaces between stiffeners with mineral-fiber insulation.
      d. Fire-Rated Door Core: As required to provide fire-protection and temperature-rise ratings indicated.

   3. Vertical Edges for Single-Acting Doors: Beveled 1/8 inch in 2 inches.
   4. Vertical Edges for Double-Acting Doors: Round vertical edges with 2-1/8-inch radius.
   5. Moldings for Glazed Lites in Doors: 0.038-inch- thick stainless steel.

6. Loose Stops for Glazed Lites in Doors: 0.038-inch- thick stainless steel.
7. Top and Bottom Channels: Closed with continuous channels, 0.060-inch- nominal thickness uncoated steel.

    a. Spot welded to both face sheets.
    b. Securely fastened using adhesive.

8. Hardware Reinforcement: Fabricate according to ANSI/NAAMM-HMMA 866 with reinforcing plates from stainless steel.
9. Electrical Hardware Enclosures: Provide enclosures and junction boxes within doors for electrically operated door hardware, interconnected with UL-approved, 1/2-inch-diameter conduit and connectors.

    a. Where indicated for installation of wiring, provide access plates to junction boxes, fabricate from same material and thickness as face sheet and fasten with at least four security fasteners spaced not more than 6 inches o.c.

B. Performance: Level A, ANSI A250.4.

C. Materials:

1. Stainless-Steel Sheet: ASTM A 240/A 240M, austenitic stainless steel, Type 316.
2. Steel Sheet: ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, Commercial Steel (CS), Type B.

D. Stainless-Steel Finishes:

1. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
2. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.

    a. Run grain of directional finishes with long dimension of each piece.
    b. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
    c. Directional Satin Finish: No. 4.

2.3 STAINLESS-STEEL FRAMES

A. Description: Fabricate stainless-steel frames of construction indicated, with faces of corners mitered and contact edges closed tight.

1. Door Frames: Machine mitered and full welded.

    a. Weld frames according to HMMA 820.
2. Door Frames for Openings 48 Inches Wide or Less: Fabricate from 0.078-inch- thick, stainless-steel sheet.
3. Door Frames for Openings More Than 48 Inches Wide: Fabricate from 0.109-inch-thick, stainless-steel sheet.
4. Hardware Reinforcement: Fabricate according to ANSI/NAAMM-HMMA 866 with reinforcing plates from stainless steel.

5. Jamb Anchors:
   a. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.050-inch- thick stainless steel.
   b. Compression Type for Slip-on Frames: Fabricate adjustable compression anchors from stainless steel.

6. Floor Anchors: Not less than 0.078-inch- thick stainless steel, and as follows:

   a. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

B. Performance: Level A, ANSI A250.4.

C. Materials:

1. Stainless-Steel Sheet: ASTM A 240/A 240M, austenitic stainless steel, Type 316.
2. Frame Anchors: Stainless-steel sheet. Same type as door face.
3. Inserts, Bolts, and Anchor Fasteners: Stainless-steel components complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 for bolts and nuts.

D. Finishes:

1. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
2. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.

   a. Run grain of directional finishes with long dimension of each piece.
   b. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
   c. Directional Satin Finish: No. 4.

2.4 FABRICATION

A. Stainless-Steel Door Fabrication: Stainless-steel doors to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal.
1. Seamless Edge Construction: Door face sheets joined at vertical edges by continuous weld extending full height of door; with edges ground and polished, providing smooth, flush surfaces with no visible seams.
2. Exterior Doors: Close top edges flush and seal joints against water penetration. Provide weep-hole openings in bottom of exterior doors to permit moisture to escape.
3. Stops and Moldings: Factory cut openings in doors. Provide stops and moldings around glazed lites. Form corners of stops and moldings with butted or mitered hairline joints.

   a. Glazed Lites: Provide fixed stops and moldings welded on secure side of door.
   b. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.

4. Hardware Preparation: Factory prepare stainless-steel doors to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping,

a. Reinforce doors to receive nontemplated mortised and surface-mounted door hardware.

5. Locate hardware as indicated, or if not indicated, according to HMMA 831, "Recommended Hardware Locations for Custom Hollow Metal Doors and Frames."
6. Tolerances: Fabricate doors to tolerances indicated in ANSI/NAAMM-HMMA 866.

B. Stainless-Steel Frame Fabrication: Fabricate stainless-steel frames to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

1. Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible. Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated from same thickness metal as frames.

2. Provide countersunk, flat-, or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
3. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
4. Jamb Anchors: Provide number and spacing of anchors as follows:

a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

1) Two anchors per jamb up to 60 inches in height.
2) Three anchors per jamb from 60 to 90 inches in height.
3) Four anchors per jamb from 90 to 96 inches in height.
4) Four anchors per jamb plus one additional anchor per jamb for each 24 inches or fraction thereof more than 96 inches in height.

b. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

1) Three anchors per jamb up to 60 inches in height.
2) Four anchors per jamb from 60 to 90 inches in height.
3) Five anchors per jamb from 90 to 96 inches in height.
4) Five anchors per jamb plus one additional anchor per jamb for each 24 inches or fraction thereof more than 96 inches in height.
5) Two anchors per head for frames more than 42 inches wide and mounted in metal-stud partitions.

c. Compression Type: Not less than two anchors in each jamb.
d. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.

5. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Provide plastic plugs to keep holes clear during construction.

   a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
   b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

6. Hardware Preparation: Factory prepare stainless-steel frames to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping, according to the Door Hardware Schedule and templates furnished as specified in Section 087100 "Door Hardware."

   a. Reinforce frames to receive nontemplated mortised and surface-mounted door hardware.
   b. Locate hardware as indicated, or if not indicated, according to HMMA 831, "Recommended Hardware Locations for Custom Hollow Metal Doors and Frames."

7. Tolerances: Fabricate frames to tolerances indicated in ANSI/NAAMM-HMMA 866.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of stainless-steel doors and frames.

B. Examine roughing-in for embedded and built-in anchors to verify actual locations of stainless-steel, door-frame connections before frame installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Prior to installation and with installation spreaders in place, adjust and securely brace stainless-steel door frames for squareness, alignment, twist, and plumb to the following tolerances:

   1. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
   2. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
   3. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
   4. Plumbness: Plus or minus 1/16 inch, measured at jambs on a perpendicular line from head to floor.

C. Drill and tap doors and frames to receive nontemplated mortised and surface-mounted door hardware.

3.3 INSTALLATION

A. General: Install stainless-steel doors and frames plumb, rigid, properly aligned, and securely fastened in place; comply with ANSI/NAAMM-HMMA 866 and manufacturer's written instructions.

B. Stainless-Steel Frames: Install stainless-steel frames of size and profile indicated.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

    a. At fire-protection-rated openings, install frames according to NFPA 80.
    b. Where frames are fabricated in sections due to shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
    c. Remove temporary braces necessary for installation only after frames have been properly set and secured.
    d. Check plumb, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor and secure with postinstalled expansion anchors.
3. In-Place Gypsum Board Partitions: Secure frames in place with postinstalled expansion anchors through floor anchors at each jamb. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
4. Installation Tolerances: Adjust stainless-steel frames for squareness, alignment, twist, and plumb to the following tolerances:

    a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
    b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
    c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
    d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

C. Stainless-Steel Doors: Fit doors accurately in frames with the following clearances:

1. Fire-Rated Doors: Install doors with clearances according to NFPA 80.

3.4 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace

B. Clean grout and other bonding material off stainless-steel doors and frames immediately after installation.

C. Stainless-Steel Touchup: Immediately after erection, smooth any abraded areas of stainless steel and polish to match undamaged finish.

END OF SECTION 081119

SECTION 085123 - STEEL WINDOWS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions of Division 1, State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, and Incidental Construction, Form 816 - 2004 and supplemental specifications thereto, shall be a part of this specification.

1.2 SUMMARY

A. Section Includes:
   1. Heavy custom hot-rolled steel fixed windows.

1.3 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide steel windows capable of withstanding the effects of the following loads and stresses within limits and under conditions indicated, based on testing windows that are representative of those specified according to ASTM E 330:

   1. Design Wind Loads: Determine design wind loads under conditions indicated according to ASCE/SEI 7.

      a. Basic Wind Speed: 115 mph.
      b. Importance Factor: 1.0.
      c. Exposure Category: C.

   2. Deflection Limits: Design glass framing system to limit lateral deflections of glass edges to less than 1/175 of glass-edge length or 3/4 inch, whichever is less, at design pressures.

B. Windborne-Debris Resistance: Provide glazed steel windows capable of resisting impact from windborne debris, based on the pass/fail criteria as determined from testing glazed steel windows identical to those specified, according to ASTM E 1886 and testing information in ASTM E 1996 and requirements of authorities having jurisdiction.

C. Thermal Transmittance: Provide steel windows with the maximum whole-fenestration product U-factor indicated, when tested according to AAMA 1503.

   1. U-Factor: 0.49 Btu/sq. ft. x h x deg F.

D. Solar Heat-Gain Coefficient (SHGC): Provide steel windows with a maximum whole-fenestration product SHGC of 0.40, determined according to NFRC 200.

1.4 ACTION SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Product Data: For each type of product indicated. Include construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, hardware, finishes, and operating instructions.

C. Shop Drawings: Include plans, elevations, sections, details, hardware, attachments to other work, operational clearances, installation details, and the following:

1. Mullion details including reinforcement and stiffeners.
2. Joinery details.
3. Expansion provisions.
4. Flashing and drainage details.
5. Weather-stripping details.
6. Glazing details.
7. Window-cleaning provisions.
8. Accessories.

D. Samples for Verification: For steel windows and components required, prepared on Samples of size indicated below:

1. Main Framing Member: 12-inch- long, full-sized sections, with glazing bead, weather stripping and factory-applied color finish.
2. Hardware: Full-size units with factory-applied finish.

E. Product Schedule: For steel windows. Use same designations indicated on Drawings.

F. Delegated-Design Submittal: For steel windows indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Qualification Data: For qualified Installer and manufacturer.

C. Warranties: Sample of special warranty.

1.6 QUALITY ASSURANCE

A. Source Limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

B. Manufacturer Qualifications: A manufacturer capable of fabricating steel windows that meet or exceed performance requirements indicated and of documenting this performance by inclusion in lists, and by labels, test reports, and calculations.

C. Installer Qualifications: An installer acceptable to window manufacturer for installation of units required for this Project.

1. Installer's responsibilities include providing professional engineering services needed to assume engineering responsibility including preparation of data for steel windows, including Shop Drawings and Designated Design Submittal based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

D. Source Limitations: Obtain steel windows from single source from single manufacturer.

E. Fire-Test-Response Characteristics: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated on Drawings, based on testing indicated.

1. Neutral-Pressure Test: UL 9.
2. Positive-Pressure Test: UL 9.

F. SWI Publication: Comply with applicable requirements in SWI's "The Architect's Guide to Steel Windows and Doors" except where more stringent requirements are indicated.

G. Preinstallation Conference: Conduct conference at Project site.

1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Review and discuss finishing of steel windows that is required to be coordinated with finishing of other steel work for color and finish matching.
3. Review, discuss, and coordinate the interrelationship of steel windows with other exterior wall components. Include provisions for structural anchorage, glazing, flashing, weeping, air barriers, sealants, and protection of finishes.
4. Review and discuss the sequence of work required to construct a watertight and weathertight exterior building envelope.
5. Inspect and discuss the condition of substrate and other preparatory work performed by other trades.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of steel window openings by field measurements before fabrication.

1.8 WARRANTY

A. Refer to Form 816 Article 1.20-1.06.08 and NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information.

B. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of steel windows that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Failure to meet performance requirements.
b. Structural failures including excessive deflection.
c. Water leakage or air infiltration.
d. Faulty operation of operable sash and hardware.
e. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Period: Three years from date of Substantial Completion.
3. Warranty Period for Metal Finishes: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Hot-Rolled Steel Windows:

b. A & S Window Associates, Inc.
c. Hope's Windows, Inc (Basis of Design)
d. Optimum Window Manufacturing Corp.

2.2 MATERIALS

A. Fasteners: Provide fasteners of bronze, brass, stainless steel, or other metal that are warranted by manufacturer to be noncorrosive and compatible with trim, hardware, anchors, and other components of steel windows.

1. Exposed Fasteners: If exposed fasteners are used, provide Phillips flat-head machined screws that match finish of member or hardware being fastened, as appropriate.

B. Anchors, Clips, and Window Accessories: Provide units of stainless steel, hot-dip zinc-coated steel, bronze, brass, or iron complying with ASTM A 123/A 123M. Provide units with sufficient strength to withstand design pressure indicated.

C. Compression-Type Weather Stripping: Provide compressible weather stripping designed for permanently resilient sealing under bumper or wiper action and for complete concealment when steel window is closed.
1. Weather-Stripping Material: Manufacturer's standard.

D. Glazing Stops: Manufacturer's standard.

E. Sealant: For sealants required within fabricated windows, provide manufacturer's standard, permanently elastic, nonshrinking, and nonmigrating type recommended by sealant manufacturer for joint size and movement.

2.3 WINDOWS

A. Window Type: Fixed.

B. Hot-Rolled Steel Window Members: Provide frame and ventilator members formed from hot-rolled, new billet steel sections. For combined weight of frame and ventilator members and front-to-back depth of frame or ventilator members, comply with the following requirements:

1. Heavy Custom Windows: Not less than 4.2 lb/ft. in combined weight and not less than 1-1/2 inches deep.

    a. Dimensions of Projected Frame and Ventilator Members: Nominally 1/8 inch thick by 1-3/8 inches deep except members nominally 1-1/4 inches deep may be used provided corners are welded and ground.

    b. Applied Weather Stripping: Where indicated, 0.074-inch minimum thickness.

2. Window Finish: Baked enamel High performance, organic.

    a. Color and Gloss: Custom color as indicated in finish schedule.

2.4 GLAZING

A. Glass and Glazing System: See Section 088000 "Glazing" for glass units and glazing requirements for steel windows.

2.5 HARDWARE

A. General: Provide manufacturer's standard, solid bronze hardware, with operating components of stainless steel, carbon steel complying with AAMA 907, brass, bronze, or other corrosion-resistant material designed to operate smoothly, to close tightly, and to lock steel window ventilators securely. Provide hardware of sufficient strength to accommodate size and weight of ventilator for which it is intended.

B. Sill Cap/Track: Designed to comply with performance requirements indicated and to drain to the exterior.

2.6 ACCESSORIES

A. General: Provide manufacturer's standard accessories that comply with indicated standards.

B. Window Cleaner Anchor Bolts: Provide window cleaner anchor bolts of standard design, complying with requirements of authorities having jurisdiction. Fabricate bolts of nonmagnetic stainless steel.

1. Reinforce window units or mullions to receive bolts and provide additional anchorage of units at bolt locations.

2.7 FABRICATION

A. General: Fabricate steel windows of type and in sizes indicated to comply with SWI standards. Include a complete system for assembly of components and anchorage of window units.

1. Provide units that are reglazable without dismantling ventilator framing.

B. Mullions: Formed of hot-rolled steel matching window units; with anchors for support to structure and for installation of window units and having sufficient strength to withstand design pressure indicated. Provide mullions of profile indicated and with cover plates. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections.

C. Subframes and Operable Ventilators: Formed of hot-rolled steel of profile indicated. Miter or cope corners, and mechanically fasten and seal joints or weld and dress joints smooth.

D. Provide weep holes and internal water passages to conduct infiltrating water to the exterior.

E. Glazing Stops: Provide screw-applied glazing stops; coordinate with Section 088000 "Glazing" and with glazing system indicated. Provide glazing stops to match panel frames. Finish glazing stops to match window units if fabricated of steel; otherwise, provide manufacturer's standard finish.

2.8 STEEL FINISHES

A. Surface Preparation: Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning" or SSPC-SP 8, "Pickling".

B. Steel Prime Finish: Apply manufacturer's standard primer immediately after cleaning and pretreating.

C. High-Performance Organic Finish: Two-coat fluoropolymer finish containing not less than [**50**] [**70**] percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work. Verify rough opening dimensions, levelness of sill plate, and operational clearances. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure a coordinated, weathertight window installation.

1. Masonry Surfaces: Visibly dry and free of excess mortar, sand, and other construction debris.
2. Wood Frame Walls: Dry, clean, sound, well nailed, free of voids, and without offsets at joints. Ensure that nail heads are driven flush with surfaces in opening and within 3 inches of opening.
3. Metal Surfaces: Dry, clean, and free of grease, oil, dirt, rust, corrosion, and welding slag; without sharp edges or offsets at joints.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's written instructions for installing windows, hardware, operators, accessories, and other components.

B. Install windows level, plumb, square, true to line, without distortion or impediment to thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.

C. Set sill members in bed of sealant or with gaskets, as indicated, to provide weathertight construction.

D. Install windows and components to drain condensation, water-penetrating joints, and moisture migrating within windows to the exterior.

E. Separate corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials according to ASTM E 2112, Section 5.12 "Dissimilar Materials."

3.3 ADJUSTING, CLEANING, AND PROTECTION

A. Clean factory-finished steel surfaces immediately after installing windows. Comply with manufacturer's written recommendations for final cleaning and maintenance. Avoid damaging protective coatings and finishes.

B. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

C. Protect window surfaces from contact with contaminating substances resulting from construction operations. Remove contaminants immediately according to manufacturer's written recommendations.

D. Refinish or replace windows with damaged finish.

END OF SECTION 085123

SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions of Division 1, State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, and Incidental Construction, Form 816 - 2004 and supplemental specifications thereto, shall be a part of this specification.

1.2 SUMMARY

A. Section includes:

1. Mechanical door hardware for the following:

a. Swinging doors.

2. Electrified door hardware.

1.3 ACTION SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Product Data: For each type of product indicated. Include construction and installation details, material descriptions, dimensions of individual components and profiles, and finishes.

C. Shop Drawings: Details of electrified door hardware, indicating the following:

1. Wiring Diagrams: For power, signal, and control wiring and including the following:

a. Details of interface of electrified door hardware and building safety and security systems.
b. Schematic diagram of systems that interface with electrified door hardware.
c. Point-to-point wiring.
d. Risers.

2. Operation Narrative: Describe the operation of doors controlled by electrified door hardware.

D. Other Action Submittals:

1. Door Hardware Schedule: Prepared by or under the supervision of Installer, detailing fabrication and assembly of door hardware, as well as installation procedures and

diagrams. Coordinate final door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

a. Submittal Sequence: Submit door hardware schedule after submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate the fabrication of other work that is critical in Project construction schedule.
b. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule." Double space entries, and number and date each page.
c. Format: Use same scheduling sequence and format as in the Contract Documents.
d. Content: Include the following information:

1) Identification number, location, hand, fire rating, size, and material of each door and frame.
2) Locations of each door hardware set, cross-referenced to Drawings on floor plans and to door and frame schedule.
3) Complete designations, including name and manufacturer, type, style, function, size, quantity, function, and finish of each door hardware product.
4) Description of electrified door hardware sequences of operation and interfaces with other building control systems.
5) Fastenings and other pertinent information.
6) Explanation of abbreviations, symbols, and codes contained in schedule.
7) Mounting locations for door hardware.
8) List of related door devices specified in other Sections for each door and frame.

2. Keying Schedule: Prepared by or under the supervision of Installer, detailing Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations that are coordinated with the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Qualification Data: For Installer and Architectural Hardware Consultant.

C. Product Certificates: For electrified door hardware, from the manufacturer.

1. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.

D. Product Test Reports: For compliance with accessibility requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for door hardware on doors located in accessible routes.

E. Warranty: Special warranty specified in this Section.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

B. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers and an Architectural Hardware Consultant who is available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.

1. Warehousing Facilities: In Project's vicinity.
2. Scheduling Responsibility: Preparation of door hardware and keying schedules.

C. Architectural Hardware Consultant Qualifications: A person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and who is currently certified by DHI as follows:

1. For door hardware, an Architectural Hardware Consultant (AHC) who is also an Electrified Hardware Consultant (EHC).

D. Source Limitations: Obtain each type of door hardware from a single manufacturer.

1. Provide electrified door hardware from same manufacturer as mechanical door hardware, unless otherwise indicated. Manufacturers that perform electrical modifications and that are listed by a testing and inspecting agency acceptable to authorities having jurisdiction are acceptable.

E. Fire-Rated Door Assemblies: Where fire-rated door assemblies are indicated, provide door hardware rated for use in assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C, unless otherwise indicated.

F. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meet requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.

1. Air Leakage Rate: Maximum air leakage of0.3 cfm/sq. ft. at the tested pressure differential of 0.3-inch wg of water.

G. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.

H. Means of Egress Doors: Latches do not require more than 15 lbf to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.

I. Accessibility Requirements: For door hardware on doors in an accessible route, comply with ICC/ANSI A117.1 and the Connecticut State Building Code.

1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf.
2. Comply with the following maximum opening-force requirements:

a. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.

3. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch high.
4. Adjust door closer sweep periods so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the leading edge of the door.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Refer to Form 816 Article 1.06.03 and Form 816 Article 1.20-1.06.03 for additional information.

B. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.

C. Tag each item or package separately with identification coordinated with the final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.

D. Deliver keys to Owner by registered mail or overnight package service.

1.7 COORDINATION

A. Prior to ordering hardware, coordinate keying with Mr. David A. Hartley of the Connecticut Department of Transportation.

B. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.

D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.

E. Existing Openings: Where hardware components are scheduled for application to existing construction or where modifications to existing door hardware are required, field verify existing conditions and coordinate installation of door hardware to suit opening conditions and to provide proper door operation.

1.8 WARRANTY

A. Refer to Form 816 Article 1.20-1.06.08 and NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information.

B. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including excessive deflection, cracking, or breakage.
b. Faulty operation of doors and door hardware.
c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.

2. Warranty Period: Three years from date of Substantial Completion, unless otherwise indicated.

a. Electromagnetic Locks: Five years from date of Substantial Completion.
b. Exit Devices: Two years from date of Substantial Completion.
c. Manual Closers: 10 years from date of Substantial Completion.

1.9 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. Provide door hardware for each door as scheduled in Part 3 "Door Hardware Schedule" Article to comply with requirements in this Section.

1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and products equivalent in function and comparable in quality to named products.
2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.

B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in Part 3 "Door Hardware Schedule" Article. Products are identified by using door hardware designations, as follows:

1. Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers' names are abbreviated in Part 3 "Door Hardware Schedule" Article.

2.2 HINGES

A. Hinges: BHMA A156.1. Provide template-produced hinges for hinges installed on hollow-metal doors and hollow-metal frames.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. IVES Hardware; an Ingersoll-Rand company.
   b. McKinney Products Company; an ASSA ABLOY Group company.
   c. Stanley Commercial Hardware; Div. of The Stanley Works.

2.3 SELF-CLOSING HINGES AND PIVOTS

A. Self-Closing Hinges and Pivots: BHMA A156.17.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Baldwin Hardware Corporation.
   b. McKinney Products Company; an ASSA ABLOY Group company.
   c. Stanley Commercial Hardware; Div. of The Stanley Works.

2.4 MECHANICAL LOCKS AND LATCHES

A. Lock Functions: As indicated in door hardware schedule.

B. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:

1. Bored Locks: Minimum 1/2-inch latchbolt throw.
2. Mortise Locks: Minimum 3/4-inch latchbolt throw.
3. Deadbolts: Minimum 1.25-inch bolt throw.

C. Lock Backset: 2-3/4 inches, unless otherwise indicated.

D. Lock Trim:

1. Description: As indicated in schedule.
2. Levers: Cast.
3. Escutcheons (Roses): Cast.
4. Operating Device: Lever with escutcheons (roses).

E. Strikes: Provide manufacturer's standard strike for each lock bolt or latchbolt complying with requirements indicated for applicable lock or latch and with strike box and curved lip extended to protect frame; finished to match lock or latch.

F. Bored Locks: BHMA A156.2; Grade 1; Series 4000.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Best Access Systems; Div. of Stanley Security Solutions, Inc.
   b. Corbin Russwin Architectural Hardware; n ASSA ABLOY Group Company.
   c. SARGENT Manufacturing Company; an ASSA ABLOY Group company.
   d. Schlage Commercial Lock Division; an Ingersoll-Rand company.

2.5 ELECTRIC STRIKES

A. Electric Strikes: BHMA A156.31; Grade 1; with faceplate to suit lock and frame.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Adams Rite Manufacturing Co.; an ASSA ABLOY Group company.
   b. Folger Adam Electric Door Controls; an ASSA ABLOY Group company.
   c. Von Duprin; an Ingersoll-Rand company.

2.6 SURFACE BOLTS

A. Surface Bolts: BHMA A156.16.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Burns Manufacturing Incorporated.
   b. Door Controls International, Inc.
   c. IVES Hardware; an Ingersoll-Rand company.
   d. Trimco.

2.7 MANUAL FLUSH BOLTS

A. Manual Flush Bolts: BHMA A156.16; minimum 3/4-inch throw; designed for mortising into door edge.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Adams Rite Manufacturing Co.; an ASSA ABLOY Group company.
   b. IVES Hardware; an Ingersoll-Rand company.
   c. Trimco.

2.8 AUTOMATIC AND SELF-LATCHING FLUSH BOLTS

A. Automatic and Self-Latching Flush Bolts: BHMA A156.16; minimum 3/4-inch throw; designed for mortising into door edge.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Door Controls International, Inc.
   b. IVES Hardware; an Ingersoll-Rand company.
   c. Trimco.

2.9 EXIT DEVICES AND AUXILIARY ITEMS

A. Exit Devices and Auxiliary Items: BHMA A156.3.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Adams Rite Manufacturing Co.; an ASSA ABLOY Group company.
   b. Arrow USA; an ASSA ABLOY Group company.
   c. Corbin Russwin Architectural Hardware; an ASSA ABLOY Group company.
   d. Precision Hardware, Inc.; Division of Stanley Security Solutions, Inc.
   e. SARGENT Manufacturing Company; an ASSA ABLOY Group company.
   f. Von Duprin; an Ingersoll-Rand company.

2.10 LOCK CYLINDERS

A. Lock Cylinders: Tumbler type, constructed from brass or bronze, stainless steel, or nickel silver.

1. Manufacturer: Same manufacturer as for locking devices.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. ASSA, Inc.; An ASSA ABLOY Group Company.
   b. Best Access Systems; Div. of Stanley Security Solutions, Inc.
   c. Corbin Russwin Architectural Hardware; an ASSA ABLOY Group company.
   d. SARGENT Manufacturing Company; an ASSA ABLOY Group company.
   e. Schlage Commercial Lock Division; an Ingersoll-Rand company.

B. Standard Lock Cylinders: BHMA A156.5; Grade 1; permanent cores that are interchangeable; face finished to match lockset.

C. High-Security Lock Cylinders: BHMA A156.30; Grade 1; Type ; permanent cores that are removable; face finished to match lockset.

D. Construction Master Keys: Provide cylinders with feature that permits voiding of construction keys without cylinder removal. Provide 10 construction master keys.

E. Construction Cores: Provide construction cores that are replaceable by permanent cores. Provide 10 construction master keys.

2.11 KEYING

A. Temporary 7 pin cores shall be furnished by the contractor for all locks. Cores to be 626 Finish in the Best / Falcon “A” keyway. Cores to be keyed 1335331 for an operating key and operated by a control key of 4118114.

B. One control key and one operating key shall be forwarded to Mr. David A. Hartley and 10 operating keys are to be forwarded to the Engineer.

C. Permanent cores will be furnished, keyed, and installed by the State upon completion of the Project. The State will retain the temporary cores.

2.12 OPERATING TRIM

A. Operating Trim: BHMA A156.6; stainless steel, unless otherwise indicated.

2.13 CLOSER HOLDER RELEASE DEVICES

A. Closer Holder Release Devices: BHMA A156.15; Grade 1; closer connected with separate or integral releasing and fire- or smoke-detecting devices. Door shall become self-closing on interruption of signal to release device. Automatic release is activated by smoke detection system.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:

   a. Corbin Russwin Architectural Hardware; an ASSA ABLOY Group company.
   b. LCN Closers; an Ingersoll-Rand company.
   c. SARGENT Manufacturing Company; an ASSA ABLOY Group company.

2.14 MECHANICAL STOPS AND HOLDERS

A. Wall- and Floor-Mounted Stops: BHMA A156.16; polished cast brass, bronze, or aluminum base metal.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:
   a. IVES Hardware; an Ingersoll-Rand company.
   b. Rockwood Manufacturing Company.
   c. Stanley Commercial Hardware; Div. of The Stanley Works.

2.15 ELECTROMAGNETIC STOPS AND HOLDERS

A. Electromagnetic Door Holders: BHMA A156.15, Grade 1; wall-mounted electromagnetic single unit with strike plate attached to swinging door; coordinated with fire detectors and interface with fire alarm system for labeled fire-rated door assemblies.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:

   a. Architectural Builders Hardware Mfg., Inc.
   b. DORMA Architectural Hardware; Member of The DORMA Group North America.
   c. SARGENT Manufacturing Company; an ASSA ABLOY Group company.

2.16 OVERHEAD STOPS AND HOLDERS

A. Overhead Stops and Holders: BHMA A156.8.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Architectural Builders Hardware Mfg., Inc.
   b. Rockwood Manufacturing Company.
   c. SARGENT Manufacturing Company; an ASSA ABLOY Group company.

2.17 DOOR GASKETING

A. Door Gasketing: BHMA A156.22; air leakage not to exceed 0.50 cfm per foot (0.000774 cu. m/s per m) of crack length for gasketing other than for smoke control, as tested according to ASTM E 283; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Hager Companies.
   b. M-D Building Products, Inc.
   c. National Guard Products.
   d. Pemko Manufacturing Co.; an ASSA ABLOY Group company.
   e. Reese Enterprises, Inc.
   f. Sealeze; a unit of Jason Incorporated.
   g. Zero International.

2.18 THRESHOLDS

A. Thresholds: BHMA A156.21; fabricated to full width of opening indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Hager Companies.
   b. M-D Building Products, Inc.
   c. National Guard Products.
   d. Pemko Manufacturing Co.; an ASSA ABLOY Group company.
   e. Reese Enterprises, Inc.
   f. Rixson Specialty Door Controls; an ASSA ABLOY Group company.
   g. Sealeze; a unit of Jason Incorporated.
   h. Zero International.

2.19 METAL PROTECTIVE TRIM UNITS

A. Metal Protective Trim Units: BHMA A156.6; fabricated from 0.050-inch- (1.3-mm-) thick stainless steel; with manufacturer's standard machine or self-tapping screw fasteners.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Baldwin Hardware Corporation.
    b. IVES Hardware; an Ingersoll-Rand company.
    c. Rockwood Manufacturing Company.
    d. Trimco.

2.20 AUXILIARY DOOR HARDWARE

A. Auxiliary Hardware: BHMA A156.16.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    a. Rockwood Manufacturing Company.
    b. Stanley Commercial Hardware; Div. of The Stanley Works.
    c. Trimco.

2.21 AUXILIARY ELECTRIFIED DOOR HARDWARE

A. Auxiliary Electrified Door Hardware:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    a. GE Security, Inc.
    b. SARGENT Manufacturing Company; an ASSA ABLOY Group company.
    c. Schlage Commercial Lock Division; an Ingersoll-Rand company.
    d. Security Door Controls.

2.22 FABRICATION

A. Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location except in conjunction with required fire-rated labels and as otherwise approved by Architect.

1. Manufacturer's identification is permitted on rim of lock cylinders only.

B. Base Metals: Produce door hardware units of base metal indicated, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18.

C. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.

1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
2. Fire-Rated Applications:

    a. Wood or Machine Screws: For the following:

        1) Hinges mortised to doors or frames.
        2) Strike plates to frames.
        3) Closers to doors and frames.

    b. Steel Through Bolts: For the following unless door blocking is provided:

        1) Surface hinges to doors.
        2) Closers to doors and frames.
        3) Surface-mounted exit devices.

3. Spacers or Sex Bolts: For through bolting of hollow-metal doors.
4. Fasteners for Wood Doors: Comply with requirements in DHI WDHS.2, "Recommended Fasteners for Wood Doors."
5. Gasketing Fasteners: Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

2.23 FINISHES

A. Provide finishes complying with BHMA A156.18 as indicated in door hardware schedule.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Mounting Heights: Mount door hardware units at heights to comply with the following unless otherwise indicated or required to comply with governing regulations.

1. Standard Steel Doors and Frames: ANSI/SDI A250.8.

B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing. Do not install surface-mounted items until finishes have been completed on substrates involved.

1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

C. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches (750 mm) of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.

D. Intermediate Offset Pivots: Where offset pivots are indicated, provide intermediate offset pivots in quantities indicated in door hardware schedule but not fewer than one intermediate offset pivot per door and one additional intermediate offset pivot for every 30 inches (750 mm) of door height greater than 90 inches (2286 mm).

E. Lock Cylinders: Install construction cores to secure building and areas during construction period.

1. Replace construction cores with permanent cores as directed by Owner.

F. Boxed Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings. Verify location with Architect.

1. Configuration: Provide one power supply for each door opening with electrified door hardware.

G. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant complying with requirements specified in Section 079200 "Joint Sealants."

H. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic.

I. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

J. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.

K. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

3.3 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

1. Spring Hinges: Adjust to achieve positive latching when door is allowed to close freely from an open position of 30 degrees.
2. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.
3. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.

B. Occupancy Adjustment: Approximately three months after date of Substantial Completion, Installer's Architectural Hardware Consultant shall examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors, door hardware, and electrified door hardware.

3.4 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items as necessary to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

3.5 DOOR HARDWARE SCHEDULE

END OF SECTION 087100

SECTION 088000 - GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions of Division 1, State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, and Incidental Construction, Form 816 - 2004 and supplemental specifications thereto, shall be a part of this specification.

B. Work included in this section may require coordination with Amtrak regarding track outages, flagmen, or other issues related to work around railroad facilities. The Contractor shall pay special attention to the specification entitled "SAFETY AND PROTECTION OF RAILROAD TRAFFIC AND PROPERTY" and other Amtrak Specifications contained in the Contract.

1.2 SUMMARY

A. Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:

1. Windscreens
2. Opaque spandrel panels in window systems
3. Glass mounting accessories
4. Glazing in elevator towers, stair towers, and pedestrian overpass.

1.3 DEFINITIONS

A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.

C. Interspace: Space between lites of an insulating-glass unit.

1.4 PERFORMANCE REQUIREMENTS

A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Delegated Design: Design glass, including comprehensive engineering analysis according to ICC's 2003 International Building Code by a qualified professional engineer, using the following design criteria:

1. Design Wind Pressures: As indicated on Drawings.
2. Design Wind Pressures: Determine design wind pressures applicable to Project according to ASCE/SEI 7, based on heights above grade indicated on Drawings.

    a. Wind Design Data: As indicated on Drawings.
    b. Basic Wind Speed: 120 mph.
    c. Importance Factor: 1.0
    d. Exposure Category: C.

3. Design Snow Loads: As indicated on Drawings.
4. Vertical Glazing: For glass surfaces sloped 15 degrees or less from vertical, design glass to resist design wind pressure based on glass type factors for short-duration load.
5. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or 1 inch, whichever is less.
6. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

1.5 PRECONSTRUCTION TESTING

A. Preconstruction Adhesion and Compatibility Testing: Test each glazing material type, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.

1. Testing will not be required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.
2. Use ASTM C 1087 to determine whether priming and other specific joint-preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glass, tape sealants, gaskets, and glazing channel substrates.
3. Test no fewer than eight Samples of each type of material, including joint substrates, shims, sealant backings, secondary seals, and miscellaneous materials.
4. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
5. For materials failing tests, submit sealant manufacturer's written instructions for corrective measures including the use of specially formulated primers.

1.6 ACTION SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Product Data: For each glass product and glazing material indicated.

C. Glass Samples: For each type of the following products; 12 inches square.

1. Tinted glass.
2. Fire-resistive glazing products.
3. Laminated glass.

D. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

E. Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.7 INFORMATIONAL SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Qualification Data: For installers.

C. Product Certificates: For glass and glazing products, from manufacturer.

D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for glazing sealants and glazing gaskets.

1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.

E. Preconstruction adhesion and compatibility test report.

F. Warranties: Sample of special warranties.

G. Manufacturer Certification Letter in accordance with NOTICE TO CONTRACTOR – POTENTIAL FOR ASBESTOS CONTAINING MATERIALS.

1.8 QUALITY ASSURANCE

A. Source Limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

B. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.

C. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.

D. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

E. Source Limitations for Glass: Obtain laminated glass and insulating glass from single source from single manufacturer for each glass type.

F. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. GANA Publications: GANA's "Laminated Glazing Reference Manual" and GANA's "Glazing Manual."
2. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR-A7, "Sloped Glazing Guidelines."
3. IGMA Publication for Sloped Glazing: IGMA TB-3001, "Guidelines for Sloped Glazing."
4. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."

G. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark each glass with certification label of the SGCC. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies. Label shall not be obscured by frame assembly.

H. Fire-Protection-Rated Glazing Labeling: Permanently mark each fire-protection-rated glass panel with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, test standard, whether glazing is for use in fire doors or other openings, whether or not glazing passes hose-stream test, whether or not glazing has a temperature rise rating of 450 deg F, and the fire-resistance rating in minutes. Label shall not be obscured by frame assembly.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Refer to Form 816 Article 1.06.03 and Form 816 Article 1.20-1.06.03 for additional information.

B. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

C. Comply with insulating-glass manufacturer's written recommendations for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.10 PROJECT CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or below 40 deg F.

1.11 WARRANTY

A. Refer to Form 816 Article 1.20-1.06.08 and NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information.

B. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form in which coated-glass manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.

1. Warranty Period: 10 years from date of Substantial Completion.

C. Manufacturer's Special Warranty on Laminated Glass: Manufacturer's standard form in which laminated-glass manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

1. Warranty Period: 10 years from date of Substantial Completion.

D. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form in which insulating-glass manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GLASS PRODUCTS, GENERAL

A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.

1. Minimum Glass Thickness for Exterior Lites: Not less than 6.0 mm.
2. Thickness of Tinted Glass: Provide same thickness for each tint color indicated throughout Project.

B. Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass, or Kind FT heat-treated float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened glass is indicated, provide Kind HS heat-treated float glass or Kind FT heat-treated float glass as needed to comply with "Performance

C. Windborne-Debris-Impact Resistance: Provide exterior glazing that passes enhanced-protection testing requirements in ASTM E 1996 for Wind Zone 1 when tested according to ASTM E 1886. Test specimens shall be no smaller in width and length than glazing indicated for use on the Project and shall be installed in same manner as glazing indicated for use on the Project.

1. Large-Missile Test: For glazing located within 30 feet of grade.
2. Small-Missile Test: For glazing located more than 30 feet above grade.
3. Large-Missile Test: For all glazing, regardless of height above grade.

D. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:

1. For monolithic-glass lites, properties are based on units with lites of thickness indicated.
2. For laminated-glass lites, properties are based on products of construction indicated.
3. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
4. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F.
5. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
6. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.2 GLASS PRODUCTS

A. Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.

B. Ultraclear Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I, complying with other requirements specified and with visible light transmission not less than 91 percent and solar heat gain coefficient not less than 0.87.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. AFG Industries, Inc.; Krystal Klear.
b. Guardian Industries Corp.; Ultrawhite.
c. Pilkington North America; Optiwhite.
d. PPG Industries, Inc.; Starphire.

C. Heat-Treated Float Glass: ASTM C 1048; Type I; Quality-Q3; Class I (clear) unless otherwise indicated; of kind and condition indicated.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
2. For uncoated glass, comply with requirements for Condition A.
3. For coated vision glass, comply with requirements for Condition C (other coated glass).

D. Pyrolytic-Coated, Self-Cleaning, Low-Maintenance Glass: Clear float glass with a coating on first surface having both photocatalytic and hydrophilic properties that act to loosen dirt and to cause water to sheet evenly over the glass instead of beading.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. AFG Industries, Inc.; Spotless Ti.
b. Cardinal Glass Industries; LoE2 Plus.
c. Pilkington North America; Activ.
d. PPG Industries, Inc.; SunClean.

E. Silicone-Coated Spandrel Glass: ASTM C 1048, Condition C, Type I, Quality-Q3, and complying with other requirements specified.

1. Glass: Tinted float.
2. Tint Color: Gray.
3. Silicone Coating Color: As selected by Architect from manufacturer's full range.

2.3 LAMINATED GLASS

A. Laminated Glass: ASTM C 1172, and complying with testing requirements in 16 CFR 1201 for Category II materials, and with other requirements specified. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.

1. Construction: Laminate glass with polyvinyl butyral interlayer or cast-in-place and cured-transparent-resin interlayer to comply with interlayer manufacturer's written recommendations.
2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
3. Interlayer Color: Clear unless otherwise indicated.

B. Windborne-Debris-Impact-Resistant Laminated Glass: ASTM C 1172, and complying with testing requirements in 16 CFR 1201 for Category II materials, with "Windborne-Debris-Impact Resistance" Paragraph in "Glass Products, General" Article, and with other requirements specified. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.

1. Construction: Laminate glass with one of the following to comply with interlayer manufacturer's written recommendations:

a. Polyvinyl butyral interlayer.
b. Polyvinyl butyral interlayers reinforced with polyethylene terephthalate film.
c. Ionoplast interlayer.
d. Cast-in-place and cured-transparent-resin interlayer.
e. Cast-in-place and cured-transparent-resin interlayer reinforced with polyethylene terephthalate film.

2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
3. Interlayer Color: Clear unless otherwise indicated.

C. Glass: Comply with applicable requirements in "Glass Products" Article as indicated by designations in "Laminated-Glass Types" Article.

2.4 FIRE-PROTECTION-RATED GLAZING

A. Fire-Protection-Rated Glazing, General: Listed and labeled by a testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252 for door assemblies and NFPA 257 for window assemblies.

B. Monolithic Ceramic Glazing: Clear, ceramic flat glass; 3/16-inch nominal thickness.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Nippon Electric Glass Co., Ltd. (distributed by Technical Glass Products); Premium FireLite.
b. Safti First; SuperLite C/P.
c. Schott North America, Inc.; Pyran Star.
d. Vetrotech Saint-Gobain; SGG Keralite FR-R.
e. .

C. Fire-Protection-Rated Tempered Glass: 1/2-inch- thick, fire-protection-rated tempered glass, complying with testing requirements in 16 CFR 1201 for Category II materials.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. InterEdge, Inc., a subsidiary of AFG Industries, Inc.; PyroEdge-20.
b. Safti First; SuperLite20.
c. Vetrotech Saint-Gobain; SSG Pyroswiss.
d. .

D. Fire-Protection-Rated Laminated Glass: 5/16-inch- thick, fire-protection-rated laminated glass, complying with testing requirements in 16 CFR 1201 for Category II materials.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Oldcastle Glass, Inc.; Pyroguard.

2.5 GLAZING GASKETS

A. Dense Compression Gaskets: Molded or extruded gaskets of profile and hardness required to maintain watertight seal, made from one of the following:

1. Neoprene complying with ASTM C 864.
2. EPDM complying with ASTM C 864.
3. Silicone complying with ASTM C 1115.
4. Thermoplastic polyolefin rubber complying with ASTM C 1115.

B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned neoprene EPDM silicone or thermoplastic polyolefin rubber gaskets complying with ASTM C 509, Type II, black; of profile and hardness required to maintain watertight seal.

1. Application: Use where soft compression gaskets will be compressed by inserting dense compression gaskets on opposite side of glazing or pressure applied by means of pressure-glazing stops on opposite side of glazing.

C. Lock-Strip Gaskets: Neoprene extrusions in size and shape indicated, fabricated into frames with molded corner units and zipper lock-strips, complying with ASTM C 542, black.

2.6 GLAZING SEALANTS

A. General:

1. Compatibility: Provide glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Dow Corning Corporation; 790.
b. GE Advanced Materials - Silicones; SilPruf LM SCS2700.
c. May National Associates, Inc.; Bondaflex Sil 290.
d. Pecora Corporation; 890.
e. Sika Corporation, Construction Products Division; SikaSil-C990.
f. Tremco Incorporated; Spectrem 1.
g. .

C. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 50, Use NT.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. BASF Building Systems; Omniseal 50.
b. Dow Corning Corporation; 995.
c. GE Advanced Materials - Silicones; UltraPruf II SCS2900.
d. May National Associates, Inc.; Bondaflex Sil 295.
e. Pecora Corporation; 898.
f. Polymeric Systems, Inc.; PSI-641.
g. Sika Corporation, Construction Products Division; SikaSil-C995.
h. Tremco Incorporated; Spectrem 3.

D. Glazing Sealants for Fire-Rated Glazing Products: Products that are approved by testing agencies that listed and labeled fire-resistant glazing products with which they are used for applications and fire-protection ratings indicated.

2.7 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:

1. AAMA 804.3 tape, where indicated.
2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:

1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.8 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

F. Perimeter Insulation for Fire-Resistive Glazing: Product that is approved by testing agency that listed and labeled fire-resistant glazing product with which it is used for application and fire-protection rating indicated.

2.9 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.

C. Grind smooth and polish exposed glass edges and corners.

2.10 LAMINATED-GLASS TYPES

A. Glass Type : Clear laminated glass with two plies of ultraclear fully tempered float glass.

1. Thickness of Each Glass Ply: As indicated.
2. Interlayer Thickness: 0.030 inch.
3. Provide safety glazing labeling.

2.11 FIRE-PROTECTION-RATED GLAZING TYPES

A. Glass Type : 60-minute fire-rated glazing with 450 deg F temperature rise limitation; laminated glass with intumescent interlayers or gel-filled, double glazing units.

1. Provide safety glazing labeling.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Presence and functioning of weep systems.
3. Minimum required face and edge clearances.
4. Effective sealing between joints of glass-framing members.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that will leave visible marks in the completed work.

3.3 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Adjust glazing channel dimensions as required by Project conditions during installation to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

G. Provide spacers for glass lites where length plus width is larger than 50 inches.

1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.

K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Do not remove release paper from tape until right before each glazing unit is installed.

F. Apply heel bead of elastomeric sealant.

G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 GASKET GLAZING (DRY)

A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to

E. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.7 LOCK-STRIP GASKET GLAZING

A. Comply with ASTM C 716 and gasket manufacturer's written instructions. Provide supplementary wet seal and weep system unless otherwise indicated.

3.8 CLEANING AND PROTECTION

A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer.

C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.

D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.

E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION 088000

SECTION 089000 - LOUVERS AND VENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions of Division 1, State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, and Incidental Construction, Form 816 - 2004 and supplemental specifications thereto, shall be a part of this specification.

B. Work included in this section may require coordination with Amtrak regarding track outages, flagmen, or other issues related to work around railroad facilities. The Contractor shall pay special attention to the specification entitled "SAFETY AND PROTECTION OF RAILROAD TRAFFIC AND PROPERTY" and other Amtrak Specifications contained in the Contract.

1.2 SUMMARY

A. Section Includes:

1. Fixed, storm class extruded-aluminum louvers.

1.3 DEFINITIONS

A. Louver Terminology: Definitions of terms for metal louvers contained in AMCA 501 apply to this Section unless otherwise defined in this Section or in referenced standards.

B. Horizontal Louver: Louver with horizontal blades; i.e., the axes of the blades are horizontal.

C. Vertical Louver: Louver with vertical blades; i.e., the axes of the blades are vertical.

D. Drainable-Blade Louver: Louver with blades having gutters that collect water and drain it to channels in jambs and mullions, which carry it to bottom of unit and away from opening.

E. Storm-Resistant Louver: Louver that provides specified wind-driven rain performance, as determined by testing according to AMCA 500-L.

1.4 PERFORMANCE REQUIREMENTS

A. Structural Performance: Louvers shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver blade rattle or flutter, or permanent damage to fasteners and anchors. Wind pressures shall be considered to act normal to the face of the building.

1. Wind Loads: Determine loads based on a uniform pressure of 30 lbf/sq. ft. (1436 Pa) acting inward or outward.

1.5 ACTION SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Product Data: For each type of product indicated.

1. For louvers specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.

C. Shop Drawings: For louvers and accessories. Include plans, elevations, sections, details, and attachments to other work. Show frame profiles and blade profiles, angles, and spacing.

1. Show weep paths, gaskets, flashing, sealant, and other means of preventing water intrusion.
2. Show mullion profiles and locations.
3. Wiring Diagrams: For power, signal, and control wiring for motorized adjustable louvers.

D. Samples for Verification: For each type of metal finish required.

1.6 INFORMATIONAL SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Product Test Reports: Based on evaluation of comprehensive tests performed according to AMCA 500-L by a qualified testing agency or by manufacturer and witnessed by a qualified testing agency, for each type of louver and showing compliance with performance requirements specified.

1.7 QUALITY ASSURANCE

A. Source Limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

B. SMACNA Standard: Comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" for fabrication, construction details, and installation procedures.

1.8 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.9 DELIVERY, STORAGE AND HANDLING

A. Refer to Form 816 Article 1.06.03 and Form 816 Article 1.20-1.06.03 for additional information.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aluminum Extrusions: ASTM B 221, Alloy 6063-T5, T-52, or T6.

B. Aluminum Sheet: ASTM B 209, Alloy 3003 or 5005 with temper as required for forming, or as otherwise recommended by metal producer for required finish.

C. Aluminum Castings: ASTM B 26/B 26M, Alloy 319.

D. Fasteners: Use types and sizes to suit unit installation conditions.

1. Use hex-head or Phillips pan-head screws for exposed fasteners unless otherwise indicated.
2. For color-finished louvers, use fasteners with heads that match color of louvers.

2.2 FABRICATION, GENERAL

A. Assemble louvers in factory to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

B. Maintain equal louver blade spacing to produce uniform appearance.

C. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.

1. Frame Type: Channel unless otherwise indicated.

D. Include supports, anchorages, and accessories required for complete assembly.

E. Provide vertical mullions of type and at spacings indicated, but not more than recommended by manufacturer, or 72 inches o.c., whichever is less.

F. Join frame members to each other and to fixed louver blades with fillet welds, threaded fasteners, or both, as standard with louver manufacturer unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

2.3 FIXED, EXTRUDED-ALUMINUM LOUVERS

A. Horizontal Storm-Resistant Louver:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Airolite Company, LLC (The); Model SCH201 (Basis of design).
   b. Arrow United Industries; a division of Mestek, Inc.
   c. Greenheck Fan Corporation.

2. Louver Depth: 2”.
3. Blades shall be horizontal, inverted-V type with a center hook and spaced approximately 1”on center.
4. Frame and Blade Nominal Thickness: Not less than 0.063 inch min.
5. Louver Performance Ratings:

    a. Free Area: Not less than 39%.
    b. Wind-Driven Rain Performance: Not less than 99.5 percent effectiveness when subjected to a rainfall rate of 3 inches per hour and a wind speed of 29 mph at a core-area intake velocity of 189 fpm.

2.4 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

2.5 ALUMINUM FINISHES

A. Finish louvers after assembly.

B. High-Performance Organic Finish: 3-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

    1. Color and Gloss: To match adjacent structural steel finish.

2.6 LOUVER SCREENS

A. General: Provide screen at each exterior louver.

    1. Screen Location for Fixed Louvers: Interior face.
    2. Screening Type: Bird screening.

B. Secure screen frames to louver frames with stainless-steel machine screws, spaced a maximum of 6 inches (150 mm) from each corner and at 12 inches (300 mm) o.c.

C. Louver Screen Frames: Fabricate with mitered corners to louver sizes indicated.

    1. Metal: Same kind and form of metal as indicated for louver to which screens are attached.
    2. Finish: Same finish as louver frames to which louver screens are attached.
    3. Type: Non-rewirable, U-shaped frames.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and openings, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorages that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

3.3 INSTALLATION

A. Locate and place louvers and vents level, plumb, and at indicated alignment with adjacent work.

B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.

C. Form closely fitted joints with exposed connections accurately located and secured.

D. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.

E. Repair finishes damaged by cutting, welding, soldering, and grinding. Restore finishes so no evidence remains of corrective work. Return items that cannot be refinished in the field to the factory, make required alterations, and refinish entire unit or provide new units.

F. Protect unpainted galvanized and nonferrous-metal surfaces that will be in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint or by separating surfaces with waterproof gaskets or nonmetallic flashing.

G. Install concealed gaskets, flashings, joint fillers, and insulation as louver installation progresses, where weathertight louver joints are required. Comply with Section 079200 "Joint Sealants" for sealants applied during louver installation.

3.4 ADJUSTING AND CLEANING

A. Test operation of adjustable louvers and adjust as needed to produce fully functioning units that comply with requirements.

B. Clean exposed surfaces of louvers and vents that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate during construction period.

C. Before final inspection, clean exposed surfaces with water and a mild soap or detergent not harmful to finishes. Thoroughly rinse surfaces and dry.

D. Restore louvers and vents damaged during installation and construction so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Architect, remove damaged units and replace with new units.

1. Touch up minor abrasions in finishes with air-dried coating that matches color and gloss of, and is compatible with, factory-applied finish coating.

END OF SECTION 089000

SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions of Division 1, State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, and Incidental Construction, Form 816 - 2004 and supplemental specifications thereto, shall be a part of this specification.

1.2 SUMMARY

A. Section Includes:
   1. Gypsum board and accessories.

1.3 ACTION SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Manufacturer Certification Letter in accordance with NOTICE TO CONTRACTOR – POTENTIAL FOR ASBESTOS CONTAINING MATERIALS.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

1.6 DELIVERY, STORAGE AND HANDLING

A. Refer to Form 816 Article 1.06.03 and Form 816 Article 1.20-1.06.03 for additional information.

B. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.7 FIELD CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

2.2 GYPSUM BOARD, GENERAL

A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.3 INTERIOR GYPSUM BOARD

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. American Gypsum.
2. CertainTeed Corp.
3. Georgia-Pacific Gypsum LLC.
4. USG Corporation.

B. Gypsum Board, Type X: ASTM C 1396/C 1396M.

1. Thickness: 5/8 inch.
2. Long Edges: Tapered and featured (rounded or beveled) for prefilling.

C. Abuse-Resistant Gypsum Board: ASTM C 1629/C 1629M, Level 1.

1. Core: 5/8 inch, Type X.
2. Long Edges: Tapered.
3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

D. Moisture- and Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.

1. Core: 5/8 inch, Type X.
2. Long Edges: Tapered.
3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.4 TRIM ACCESSORIES

A. Trim: ASTM C 1047.

1. Material: Hot-dip galvanized steel sheet, plastic, or rolled zinc.
2. Shapes:

a. Cornerbead.
b. LC-Bead: J-shaped; exposed long flange receives joint compound.
c. Expansion (Control) Joint: One-piece, rolled zinc with V-shaped slot and removable strip covering slot opening.

2.5 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:

1. Gypsum Board: Paper.

C. Joint Compound for Exterior Applications:

1. Gypsum Board: Use setting-type taping compound and setting-type, sandable topping compound.

2.6 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

C. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates including welded hollow-metal frames and framing, with Installer present, for compliance with requirements and other conditions affecting performance.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

A. Comply with ASTM C 840.

B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.

D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

E. Form control and expansion joints with space between edges of adjoining gypsum panels.

F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.

1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
2. Fit gypsum panels around ducts, pipes, and conduits.
3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- wide joints to install sealant.

G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

I. Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber,

3.3 APPLYING INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:

1. Wallboard Type: As indicated on Drawings.
2. Type X: As indicated on Drawings.
3. Abuse-Resistant Type: As indicated on Drawings.
4. Moisture- and Mold-Resistant Type: As indicated on Drawings.

B. Single-Layer Application:

1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
2. On partitions/walls, apply gypsum panels vertically (parallel to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.

    a. Stagger abutting end joints not less than one framing member in alternate courses of panels.

3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

C. Multilayer Application:

1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
3. On Z-furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
4. Fastening Methods: Fasten base layers and face layers separately to supports with screws.

3.4 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect.

C. Interior Trim: Install in the following locations:

1. Cornerbead: Use at outside corners.
2. Bullnose Bead: Use at outside corners.
3. LC-Bead: Use at exposed panel edges.
4. L-Bead: Use where indicated.
5. U-Bead: Use where indicated.
6. Curved-Edge Cornerbead: Use at curved openings.

3.5 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints and damaged surface areas.

C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:

1. Level 5: All locations.

a. Primer and its application to surfaces are specified in other Section 099123 "Interior Painting."

E. Glass-Mat Gypsum Sheathing Board: Finish according to manufacturer's written instructions for use as exposed soffit board.

F. Glass-Mat Faced Panels: Finish according to manufacturer's written instructions.

3.6 PROTECTION

A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

C. Remove and replace panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092900

SECTION 093050 -TACTILE WARNING STRIP - SURFACE APPLIED

PART 1 - GENERAL

1.1 DESCRIPTION

A. This Section specifies furnishing and installing surface applied composite tactile tiles for passenger platforms as indicated on plans, using an exterior grade tactile warning surface tile herein.

B. Drawings and general provisions of the Contract, including General Conditions of Division 1, State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, and Incidental Construction, Form 816 - 2004 and supplemental specifications thereto, shall be a part of this specification.

C. Work included in this section may require coordination with Amtrak regarding track outages, flagmen, or other issues related to work around railroad facilities. The Contractor shall pay special attention to the specification entitled "SAFETY AND PROTECTION OF RAILROAD TRAFFIC AND PROPERTY" and other Amtrak Specifications contained in the Contract.

D. This designation is the "*Basis of Design*" to which a Contractor's submittal must meet or exceed in terms of quality, finish, operation and appearance (see 2.1B).

1.2 SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and Notice to Contractor – Submittals.

B. Product Data: Submit manufacturer's literature describing products, installation procedures and routine maintenance.

C. Samples for Verification Purposes: Submit three (3) samples of full size surface applied composite tactile tiles of the kind proposed for use.

D. Shop drawings are required for products specified showing fabrication details; tile surface profile; fastener type and locations; plans of tile placement including joints, installation procedure and material to be used as well as outlining installation materials and procedure.

E. Material Test Reports: Submit test reports from qualified independent testing laboratory indicating that materials proposed for use are in compliance with requirements and meet the properties indicated.

F. Maintenance Instructions: Submit copies of manufacturer's specified maintenance practices for each type of tactile tile and accessory as required. For more information refer to NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS.

1.3 QUALITY ASSURANCE

A. Provide surface applied tactile tiles and accessories as produced by a single manufacturer.

B. Installer's Qualifications: Engage an experienced Installer certified in writing by tactile flooring manufacturer as qualified for installation, who has successfully completed tile installations similar in material, design, and extent to that indicated for Project. Manufacturer's supervisor shall be present at all times.

1.4 REGULATORY REQUIREMENTS

Comply with provisions of the following:

A. Americans with Disabilities Act: Provide tactile warning surfaces which comply with the detectable warnings on walking surfaces section of the Americans with Disabilities Act (Title 49 CFR TRANSPORTATION, Part 37.9 STANDARDS FOR ACCESSIBLE TRANSPORTATION FACILITIES, Appendix A, Section 4.29.2 DETECTABLE WARNINGS ON WALKING SURFACES. In addition products must comply with CALIFORNIA TITLE 24 requirements regarding patterns, color and sound on cane contact.

B. Comply with all local, municipal, state and federal agencies and their regulations having jurisdiction over the project.

1.5 DELIVERY, STORAGE AND HANDLING

A. Tiles shall be suitably packaged or crated to prevent damage in shipment or handling. Finished surfaces shall be protected by sturdy wrappings, and tile type shall be identified by part number.

B. Tiles shall be delivered to a secured location specified by the Contractor for storage prior to installation.

1.6 SITE CONDITIONS

A. Environmental Conditions and Protection: Maintain minimum temperature of 40 degrees F in spaces to receive tactile tiles for at least 48 hours prior to installations, during installation, and for not less than 48 hours after installation. Store tactile tiles material in spaces where they will be installed for at least 48 hours before beginning installation. Subsequently, maintain minimum temperature of 40 degrees F in areas where work is completed.

B. The use of water for work, cleaning or dust control, etc. shall be in contained and controlled and shall not be allowed to come into contact with the passengers or public. Provide barricades or screens to protect passengers or public.

C. Disposal of any liquids or other materials of possible contamination shall be made in accordance with federal state and local laws and ordinances.

D. Cleaning materials shall have code acceptable low VOC solvent content and low flammability if used on the site.

E. Contractor shall coordinate phasing and flagging personnel operations as specified elsewhere.

1.7 EXTRA STOCK

A. Deliver extra stock to warehouse designated by Designer. Furnish new materials from same manufactured lot as materials installed and enclose in protective packaging with appropriate identification. Furnish not less than two 2% of the supplied materials for each type, color and pattern installed. For more information refer to NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS.

1.8 GUARANTEE

A. Surface applied composite tactile tiles shall be guaranteed in writing for a period of five (5) years from date of final completion. The guarantee includes defective work, breakage, deformation, fading and chalking of finishes, and loosening of panels.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: The Vitrified Polymer Composite (VPC) Surface Applied Tactile Tiles specified and shown on the plans is based on "Armor-Tile" manufactured by *Engineered Plastics, Inc*. (800-682-2525). Existing engineered ADA and California Title 24 field tested products in service for a minimum of 2 years which are subject to compliance with requirements, may be incorporated in the work and shall meet or exceed the specified test criteria and characteristics.

B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

1. Engineered Plastics, Inc., "Armor-Tile"
2. ADA Solutions

2.2 VITRIFIED POLYMER COMPOSITE (VPC) TACTILE TILES

A. Vitrified Polymer Composite (VPC) Surface Applied Tactile Tiles: An epoxy polymer composition with an ultra-violet coating employing aluminum oxide particles in the truncated domes and the following:

1. Tile Dimensions: Nominal 2 ft. by 4 ft. by 0.125 inches thick; 0.325 inches thick at the domes, with a 1/2" inch deep front edge flange and 1/2 inch deep back flange. Tiles shall be formed with holes for anchors in the dome; minimum of 14 holes per tile. Three of the holes shall be in the first row of domes which overlaps and fastens through a 1 inch lap-flange in the next tile.

2. Water Absorption of Tile when tested by ASTM-D 570 not to exceed 0.35%.

3. Slip Resistance of Tile when tested by ASTM-C 1028 the combined wet/dry static co-efficient of friction not to be less than 0.80.

4. Compressive Strength of tile when tested by ASTM-D 695-91 not to be less than 18,000 psi.

5. Tensile Strength of Tile when tested by ASTM-D 638-91 not to be less than 10,000 psi.

6. Flexural Strength of Tile when tested by ASTM - C293-94 not to be less than 24,000 psi.

7. Gardner Impact to geometry "GE" of the standard when tested by ASTM-D 5420-93 to have a mean failure energy expressed as a function of specimen thickness of not less than 450 in. lbf/in. A failure is noted if a hairline fracture is visible in the specimen.

8. Chemical Stain Resistance of Tile when tested by ASTM-D 543-87 to withstand without discoloration or staining - 1% hydrochloric acid, urine, calcium chloride, stamp pad ink, gum and red aerosol paint.

9. Abrasive Wear of Tile when tested by BYK - Gardner Tester ASTM-D 2386 with reciprocating linear motion of 37+/- cycles per minute over a 10" travel. The abrasive medium, a 40 grit Norton Metallite sand paper, was fixed and leveled to a holder. The combined mass of the sled, weight and wood block is 3.2 lb. Average wear depth shall not exceed 0.030 after 1000 abrasion cycles measured on the top surface of the dome representing the average of three measurement locations per sample.

10. Fire Resistance: When tested to ASTM E84 flame spread shall be less than 25.

11. Accelerated Weathering of Tile when tested by ASTM-G26-95 for 2000 hours shall exhibit the following result - no deterioration, fading or chalking of surface of tile.

12. Accelerated Aging and Freeze Thaw Test of Tile and Adhesive System when tested to ASTM-D 1037 shall show no evidence of cracking, delamination, warpage, checking, blistering, color change, loosening of tiles or other defects.

13. Salt and Spray Performance of Tile and Adhesive System when tested to ASTM-B 117 not to show any deterioration or other defects after 100 hours of exposure.

14. Color: Yellow conforming to Federal Color No. 33538. Color shall be homogenous throughout the tile.

2.3 MISCELLANEOUS MATERIALS

A. Stainless steel low profile expansion anchors 1/4 inch diameter by 2-1/8 inch long to be positioned in the molded recess of fourteen truncated domes per tile minimum.

B. Heavy-duty elastomeric polyurethane adhesive

1. Available Manufactures:
   a. Boiardi
   b. Mapei
   c. Bostik
   d. Approved equal.

C. Fasteners: Provide Type 304 or 316 stainless-steel fasteners for exterior use. Select fasteners for type, grade, and class required

PART 3 - EXECUTION

3.1 INSTALLATION

A. During all surface preparation and tile installation procedures ensure adequate safety guidelines are in place and that they are in accordance with the applicable industry and government standards.

B. The application of all adhesives, sealants and mechanical fasteners shall be in strict accordance with the guidelines set by their respective manufacturers.

C. Throughout the installation phases of surface preparation and tile setting, ensure that care is taken to prevent damage to any work.

D. Work with the Contractor to ensure that the surfaces being prepared and fabricated to receive the tiles is constructed correctly and adequately for the tile installation. Review the plans with the Contractor prior to construction and refer any and all discrepancies to the Engineer and Designer.

E. Ensure all dimensions and tolerances are as shown on the contract drawing. Use two of the tactile tiles shipped as a template to check all tolerances are within that of the contract drawing.

F. The surface is to be vacuumed and flushed with clean clear water, free from all dirt and debris. Visually inspect all surface for obtrusions or foreign matter. If obtrusions are present, promptly grind away, making sure edges are not chipped or damaged.

G. Immediately prior to installing the surface applied tactile tiles, all surfaces must be inspected to ensure that they are clean, dry, free of voids, curing compounds, projections, loose material, dust, oils, grease, sealers and determined to be structurally sound before the application of the setting adhesive. The setting adhesive requires that the substrate and the ambient temperature are 40 degree F minimum.

H. On planed (milled) concrete surfaces:

1. Spread the adhesive to provide complete coverage over the planed concrete surface and platform edge, using a clean, well-maintained 1/4" x 1/4" V notch trowel. The adhesive is also to be applied to the leading edge to a depth of 1/2" for proper tile embedment.

2. Inspect the tile and clean with acetone all dust and other contaminants from the surfaces to be adhered, then set the tile in place, true and square to the platform edge. Drill holes true and straight to the depth required using the recommended bit with holes located by the molded recesses provided in the tile. Clean dust from the holes to provide clear passage for the anchor.

3. Mechanically fasten tiles to the floor surface using a punch pin and hammer to set the stainless steel impact anchors provided. Ensure the fastener has been set to full depth, straight and true. Care should be taken when setting the fastener to avoid any inadvertent blows with the hammer to the tile surface.

4. Following the installation of the tiles and allowing the tile setting adhesive 12 hours for curing, the urethane sealant system color matched to the adjacent floor finish should be applied to the leading edge to finish the tile flush with the adjacent floor finish. Follow the manufacturer's recommendations when mixing or applying the sealant system and ensure that the joint is clean and free of debris, and any excess adhesive is cut away to provide sufficient depth for the sealant in the saw cut in accordance with the plans.

I. On the aluminum fold-up edge: Mechanically fasten tiles to aluminum surface using stainless steel set screws in each of the pre-drilled dome holes, as required by the Manufacturer.

J. The leading edge of the tile should be checked to ensure that the tolerance provided is in accordance with the plans. Adjustment to the tiles leading edge is accomplished with a small shim driven into the leading edge saw cut to wedge the tile flange against the side walls of the groove and hold the tile to the desired elevation.

K. All subsequent tiles are set following the same procedures as outlined above. The gap of 1/8" allowed between tiles for expansion and contraction is mandatory.

L. After the platform edge has been fully tiled and sealant system applied, the tile surface shall be cleaned, following the recommended maintenance and cleaning procedures.

3.2 CLEANING AND PROTECTING

A. Protect panels against damage during construction period to comply with tactile panel manufacturer's specification.

B. Protect panels against damage from rolling loads following installation by covering with plywood or hardwood.

C. Clean tactile panels not more than four days prior to date scheduled for inspection intended to establish date of substantial completion in each area of project. Clean tactile panel by method specified by tactile panel manufacturer.

END OF SECTION 093050

SECTION 099113 - EXTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions of Division 1, State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, and Incidental Construction, Form 816 - 2004 and supplemental specifications thereto, shall be a part of this specification.

B. Work included in this section may require coordination with Amtrak regarding track outages, flagmen, or other issues related to work around railroad facilities. The Contractor shall pay special attention to the specification entitled “SAFETY AND PROTECTION OF RAILROAD TRAFFIC AND PROPERTY” and other Amtrak Specifications contained in the Contract.

1.2 SUMMARY

A. Section includes surface preparation and the application of paint systems on the following exterior substrates:
   1. Wood and fiber-cement siding.
   2. Gypsum board.

B. All sainted steel components shall be shop-applied, and are specified elsewhere.

C. Related Requirements:

   1. Section 051200 "Structural Steel Framing" for shop priming of metal substrates with primers specified in this Section.
   2. Section 099600 "High-Performance Coatings" for special-use coatings.
   3. Section 099300 "Staining and Transparent Finishing" for surface preparation and the application of wood stains and transparent finishes on exterior wood substrates.

1.3 DEFINITIONS

A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.

B. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

C. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.

D. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

E. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

F. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Product Data: For each type of product. Include preparation requirements and application instructions.

C. Samples for Verification: For each type of paint system and each color and gloss of topcoat.

1. Submit Samples on rigid backing, 8 inches square.
2. Step coats on Samples to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

D. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
2. Printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
3. VOC content.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents. Refer to NOTICE TO CONTRACTOR – CLOSING DOCUMENTS for more information.

1. Paint: 5 percent, but not less than 1 gal. of each material and color applied.

1.6 QUALITY ASSURANCE

A. Source Limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Refer to Form 816 Article 1.06.03 and Form 816 Article 1.20-1.06.03 for additional information.

B. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.8 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Benjamin Moore & Co.
   2. ICI Paints.
   3. Sherwin-Williams Company (The).

2.2 PAINT, GENERAL

A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."

B. Material Compatibility:

   1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
   2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

C. VOC Content: Provide materials that comply with VOC limits of authorities having jurisdiction.

D. Colors: As indicated in a color schedule.

2.3 PRIMERS/SEALERS

A. Primer, Alkali Resistant, Water Based: MPI #3.

B. Primer, Bonding, Solvent Based: MPI #69.

C. Wood-Knot Sealer: Sealer recommended in writing by topcoat manufacturer for exterior use in paint system indicated.

2.4 WOOD PRIMERS

A. Primer, Alkyd for Exterior Wood: MPI #5.

B. Primer, Oil for Exterior Wood: MPI #7.

2.5 WATER-BASED PAINTS

A. 100% Acylic Latex, Exterior Semi-Gloss (Gloss Level 5): MPI #11.

2.6 SOURCE QUALITY CONTROL

A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:

1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
2. Testing agency will perform tests for compliance with product requirements.
3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
1. Wood: 15 percent.
2. Gypsum Board: 12 percent.

C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

D. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

E. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates and paint systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

   1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

   1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Wood and fiber cement siding Substrates:

   1. Scrape and clean knots. Before applying primer, apply coat of knot sealer recommended in writing by topcoat manufacturer for exterior use in paint system indicated.
   2. Sand surfaces that will be exposed to view, and dust off.
   3. Prime edges, ends, faces, undersides, and backsides of wood.
   4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

E. Plastic Trim Fabrication Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Manual."

   1. Use applicators and techniques suited for paint and substrate indicated.
   2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
   3. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
   4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
   5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. Tint undercoats same color as topcoat, but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.

1. Contractor shall touch up and restore painted surfaces damaged by testing.
2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINTING SCHEDULE

A. Wood Substrates: Including wood trim architectural woodwork wood-based panel products.

1. Latex System with oil-based primer:

a. Sealer Coat: Water-repellant preservative
b. Prime Coat: Primer, Oil-based primer, MPI#7.
c. Intermediate Coat: Latex, 100% Acrylic semi gloss.
d. Topcoat: Latex, 100% Acrylic semi gloss.

B. Fiber-Cement Siding Substrates: Including wood trim architectural woodwork wood-based panel products.

1. Latex System with Alkyd Primer:
a. Prime Coat: Primer, Oil-based primer, MPI#7.

b. Primer, Alkyd for Exterior Wood: MPI #5 (over manufacturer's shop-applied primer)
c. Intermediate Coat: Latex, 100% Acrylic semi gloss.
d. Topcoat: Latex, 100% Acrylic semi gloss.

C. Gypsum Board Substrates:

1. Latex System with Alkyd Primer:
   a. Prime Coat: Primer, Oil-based primer, MPI#7.
   b. Primer, Alkyd for Exterior Wood: MPI #5 (over manufacturer's shop-applied primer)
   c. Intermediate Coat: Latex, 100% Acrylic semi gloss.
   d. Topcoat: Latex, 100% Acrylic semi gloss.

END OF SECTION 099113

SECTION 099300 - STAINING AND TRANSPARENT FINISHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions of Division 1, State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, and Incidental Construction, Form 816 - 2004 and supplemental specifications thereto, shall be a part of this specification.

B. Work included in this section may require coordination with Amtrak regarding track outages, flagmen, or other issues related to work around railroad facilities. The Contractor shall pay special attention to the specification entitled "SAFETY AND PROTECTION OF RAILROAD TRAFFIC AND PROPERTY" and other Amtrak Specifications contained in the Contract.

1.2 SUMMARY

A. Section includes surface preparation and application of wood finishes on the following substrates:

1. Exterior Substrates:
   a. Exposed dimension lumber (rough carpentry).
   b. Dressed lumber (finish carpentry).
   c. Wood roof decking boards.

1.3 ACTION SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Product Data: For each type of product indicated. Include preparation requirements and application instructions.

C. Samples for Verification: For each type of finish system and in each color and gloss of finish indicated.

1. Submit Samples on representative samples of actual wood substrates, 8 inches square.
2. Label each Sample for location and application area.

D. Product List: For each product indicated, include the following:

1. Cross-reference to finish system and locations of application areas. Use same designations indicated on Drawings and in schedules.
2. VOC content.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

B. Mockups: Apply mockups of each finish system indicated and each color selected to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Designer will select one surface to represent surfaces and conditions for application of each type of finish system and substrate.

   a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft..

2. Final approval of stain color selections will be based on mockups.

   a. If preliminary stain color selections are not approved, apply additional mockups of additional stain colors selected by Designer at no added cost to Owner.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Refer to Form 816 Article 1.06.03 and Form 816 Article 1.20-1.06.03 for additional information.

B. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.6 FIELD CONDITIONS

A. Apply finishes only when temperature of surfaces to be finished and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply finishes when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

C. Do not apply exterior finishes in snow, rain, fog, or mist.

D. Stain applications will require coordination with Amtrak regarding track outages, flagmen, or other issues related to work around railroad facilities. The Contractor shall pay special attention to the article entitled, “Safety and Protection of the Railroad Traffic and Property”, “requirements for Temporary Protection Shields…” and other Amtrak Specifications in the General Provisions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Benjamin Moore & Co.
   2. ICI Paints.
   3. Samuel Cabot, Inc (Cabot)
   4. Sherwin-Williams Company (The).

2.2 MATERIALS, GENERAL

A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."

B. Material Compatibility:

   1. Provide materials for use within each finish system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
   2. For each coat in a finish system, provide products recommended in writing by manufacturers of topcoat for use in finish system and on substrate indicated.

C. Stain Colors: Clear

2.3 BRIGHTENERS AND NEUTRALIZERS

A. Wood brightener and neutralizer for removing mill glaze and removing tannin and rust stains, Clear:

   1. Benjamin Moore BRIGHTEN Brightener and Neutralizer (317), or approved equal.

2.4 BASE COAT STAINS

A. Stain, Exterior, Waterborne alkyd/acrylic transparent

   1. Benjamin Moore Arborcoat Transparent Decking and Siding Stain (637), or approved equal.

2.5 PROTECTIVE CLEAR COAT

A. Stain, Exterior, 100% Acrylic Finish Coat
   1. Benjamin Moore Arborcoat Exterior Waterborne Stain Protective Clear Coat (636), or approved equal.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Exterior Wood Substrates: 15 percent, when measured with an electronic moisture meter.

C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

D. Proceed with finish application only after unsatisfactory conditions have been corrected.

1. Beginning finish application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

B. To the greatest extent possible, apply prep and base coatings to lumber prior to installation of wood components, coating all sides of surfaces.

C. Clean and prepare surfaces to be finished according to manufacturer's written instructions for each particular substrate condition and as specified.

1. Remove dust, dirt, oil, and grease by washing with a detergent solution; rinse thoroughly with clean water and allow to dry. Remove grade stamps and pencil marks by sanding lightly. Remove loose wood fibers by brushing.
2. Remove mildew by scrubbing with a commercial wash formulated for mildew removal and as recommended by stain manufacturer.

D. Exterior Wood Substrates:

1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
2. Coat edges, ends, faces, undersides, and backsides of wood.
   a. For varnish coated stained wood, stain edges and ends and prime with varnish. Prime undersides and backsides with varnish.

3.3 APPLICATION

A. Apply finishes according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."

1. Use applicators and techniques suited for finish and substrate indicated.

2. Finish surfaces behind movable equipment and furniture same as similar exposed surfaces.
3. Do not apply finishes over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

B. Apply finishes to produce surface films without cloudiness, holidays, lap marks, brush marks, runs, ropiness, or other surface imperfections.

3.4 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing finish application, clean spattered surfaces. Remove spattered materials by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from finish application. Correct damage by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced finished wood surfaces.

3.5 EXTERIOR WOOD-FINISH-SYSTEM SCHEDULE

A. All exterior wood substrates.

1. Transparent Stain System:
   a. Wood Prep: Benjamin Moore BRIGHTEN Brightener and Neutralizer (317), or approved equal.
   b. Basecoat: Benjamin Moore Arborcoat Transparent Decking and Siding Stain (637), or approved equal.
   c. Topcoat: Benjamin Moore Arborcoat Exterior Waterborne Stain Protective Clear Coat (636), or approved equal.

END OF SECTION 099300

SECTION 099600 - HIGH-PERFORMANCE COATINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions of Division 1, State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, and Incidental Construction, Form 816 - 2004 and supplemental specifications thereto, shall be a part of this specification.

B. Work included in this section may require coordination with Amtrak regarding track outages, flagmen, or other issues related to work around railroad facilities. The Contractor shall pay special attention to the specification entitled "SAFETY AND PROTECTION OF RAILROAD TRAFFIC AND PROPERTY" and other Amtrak Specifications contained in the Contract.

1.2 SUMMARY

A. Section includes surface preparation, shop application and field touch up of high-performance coating systems on the following substrates:

1. Exterior Substrates:
   a. Steel.
   b. Thermal spray metalized steel

B. The adverse conditions dictated by work along a operating railroad necessitate the following conditions:

1. All high performance coatings will be shop-applied.
2. Areas that require field touch-up will be limited to connections and minor abrasions due to erection. Field touch-up is to be applied by the Painting Contractor, certified by the Manufacturer.

1.3 DEFINITIONS

A. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

B. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Product Data: For each type of product indicated. Include preparation requirements and application instructions.

C. Samples for Verification: For each type of coating system and in each color and gloss of topcoat indicated.

1. Submit Samples on rigid backing, 8 inches square.
2. Step coats on Samples to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

D. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
2. Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.
3. VOC content.

E. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

B. Applicator Qualifications: Engage an experienced applicator who has completed high-performance coating system applications similar in material and extent to those indicated for Project and whose work has a record of successful in-service performance.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Refer to Form 816 Article 1.06.03 and Form 816 Article 1.20-1.06.03 for additional information.

B. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

A. Apply field touch-up of coatings only when temperature of surfaces to be coated and surrounding air temperatures are between 50 and 95 deg F.

B. Do not apply coatings when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

C. Do not apply exterior coatings in snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Carboline Company (Carboline).
2. DuPont Company, High Performance Coatings (DuPont).
3. International Protective Coatings; Courtaulds Coatings (International).
4. Tnemec Company, Inc. (Tnemec).

2.2 HIGH-PERFORMANCE COATINGS, GENERAL

A. MPI Standards: Provide products that comply with MPI standards indicated and are listed in "MPI Approved Products List."

B. Material Compatibility:

1. Provide materials for use within each coating system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a coating system, provide products recommended in writing by manufacturers of topcoat for use in coating system and on substrate indicated.
3. Provide products of same manufacturer for each coat in a coating system.

C. Colors: Custom color as indicated in the finish schedule on the drawings.
1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer's material data and certificates of performance for proposed substitutions.

2.3 SCHEDULE OF FINISHES

A. The Steel Fabricator shall finish structural steel components for high-performance coatings as specified below:

1. Exterior Exposed Structural Steel including the following components and systems are to receive a 3-coat finishing system per Section 09960 – High Performance Coatings.

a. Platform, canopy, stair/elevator towers: All steel members including columns, beams, purlins, roof framing components and accessories including base plates. Refer to Specification Section 05120 – Structural Steel for additional details.

b. Exterior platform railings and incorporated systems, stairs, gates, sign frames, brackets and fasteners, unless specified as galvanized and to remain unfinished

and exposed to view (stair gratings). Refer to Specifications Section 05520 – Handrails And Guardrails, 05500 - Metal Fabrications, and 05511 - Metal Stairs, for additional details.

c. Exposed tube steel framing and connected miscellaneous steel, including railing systems etc., associated with the station Shelters.

2. Structural Steel Systems including the following components and systems are to receive an epoxy-based ferrous metal paint system per Section 09900 – Painting. These systems are to receive a primer as defined in 09900.

a. Structural framing members supporting the precast platform planks.

3. The following items are hot-dipped galvanized:

a. Platform fold-up edge steel system (not including aluminum components). No paint applied over these components.
b. Traffic surfaces such as metal stair grates and platforms.
c. Steel platform stair stringers and support structures (at platform ends).
d. Surfaces embedded in concrete or mortar.
e. Any remaining exterior exposed to weather steel as depicted in the contract drawings.

2.4 EXTERIOR HIGH-PERFORMANCE COATING SYSTEMS

A. Basis of Design: System specified is based upon a 3-coat priming and finishing system as manufactured by Tnemec, as follows:

1. Severe Environment (High-Gloss Finish): One finish coat over one intermediate coat and a primer.

a. Primer: Tnemec Series 90-97 Zinc @ 2.0-3.5 mils dry. Coordinate with steel fabricator for application, and Section 05120 – Structral Steel for priming and steel preprataion.
b. 2nd Coat: Tnemec Series 27 Typoxy (color) @ 3.0-5.0 mils dry.
c. 3rd Coat: Tnemec Series 73 Endura Shield (color) @ 1.5-3.0 mils dry.

2. Acceptable Systems:

a. Primer: Epoxy primer applied at spreading rate recommended by manufacturer.

1) Carboline: 893 2-Component Cross-Linked Epoxy.
2) DuPont: 25P High Solids Epoxy Mastic.
3) International: Intergard 251 Thin- Film Polyamide Epoxy Rust Inhibitive Primer.

b. 2nd Intermediate Coat: Epoxy applied at spreading rate recommended by manufacturer to achieve a dry film thickness of 3.0 to 8.0 mils.

1) Carboline: 890 2-Component Epoxy.
2) DuPont: 25P High Solids Epoxy Mastic.

3) International: Intergard 345 DTM Semi-Gloss Epoxy.

c. 3rd Coat: Aliphatic polyurethane enamel applied at spreading rate recommended by manufacturer to achieve a dry film thickness of 1.5 to 4.0 mils.

1) Carboline: 134-HS 2-Component Acrylic-Aliphatic Urethane.
2) DuPont: Imron 333 High Gloss Polyurethane Enamel.
3) International: Interthane 990 Low VOC Thin Film Polyurethane.

2.5 SOURCE QUALITY CONTROL

A. Source Limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

B. Testing of Coating Materials: Owner reserves the right to invoke the following procedure:

1. Owner will engage the services of a qualified testing agency to sample coating materials. Contractor will be notified in advance and may be present when samples are taken. If coating materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
2. Testing agency will perform tests for compliance with product requirements.
3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying coating materials from Project site, pay for testing, and recoat surfaces coated with rejected materials. Contractor will be required to remove rejected materials from previously coated surfaces if, on recoating with complying materials, the two coatings are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.

C. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:
   1. SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning" for Exterior platform railings and incorporated systems, stairs, gates, sign frames, brackets and fasteners
   2. SSPC-SP 10/NACE No. 2, "Near-White Blast Cleaning." For platform, canopy, stair/elevator towers - all steel members including columns, beams, purlins, roof framing components and accessories including base plates.

3.3 APPLICATION

A. Apply high-performance coatings according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."

   1. Use applicators and techniques suited for coating and substrate indicated.
   2. Coat surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, coat surfaces behind permanently fixed equipment or furniture with prime coat only.
   3. Coat back sides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
   4. Do not apply coatings over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of the same material are to be applied. Tint undercoats to match color of finish coat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through final coat, apply additional coats until cured film has a uniform coating finish, color, and appearance.

D. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Produce sharp glass lines and color breaks.

E. Application Procedures: Apply coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.

F. Brush Application: Use brushes best suited for material applied and of appropriate size for the surface or item being coated.
   1. Apply primers and first coats by brush unless manufacturer's written instructions permit using roller or mechanical applicators.
   2. Brush out and work brush coats into surfaces in an even film.
   3. Eliminate cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Neatly draw glass lines and color breaks.

   4. Rollers: Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by manufacturer for the material and texture required.

5. Spray Equipment: Use mechanical methods to apply coating if permitted by manufacturer's written instructions and governing regulations.

   a. Use spray equipment with orifice size recommended by manufacturer for material and texture required.
   b. Apply each coat to provide the equivalent hiding of brush-applied coats.
   c. Do not double back with spray equipment building-up film thickness of two coats in one pass, unless recommended by manufacturer.

G. Minimum Coating Thickness: Apply each material no thinner than manufacturer's recommended spreading rate. Provide total dry film thickness of the entire system as recommended by manufacturer.

H. Field Connections: Areas adjacent steel field connections to be delivered to jobsite with primer coat only. See Section: ” FIELD PAINTING ”
   1. Shop-apply primer coat to entire component.
   2. Mask-off areas around field connections after erection and final torque of connection bolts
   3. Touch-up areas of primer coat that have been damaged.
   4. Apply finish coats to components, allowing proper feathering of surfaces to obtain a consistent finish.

I. Prime Coats: Before applying finish coats, apply a prime coat of material, as recommended by manufacturer, to material required to be coated or finished that has not been prime coated by others.
   1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
   2. Recoat primed and sealed substrates if there is evidence of suction spots or unsealed areas in first coat, to ensure a finish coat with no burn-through or other defects caused by insufficient sealing.

J. Completed Work: Match approved Samples for color, texture, and coverage. Remove, refinish, or recoat work that does not comply with specified requirements.

3.4 QUALITY CONTROL

A. Dry Film Thickness Testing: Owner will engage the services of a qualified testing and inspecting agency to inspect and test coatings for dry film thickness.

   1. Contractor shall touch up and restore coated surfaces damaged by testing.
   2. If test results show that dry film thickness of applied coating does not comply with coating manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with coating manufacturer's written recommendations.

3.5 FIELD PAINTING

A. Summary: Field painting will be limited to connections and minor abrasions from delivery or erection. All other painting is shop-applied.

B. Restrictions: Train schedules and site conditions may necessitate railroad track outages, railroad flagmen, and nighttime work periods for field painting. The Contractor shall pay special attention to the article entitled, "Safety and Protection of the Railroad Traffic and Property", "requirements for Temporary Protection Shields…" and other Amtrak Specifications in the General Provisions.

C. Comply with the provisions of Article M.07 of Form 816 except as otherwise stated specified.
   1 Clean all steel soon after erection of dirt, mud, lubricant or other foreign matter that may have accumulated.
   2. Mask off adjacent painted areas that have already been painted, allowing approximately 1" overlap for feathering.
   2. Prime and Spot paint all field bolts, field welds, and abrasions to the shop coat with the same material used for the shop coat. Use a heavy field coat of bituminous paint on those portions of columns to be embedded in masonry or concrete in the exterior walls, and on interior columns through the slab on grade to be encased in concrete.

D. The ambient air and surface temperature shall be at least 5^0F above the dew point prior to and during coating applications.

3.6 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from coating operation. Correct damage by cleaning, repairing, replacing, and recoating, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

END OF SECTION 099600

SECTION 099610 – GRAFFITI CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions of Division 1, State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, and Incidental Construction, Form 816 - 2004 and supplemental specifications thereto, shall be a part of this specification.

B. Work included in this section may require coordination with Amtrak regarding track outages, flagmen, or other issues related to work around railroad facilities. The Contractor shall pay special attention to the specification entitled "SAFETY AND PROTECTION OF RAILROAD TRAFFIC AND PROPERTY" and other Amtrak Specifications contained in the Contract.

1.2 SUMMARY

A. Section Includes: Protective anti graffiti system applied directly to above grade, exterior vertical surfaces indicated, including surface preparation and application.
   1. Substrate applications of water-repellents include:
      a. Pre-cast Concrete surfaces.
      b. Cast-in-Place Concrete.
      c. Brick
      d. Stone Veneer

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM)

1.4 ACTION SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Product Data.

C. M.S.D.S. sheets indicating V.O.C. content and safety pre-cautions.

D. Pre-Installation Conference Report: Submit report verifying project site conditions, approval of jobsite Mock-Up, manufacturer's instructions and requirements.

1.5 INFORMATIONAL SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Qualification Data: For qualified Installer.

C. Product Certificates: For each kind of joint sealant and accessory, from manufacturer.

D. Warranties: Sample of special warranties.

E. Manufacturer Certification Letter in accordance with NOTICE TO CONTRACTOR – POTENTIAL FOR ASBESTOS CONTAINING MATERIALS.

1.6 QUALITY ASSURANCE

A. Source Limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

B. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project. Minimum of Five (5) Years experience in the successful application of anti graffiti coating.

C. Manufacturer Qualifications: Manufacturer with a minimum of Five (5) Years experience in the successful production of anti graffiti technology.

D. Source Limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

E. Mock-Up: Install mock-up at project site using acceptable anti graffiti system per manufacturer's instructions. Obtain Engineer/Designer/Owner's approval of system, appearance and workmanship standard. Test a small, remote area to assure desired results. Perform anti graffiti function testing and analysis required prior to installation.
   1. Mock-Up Size: Five (5) feet by Five (5) feet (Minimum).
   2. Mock-Up Substrate: Vertical Wall.
   3. Maintain mock-up during construction for workmanship comparison.
   4. Mock-up may be incorporated into final construction upon Engineer/ Architect/Owner's approval.

1.7 DELIVERY, STORAGE AND HANDLING

A. Refer to Form 816 Article 1.06.03 and Form 816 Article 1.20-1.06.03 for additional information.

1.8 WARRANTY

A. Refer to Form 816 Article 1.20-1.06.08 and NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information.

B. Warranty Period: Manufacturer's standard, but not less than 5-years from the issuance of the Certificate of Compliance.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Compatibility: Provide graffiti control products that are compatible with one another and with substrates under conditions of service and application, as demonstrated by the manufacturer, based on testing and field experience.

B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. LymTal, Intl., "Iso-Flex 640 WB"
      a. Address: 4150 S. Lapeer Rd., Lake Orion, MI 48359 Telephone: 248-373-8100
      b. Approved Equal

C. Performance Requirements: Anti graffiti products shall meet or exceed the following performance standards:
   1. Percent Active Ingredients - not less than 55%.
   2. Flash Point: ASTM D 3278-82 - Results: Greater than 100 degrees F. (SETA C.C.)
   3. Pot Life: 1-3 hours
   4. Tensile Strength: ASTM D412 – 8000 psi
   5. Ultimate Elongation: ASTM D412 – 20%
   6. Abrasion Resistance: Tabor 1,000 Rev., CS 17 Wheel, 1000 g – 20 mgs.
   7. Impact Resistance: ASTM D2794 – Direct >160 in-lbs, Reverse > 160 in-lbs.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to receive coatings, with Installer present, for compliance with requirements other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. Determine acceptable removal techniques for contaminants harmful to anti graffiti performance, such as dust, dirt, grease, oils, curing compounds, form release agents, laitance, efflorescence, existing films and other water repellent coatings.

3.2 PREPARATION

A. Protect adjacent work areas and finish surfaces from damage during anti graffiti system installation.

B. Prior to installation, clean substrates of substances that could impair penetration or reaction of anti graffiti system. Coordinate cleaning and application to avoid contamination of newly treated surfaces.

C. Substrates shall be clean, dry, sound, and free of contaminants detrimental to anti graffiti system performance.

D. Remove contaminants by method approved at mock-up.

E. Allow cleaned, damp, or water soaked surfaces to become dry before installation.

3.3 INSTALLATION

3.4 Apply anti graffiti system to properly prepared surfaces indicated. Apply material within time restrictions after surface preparation as recommended by manufacturer.

3.5 Apply anti graffiti by rolling or brushing techniques recommended by manufacturer to achieve desired function and results.

3.6 Apply anti graffiti material as demonstrated and approved at jobsite mock-up and not less than manufacturer's minimum recommended coverage rate. Coverages of approximately 100 square feet per gallon can be attained depending on substrate porosity, texture and profile. A second coat should be applied within 24 hours of the first coat. Coverage rates of the second coat will be approximately 125 ft/gallon.

3.7 CLEANING

A. Clean off excess coatings as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of and of products on which coatings are applied.

3.8 PROTECTION

A. Protect surfaces during and after drying period from contact with contaminating substances and from damage resulting from construction operations or other causes so surfaces are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, remove damaged or deteriorated coatings immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 099610

SECTION 104060 – BENCHES AND TRASH RECEPTACLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions of Division 1, State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, and Incidental Construction, Form 816 - 2004 and supplemental specifications thereto, shall be a part of this specification.

B. Work included in this section may require coordination with Amtrak regarding track outages, flagmen, or other issues related to work around railroad facilities. The Contractor shall pay special attention to the specification entitled "SAFETY AND PROTECTION OF RAILROAD TRAFFIC AND PROPERTY" and other Amtrak Specifications contained in the Contract.

1.2 SUMMARY

A. Section Includes:
   a. Benches and trash receptacles furnished and installed in locations indicated on the drawings.

1.3 ACTION SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Product Data.

C. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
   1. Show mounting details
   2. Show details for grounding wire attachment.

D. Samples for Initial Selection: Manufacturer's color charts consisting of units or sections of units showing the full range of colors available.

E. Samples for Verification: For the following bicycle parking rack/s, showing;
   1. The color of the powder coat finish. Prepare 2 inch by 3.5-inch powder coat samples (or larger) from the same material to be used to finish the product.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

B. Compatibility: Provide benches and trash receptacles that are from the same manufacturer's product line.

1.5 DELIVERY, STORAGE AND HANDLING

A. Refer to Form 816 Article 1.06.03 and Form 816 Article 1.20-1.06.03 for additional information.

B. Do not deliver benches and trash receptacles until platform and canopy work is complete.

C. Store benches and trash receptacles in original undamaged packages and containers until ready for installation. Handle with sufficient care to prevent any scratches or damage to the finish.

1.6 COORDINATION

A. Coordinate sizes and locations of mounting bolts, grounding attachments, and other related units of Work specified in other Sections to ensure that benches can be supported and installed as indicated.

1.7 WARRANTY

A. Refer to Form 816 Article 1.20-1.06.08 and NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information.

B. Warranty Period: Manufacturer's standard, but not less than 3-years from the issuance of the Certificate of Compliance.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Support Pipes: Horizontal support to be 3" o.d., .120" wall thickness. Vertical support to be 2 ½ o.d. x .120" wall thickness. Support pipes to be surface mounted.

B. Seat: Seat configuration to be constructed per the platform architectural plans. Seats are to be constructed with a wire grid panel and frame. Wires are 5/16", with 1/8" cross wires spaced 2 ½" oc. Frame to be 7/8" x .120 wall thickness steel tube. Straight seats with backs to be 22" wide and 24" deep.

C. Armrests: Armrests to be installed on either end of bench and intermittently between every two (2) seats. Armrests to be constructed of 7/8" o.d., .065 wall thickness tubing, welded to seat support.

D. Trash Receptacles: 20" diameter. Provide full formed fiberglass lid with side cut outs (no top opening) and polyethylene liner. Quantity and location per the platform architectural plans.

E. Mounting bolt covers: Provide covers that adequately cover bench mounting plates. Finish to match Support pipes.

F. Finish: Finish on metal to include a rust inhibitor and top coat finish of thermosetting polyester powdercoat that is U.V., chip and flake resistant. Color as specified in the Finish Schedule.

2.2 MANUFACTURERS

A. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. "Plexus Collection" by Landscape Forms. (800) 521-2546
   2. Approved Equal.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Before installing benches, examine shop-fabricated work for completion and complete work as required, including removal of packing.

B. Ensure that pre-drilled mounting holes are properly aligned with bench mounting plates.

C. Examine surfaces with Installer present, for compliance with requirements other conditions affecting performance.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Handle and install benches and trash receptacles in accordance with manufacturer's recommendations and installation instructions.

B. Assembly of units to be done in accordance with assembly instructions and hardware provided by manufacturer.

C. Benches should be mechanically secured to platform surfaces with epoxy-set anchor bolts. Coordinate installation of grounding wire with electrical contractor. Refer to bench manufacturer's instructions for addition mounting/securing instructions. Coordinate embed depths with precast steel strands. Utilize full release drill and equipment to ensure that no precast strands are jeopardized.

D. Set benches and trash receptacles level and true to line, in correct relationship to adjacent materials.

3.3 CLEANING

A. Clean benches and trash receptacles with cleaning materials approved in writing by manufacturers.

3.4 PROTECTION

A. Protect surfaces from contact with contaminating substances and from damage resulting from construction operations or other causes so surfaces are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, remove damaged or deteriorated benches and trash receptacles immediately and replace.

END OF SECTION 104060

SECTION 104070 – BICYCLE PARKING RACKS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions of Division 1, State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, and Incidental Construction, Form 816 - 2004 and supplemental specifications thereto, shall be a part of this specification.

1.2 SUMMARY

A. Section Includes:
   a. Bicycle Parking Racks furnished and installed in locations indicated on drawings.

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM)

1.4 ACTION SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Product Data.

C. Samples for Verification: For the following bicycle parking rack/s, showing;
   1. The color of the powder coat finish. Prepare 2 inch by 3.5-inch powder coat samples (or larger) from the same material to be used to finish the product.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

1.6 DELIVERY, STORAGE AND HANDLING

A. Refer to Form 816 Article 1.06.03 and Form 816 Article 1.20-1.06.03 for additional information.

B. Store bicycle parking racks in original undamaged packages and containers until ready for installation.

C. Handle powder coated bicycle parking racks with sufficient care to prevent any scratches or damage to the finish.

1.7 WARRANTY

A. Refer to Form 816 Article 1.20-1.06.08 and NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information.

B. Warranty Period: Manufacturer's standard, but not less than 1-year from the issuance of the Certificate of Compliance.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Compatibility: Provide graffiti control products that are compatible with one another and with substrates under conditions of service and application, as demonstrated by the manufacturer, based on testing and field experience.

2.2 MATERIALS

A. Powder Coating: Triglycidyl isocyanurate (TGIC) powder, a polyester coating.
   1. Color as specified in the Finish Schedule.

B. Heavy Duty Winder: Rack shall be constructed of ASTM A53, 2" Schedule 40 steel pipe (2-3/8" O.D. x 0.154" thick wall (60.3mm x 3.9mm)) or better. Height is 42" (1066.8mm). Rack shall be a minimum of 42" high to provide proper clearance for parked bicycles.

2.3 MANUFACTURERS

A. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Bike Security Racks, Inc
   2. Creative Pipe, Inc.
   3. Madrax, Inc.
   4. Approved Equal.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces with Installer present, for compliance with requirements other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Handle and install bicycle parking racks in accordance with manufacturer's recommendations and installation instructions.

B. Set bicycle parking racks secured to construction, level and true to line, in correct relationship to adjacent materials.

3.3 CLEANING

A. Clean bicycle racks with cleaning materials approved in writing by manufacturers.

3.4 PROTECTION

A. Protect surfaces from contact with contaminating substances and from damage resulting from construction operations or other causes so surfaces are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, remove damaged or deteriorated racks immediately and replace.

END OF SECTION 104070

SECTION 104250 - PORCELAIN ENAMELED STEEL PANEL SIGNS

See also CSI Specification Section 104260.

PART 1 - GENERAL

1.1 SUMMARY:

A. This Section includes the following types of signs:

1. Porcelain enameled steel panel signs.

1.2 SUBMITTALS:

A. General: Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR-SUBMITTALS.

B. Product data for each type of sign specified, including details of construction relative to materials, dimensions of individual components, profiles, and finishes. Provide certifications that all work has been designed and installed in accordance with ADA requirements.

C. Shop drawings showing fabrication and erection of signs. Include plans, elevations, and large-scale sections of typical members and other components. Show anchors, grounds, layout, reinforcement, accessories, and installation details. Key plans showing proposed sign locations for the entire project.

1. Provide message list for each sign required, including large-scale details of wording and lettering layout.

2. For signs supported by or anchored to permanent construction, provide setting drawings, templates, and directions for installation of anchor bolts and other anchors to be installed.

3. Additions or modifications to details, which are necessary due to special conditions encountered during the site survey, shall be provided by the Contractor as part of the contract and at no additional cost to the State.

D. Materials List: Submit complete list of all materials proposed to be furnished and installed under this Section, making all submittals and re-submittals in accordance with the provisions of the Contract Documents and submit a notarized Certificate of Compliance.

E. Samples: Provide the following samples of each sign component for initial selection of color, pattern and surface texture as required and for verification of compliance with requirements indicated.

1. Samples for verification of color, pattern, and texture selected and compliance with requirements indicated:

    a. Porcelain Steel Panel: samples of finish type and color, on 12-inch- long plate sections showing the full range of colors available and actual finish obtained with complete graphics.

    b. Typical mounting brackets.

F. As part of Shop Drawing submission provide a detailed schedule of proposed times and dates for the installation of signage. Schedule shall be submitted for review and approval. All work shall be performed in accordance with any modifications affected by train schedule.

1.3 QUALITY ASSURANCE:

A. Sign Fabricator Qualifications: Firm experienced in producing signs similar to those indicated for this Project, with a record of successful in-service performance, and sufficient production capacity to produce sign units required without causing delay in the Work.

B. Single-Source Responsibility: For each separate sign type required, obtain signs from one source of a single manufacturer.

C. Design Concept: The Drawings indicate sizes, profiles, and dimensional requirements of signs and are based on the specific types and models indicated. Most sign units follow or closely adhere to MTA/Metro- North Railroad Sign Manual standards unless otherwise indicated.

D. For actual fabrication of the Station Signage, use only mechanics that are thoroughly trained and experienced in the skills required for the manufacture and fabrication of the units. In acceptance or rejection of the manufactured units, no allowance will be made for lack of skill on the part of the fabricator/manufacturer.

E. Tolerances:

1. Sign Panels

    a. The Contractor shall note on the shop drawings all fabrication tolerances including, but not limited to: plumb, thickness, length, width, squareness, camber, and flatness.

    b. Signs shall be free of defects including, but not limited to: buckles, dents, warps, wrinkles, and burrs.

2. Messages

a. Message Location: ±1/16 inch from the location as shown.

b. Line-to-Line: ±1/32 inch between each line and ±1/16 inch over entire message.

c. Letter-to-Letter or Symbol (horizontally and vertically): ±1/32 inch between each letter or symbol and ±1/16 inch over an entire line.

3. Where multiple panels adjoin, the face and edges shall be milled to a tolerance of a +1/32 inch or -1/32 inch from a straight plane, so that when two adjoining panels are assembled, no gap over 1/16 inch shall be visible between panels.

4. Design components to allow for expansion and contraction for temperatures ranging between -20°F and +100°F, without causing buckling, opening of joints other than control joints, or overstressing of welds and fasteners.

5. Comply with AWS D1.2 for recommended practices in shop welding. Provide welds behind finished surfaces without distortion or discoloration of exposed side. Clean exposed welded joints of all welding flux and dress on all exposed and contact surfaces.

6. Mill joints to a tight, hairline fit. Cope or miter corner joints.

F. The Contractor shall have all mounting and fabrication details and calculations designed, stamped and approved by a currently licensed Professional Engineer (PE), and reviewed and approved by the Engineer.

G. The unit, or panel to which a unit is to be mounted, must withstand a wind load of 20lbs/sf and horizontal/vertical loads of 250lbs/sf at top center of the sign with a maximum deflection of 1/360 of sign length. Calculations are to be submitted to the Engineer for review.

H. Manufacturer is to provide a five (5) year unconditional guarantee for said units against any defects in workmanship or fabrication.

I. The State reserves the right to retain an independent testing service to inspect the manufacturing process to ensure conformity to the Contract Documents.

J. The Contractor shall have in effect a Quality Assurance (QA) program clearly defining the procedures and requirements necessary to ensure that all aspects of the Work are accomplished in accordance with the Contract Documents. The Contractor will submit a copy of its QA program to the Engineer within fifteen (15) days after receipt of Notice of Award, for review and approval.

1.4 PROJECT CONDITIONS:

A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication to ensure proper fitting. Show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay.

B. The Contractor shall provide adequate staff to take measurements and notes to determine new sign mounting locations and conditions.

1.5 REFERENCES:

A. American National Standards Institute (ANSI) A 117.1

B. Copper Development Association (CDA)

C. National Association of Architectural Metal Manufacturers (NAAMM)

D. Americans with Disabilities Act Architectural Guidelines (ADAAG)

E. American Society for Testing and Materials (ASTM)

1. A424 Steel Sheets for Porcelain Enameling Commercial Quality Type 2
2. A286 Porcelain Enameling
3. C282 Porcelain Enamel Coating Acid Resistance Class A
4. C346 Porcelain Enamel Gloss Test Method (60 to 80 units)

F. American Welding Society (AWS) - Structural Welding Code for Steel Plate

G. Federal Specifications (FS)

1. FF-S-92B(1) Screw, Machine, Slotted, Cross Recessed or Hexagon Head

H. Porcelain Enamel Institute (PEI)

1. PEI-1001 Manual for Architectural Porcelain Enamel

1.6 PRODUCT HANDLING:

A. Protection: Use all means necessary to protect the signs prior to delivery. The pre-assembled units are to be shipped in water resistant protective covering and crating and palletized. Each sign package is to bear the identification as noted on the sign schedule and grouped according to locations.

B. Packaging: Each sign will come individually shrink-wrapped complete with its own bracketry and attachment hardware.

C. Replacements: In the event of damage, repair will be subject to the State's discretion as to whether replacement or repair will be the procedure for damaged units, and to be provided by the Contractor at no additional cost to the State.

1.7 SCHEDULE OF MANUFACTURE:

A. The Contractor shall submit a schedule of completion and sequence of delivery. This schedule shall include but not be limited to the following:

1. Preparation of Shop Drawings and State review and approval of Shop Drawings.

2. Prototype review, final approval, manufacture and sequence of delivery, unless otherwise indicated on the approved Construction Schedule.

1.8 DELIVERY OF UNITS:

A. Contractor shall be responsible for handling and storage. The State shall not be responsible until installed and accepted.

1.9 PRODUCTION PROTOTYPE:

A. The Contractor shall provide production prototypes for approval. The units will be reviewed by the State and comments made. These units will be used as a model for production and will be considered an actual unit for permanent installation and not as a mock-up.

1.10 FUTURE AVAILABILITY:

A. The approved manufacturer shall keep on hand the graphic stencils for future requests by the State for replacement signage for a period of not less than five (5) years.

1.11 WARRANTY:

A. Provide a written warranty issued in the name of the State and jointly signed by the supplier stating that the sign panels have a guaranteed life of five years against fading, spalling, pinholes, discoloration, staining, gloss reductions or rusting from date of substantial performance.

1.12 WRITTEN GUARANTEE:

A. Supplier shall also certify in writing that the porcelain enameling will be performed in accordance with the current edition of the Manual for Architectural Porcelain Enamel (PEI-1001) as issued by the Porcelain Enamel Institute of WA, DC.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

1. Manufacturers of Porcelain Enamel Steel Panel Signs:

a. American Porcelain Enamel (Dallas, TX)
b. Alliance International Group (Norcross, Georgia)
c. Cherokee Porcelain (Knoxville, TN)

2.2 MATERIALS:

A. Steel Panels:

1. Panels shall be fabricated from 16 gauge enameling iron of low metalloid and copper content, especially manufactured and processed for the production of porcelain enamel units.

B. Porcelain Enamel Coating:

1. Porcelain enamel shall be impervious, inorganic glasses.

2. All surfaces shall be prepared and porcelain enamel shall be applied by a recognized method and fired at temperatures which will fuse the enamel glass to the surface of the metal and which will expel any volatile matter.

3. Steel plates shall be given one coat of grip enamel on both the front and back surfaces and on all edges and on the front surface one or more applications of cover coats of colors as directed.

4. Each color shall be fired separately and shall be uniform and even.

5. The back surface and all edges shall receive a protective porcelain enamel coating over the ground coating, and such additional coats as may be necessary to counteract stresses that may be placed upon the steel plates because of the thickness of the enamel coating on the front surfaces.

6. The porcelain enamel surfaces shall be uniformly finished and shall be free from bubbles, holes, bumps, or other blemishes, imperfections and surface defects.

7. Surfaces shall be matte or eggshell unless otherwise approved by the Engineer. Contractor to certify that Finish & Contrast meets or exceeds ADA A4.30.5.

8. The total thickness of coatings shall be not less than .015 inch nor more than .035 inch on each side of the sheet, except on parts bearing several colors and on corners and returns

9. Porcelain enamel finish of 8 square feet or less shall not be distorted more than ¼ of an inch from a true plane after installation.

10. All porcelain enamel shall be acid resisting and shall show no variations in color when submitted to standard tests for staining.

11. All tests shall conform to the Porcelain Enamel Institute Standard Tests for Special Properties and Classifications.

12. The panels shall be finished in colors as indicated.

C. Fasteners: Use concealed fasteners fabricated from metals that are not corrosive to the sign material and mounting surface.

D. Anchors and Inserts: Use nonferrous metal or hot-dipped galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

E. Tactile and Braille Signs:

1. Fabricate signs to comply with ADA requirements and ANSI A 117.1.

2. Provide tactile and braille signs of type and text at locations as shown on the Contract Drawings.

a. Braille/Tactile signs shall be achieved by using a computerized relief process prior to application of the porcelain enamel coating. Letters shall be 5/8 inch upper case, Helvetica Medium typeface with wide letter spacing, raised 1/32 inch and an 18 pt. Grade 2 Braille translation of the message as manufactured by Ceramicoat or approved equal.

b. The sign message layout for restroom signs shall be per Sign Schedule. The Contractor shall certify that the braille message matches the text message.

2.3 SIGN FINISHES:

A. The Contractor shall provide signage and graphic materials for the entire project in conformance with the following:

1. Station (General)

a. Tactile/Braille Signs shall have black graphics on a white background. Typeface to be upper case Helvetica Medium with wide letter spacing.

b. Plaque Signs shall have white graphics on a blue background.

c. All signs shall use Helvetica Medium typeface, have a black band on top and black graphics on a white background with the exception of:

- Warning Signs shall have red text.
- Station Identification Signs shall have tomato red text and band. Logo copy to be provided.
- Exit Signs which shall have white text on a 1’-0” wide red background module.

2.4 COLOR SCHEDULE:

A. Signage colors specified herein and shown on the Drawings shall be based on approved manufacturers and/or color system numbers indicated, unless otherwise accepted and approved by the Engineer.

1. Red – Matte PMS-186
2. Tomato Red - Dupont Co. "Imron 326" two part aliphatic polyurethane enamel.
3. Blue - Match PMS-286

PART 3 - EXECUTION

3.1 INSTALLATION:

A. General: Locate sign units and accessories where indicated, using mounting methods of the type described and in compliance with the manufacturer's instructions.

1. Install signs level, plumb, and at the height indicated, with sign surfaces free from distortion or other defects in appearance.

2. Mounting heights for all tactile signs to be in accordance with all ADAAG and ADA requirements (see also references under section 1.6).

B. Bracket-Mounted Units: Provide the manufacturer's standard brackets, fittings, and hardware as appropriate for mounting signs that project at right angles from walls and ceilings. Attach brackets and fittings securely to walls or ceilings with concealed fasteners and anchoring devices to comply with manufacturer's directions.

3.2 CLEANING AND PROTECTION:

A. After installation, clean soiled sign surfaces according to the manufacturer's instructions. Protect units from damage until acceptance by the State.

END OF SECTION 104250

SECTION 104260 STATION IDENTIFICATION & REGULATORY SIGNAGE

See also CSI Specification Section 104250.

PART 1 - GENERAL

1.1 SUMMARY:

A. This Section includes the following types of signs:

1. Fabricated Aluminum Post and Panel Signs with pre-cast concrete footings.

2. Fabricated Kiosk Sign with pre-cast concrete footings and double sided exterior grade internally illuminated display case.

3. Changeable Schedule Holder Sign with flip type frame.

4. Aluminum Regulatory Sign Panels with Applied Reflective Graphics

5. Aluminum Regulatory Post and Panel Signs with Applied Reflective Graphics

1.2 SUBMITTALS:

A. General: Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR--SUBMITTALS.

1. Product data for each sign type specified, including details of construction relative to materials, dimensions of individual components, profiles, and finishes.

2. Shop drawings showing fabrication and mounting method of each sign type. Include plans, elevations, and large-scale sections of typical components. Show anchors, layout, reinforcement, accessories and installation details.

a. Provide large-scale details of wording and lettering layout.

b. For signs supported by or anchored to permanent construction, provide setting drawings, templates, and directions for installation of anchor bolts and other anchors to be installed.

c. Additions or modifications to details, which are necessary due to special conditions encountered during the site survey, shall be provided by the Contractor as part of the contract and at no additional cost to the State.

3. Submit 4” x 4” color samples of each specified finish including paints, applied vinyl, and colored acrylic sheeting.

4. Submit a complete sample alphabet of each typeface and pictogram specified (1” minimum height).

5. Submit an 8-1/2” x 11” color print of each specified logotype, to include any modifications as required.

6. As part of Shop Drawing submission provide a detailed schedule of proposed times and dates for the installation of the signs. Schedule shall be submitted for review and approval.

7. Wiring Diagrams: Schematic and terminal to terminal connection wiring diagrams shall be submitted.

8. Catalog Cuts: Catalog cuts shall be marked to indicate the item, model, capacities and other characteristics listed in the table or on printed sheets.

9. Submit one sample Changeable Schedule Holder type sign.

1.3 QUALITY ASSURANCE:

A. Sign Fabricator Qualifications: Firm experienced in producing signs similar to those indicated for this Project, with a record of successful in-service performance, and sufficient production capacity to produce sign units required without causing delay in the Work.

B. Single-Source Responsibility: For each separate sign type required, obtain signs from one source of a single manufacturer.

C. Design Concept: The Drawings indicate sizes, profiles, and dimensional requirements of signs and are based on the MTA/Metro- North Railroad Sign Manual standards unless otherwise indicated.

D. For actual fabrication of the Station Signage, use only mechanics that are thoroughly trained and experienced in the skills required for the manufacture and fabrication of the units. In acceptance or rejection of the manufactured units, no allowance will be made for lack of skill on the part of the fabricator/manufacturer.

E. Tolerances:

1. Sign Panels

a. The Contractor shall note on the shop drawings all fabrication tolerances including, but not limited to: plumb, thickness, length, width, squareness, camber, and flatness.

b. Signs shall be free of defects including, but not limited to: buckles, dents, warps, wrinkles, and burrs.

2. Messages
   a. Message Location: ±1/16 inch from the location as shown.

   b. Letter-to-Letter or Symbol (horizontally and vertically): ±1/32 inch between each letter or symbol and ±1/16 inch over an entire line.

3. All sign face panels shall be of a single sheet. Joined pieces will not be accepted.

4. Design components to allow for expansion and contraction for temperatures ranging between -20°F and +100°F, without causing buckling, opening of joints, or overstressing of welds and fasteners.

5. Comply with AWS D1.2 for recommended practices in shop welding. Provide welds behind finished surfaces without distortion or discoloration of exposed side. Clean exposed welded joints of all welding flux and dress on all exposed and contact surfaces.

6. Mill joints to a tight, hairline fit. Cope or miter corner joints.

F. The Contractor shall have all mounting and fabrication details and calculations designed, stamped and approved by a currently licensed Professional Engineer (PE), and reviewed and approved by the Engineer.

G. The signs must withstand a wind load of 20lbs/sf and horizontal/vertical loads of 250lbs/sf at top center of the sign with a maximum deflection of 1/360 of sign height. Calculations are to be submitted to the Engineer for review.

H. Manufacturer is to provide a five (5) year unconditional guarantee for said units against any defects in workmanship or fabrication.

I. The State reserves the right to retain an independent testing service to inspect the manufacturing process to ensure conformity to the Contract Documents.

J. The Contractor shall have in effect a Quality Assurance (QA) program clearly defining the procedures and requirements necessary to ensure that all aspects of the Work are accomplished in accordance with the Contract Documents. The Contractor will submit a copy of its QA program to the Engineer within fifteen (15) days after receipt of Notice of Award, for review and approval.

K. Minor deviations from the Specifications will be accepted to utilize a manufacturer's standard product only when approved in advance on a shop drawing as a substitution and when in the judgment of the Designer such deviations do not materially detract from the Design Concept or the intended performance.

L. The Contractor shall be responsible for the quality of all materials and workmanship required for the execution of this contract, including the materials and workmanship of any firms or individuals who act as its Subcontractors. The Contractor shall be responsible for providing Subcontractors with complete and up-to-date drawings, specifications, message schedule and other information issued by the Designer.

M. No fabrication or installation materials or methods shall be used that will change the visual quality or in any manner have an adverse effect on existing materials and surfaces. The Contractor is responsible for the structural stability of all signs and mounting thereof. All damaged surfaces and the Contractor shall restore materials to their original condition and appearance.

1.4 PROJECT CONDITIONS:

A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication. Show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay.

B. The Contractor shall provide adequate staff to take measurements and notes to determine sign locations and conditions.

1.5 REFERENCES:

A. American Society for Testing Materials (ASTM)

B. American Welding Society (AWS) – Structural Welding Code

C. Americans with Disabilities Act – 1990.

D. ANSI A-1171.1 - Specifications for Sign Requirements for the Physically Handicapped.

E. Americans with Disabilities Act Architectural Guidelines (ADAAG)

1.6 DELIVERY, STORAGE AND HANDLING:

A. Deliver signs in factory-fabricated containers or wrappings, which offer proper protection from construction debris and physical damage.

B. Store items in original wrappings in a clean dry place. Protect from weather, dirt, fumes, and water and other abuses of the environment.

C. Handle carefully to prevent damage, breaking and soiling. Do not install damaged units or components, replace with new.

D. Replacements: In the event of damage, repair will be subject to the State's discretion as to whether replacement or repair will be the procedure for damaged units, and to be provided by the Contractor at no additional cost to the State.

1.7 SCHEDULE OF MANUFACTURE:

A. The contractor shall submit a schedule of completion and sequence of delivery. This schedule shall include but not be limited to the following:

1. Preparation of Shop Drawings and review and approval of Shop Drawings.
2. Final approval, manufacture and sequence of delivery, unless otherwise indicated on the approved Construction Schedule.

1.8 DELIVERY OF UNITS:

A. Contractor shall be responsible for handling and storage. The State shall not be responsible until installed and accepted.

1.9 WARRANTY:

A. Provide a written warranty issued in the name of the State and jointly signed by the supplier stating that the signs have a guaranteed life of five years against fading, spalling, discoloration, staining, gloss reductions, or rusting from date of substantial performance.

1.10 PERMITS:

A. Contractor shall secure and pay for all permits, licenses and approvals necessary for the execution of the contract, in conformance with the rules and regulations pertaining to the performance of the work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

A. Available Manufacturers: Subject to compliance with the requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

1. Fabricated Aluminum Post and Panel Signs:

a. Howard Industries, Fairview, Pa
b. Sign Comp, Comstock Park, Michigan
c. Admiral Plastics, Cape Girardeau, Missouri

2. Double Sided exterior grade internally illuminated Display Case:

a. Nelson Harkins, Chicago Illinois, phone 1-800-882-8989
b. Tablet & Ticket Company, Chicago Illinois, phone 1-800-438-4959
c. Poblocki & Sons, Milwaukee Wisconsin, phone (414) 453-4010

3. Changeable Schedule Holder Sign with flip type frame:

a. Alpina Manufacturing LLC, phone 1-800-915-2828
b. Displays2Go, Bristol, Rhode Island, phone 1-800-572-2194
c. Creative Banner, phone 1-800-528-8846

4. Aluminum Regulatory Post and Panel Signs with Applied Reflective Graphics

a. Seton Identification Products, Branford, CT
b. Vulcan Signs, Foley, Alabama
c. Best Manufacturing Sign Systems, Montrose, Colorado

5. Aluminum Regulatory Panel Signs with Applied Vinyl Reflective Graphics

a. ID Resources, PO Box 127, Peterborough, NH (603) 924-3371
b. Dura Architectural Signs, Long Island City, NY (718) 706-6400
c. Advanced Signing LLC, Medway, MA (508) 533-9000

2.2 MATERIALS:

A. Aluminum:

1. Aluminum sheet shall be of thickness and sizes shown, constructed of alloy and temper recommended by the aluminum producer or finisher for the type of use and finish indicated with not less than the strength and durability properties specified in ASTM B 209 for 5005-H15, or as noted on drawings.

2. Aluminum extrusions shall be of alloy and temper recommended by the manufacturer for the type of use and finish indicated, and with not less than the strength and durability properties specified in ASTM B 221 for 6063-T52 ST, or as noted on drawings.

3. All metal to be free of stain, warpage and any defects impairing strength, durability and appearance.

4. Finish to be uniform on face and edges, unless otherwise specified.

B. Acrylic:

1. Cast acrylic sheet: Provide cast transparent methyl methacrylate monomer plastic sheet with a minimum flexural strength of 16,000 psi when tested according to ASTM D 790 and a minimum allowable continuous service temperature of 80 degrees C. Where sheet material is indicated as “clear,” provide colorless sheet in matte finish, with light transmittance of 92% when tested according to the requirements of ASTM D 1003.

2. All acrylic panels to be free of stain, warpage and any defects impairing strength, durability and appearance.

3. Finish to be uniform on face and edges, unless otherwise specified.

4. All colored coatings, including inks and paints and films, for copy and background colors, to be of a type recommended by acrylic manufacturers for optimum adherence to acrylic surface and non-fading for the application intended.

C. Paint:

1. Paint required for painted letters and surfaces to be a type recommended by the manufacturer for the surface to which it is applied. Colors to match as follows.

   a. Grey = to match Pantone Coating # 422C
   b. Red = to match Pantone Coating #186C
   c. White = Matthews Natural White # 42-202, VOC282-202
   d. Black = Mathews Paint Company Black - #41-335, Black Anodic

2. Exact identification of all paints to be noted on the shop drawings, with data describing method of application if other than air-drying. Paint finish on signs shall be surface sprayed and have a consistent satin finish, free of dirt, grit, mottling, etc. Each paint coat shall contain ultra-violet inhibitors and shall be applied with sufficient time allowed between applications for proper curing. Provide barrier coats over incompatible primers or remove and re-prime as required.

D. Opaque Vinyl Lettering:

1. All opaque vinyl lettering to be die-cut from opaque, non-reflective vinyl film as manufactured by 3M Co., or approved equal. Vinyl shall have a matte finish with a .003 to .006 thickness and shall match colors indicated on drawings. No hand cut letters will be accepted. Messages to be pre-spaced for application on site. Colors shall be as follows:

   a. Red - 3M Scotchcal Series 220 #220-13 or approved equal
   b. White - 3M Scotchcal Series 220 #220-10 or approved equal
   c. Black - 3M Scotchcal Series 220 # 220-12 or approved equal

E. Reflective Vinyl Lettering:

1. Reflective Vinyl Lettering: All reflective vinyl lettering to be 3M Company, or approved equal, engineering grade reflective vinyl with clear pressure sensitive adhesive backing and carry a minimum 5 year material warranty. Letters to con -form with the specified typeface. Colors shall be as follows:

    a. Reflective Black - 3M Scotchlite Series 280 # 280-85
    b. Reflective White - 3M Scotchlite Series 280 # 280-10
    c. Reflective Red - 3M Scotchlite Series 280 # 280-72

F. Mounting Materials:

1. Mechanical Mounting: Corrosion resistant fasteners of a type recommended by the manufacturer for use in the type of substrate encountered at each location.

2. Adhesives: Where adhesive mounting techniques are required, the Contractor shall use adhesives specifically designed for compatibility with the base materials and the desired adhesive strength in accordance with recommendations made by the manufacturer of the materials specified to be laminated or adhered. No adhesives that will fade, discolor or delaminate as a result of proximity to ultraviolet light source or heat or cold shall be used. No adhesives shall change the color or deteriorate the materials to which they are applied. All adhesives shall be of a non-staining, non-yellowing quality and all visible joints shall be free from air bubbles and other defects. All adhesives shall be tested on site. All adhesives shall be indicated in the shop drawings.

G. Electrical:

1. All electrical items – light fixtures, fluorescent lamps, wiring and appurtenances necessary for the signs shown in the drawings shall be provided and installed as part of this Contract. All specific electrical equipment required by product codes or building codes, such as item grounds, disconnect switches, insulation etc. shall be shown and noted in the shop drawings.

2. All signage needing electrical connections shall be furnished with 10’0” pigtails to easily meet with wiring provided and installed by electrical contractor.

3. All electrical items shall bear an Underwriter’s label.

4. A licensed electrician shall perform all electrical installations and connections.

H. Welding:

1. Fabrication shall be accomplished using the highest standards of workmanship. All pieces shall be cut and carefully fit together. All visible connections shall be full welded and ground smooth. All visible surfaces and connections shall be without visible grounding marks, surface differentiation or variation.

I. Fasteners:

1. Use concealed fasteners fabricated from metals that are not corrosive to the sign material and mounting surface.

J. Anchors and Inserts:

1. Use nonferrous metal or hot-dipped galvanized anchors and inserts as required for corrosion resistance. Use toothed steel or lead expansion bolt devices for drilled in place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

2.3 GRAPHIC PROCESS TYPES:

A. Applied Vinyl:

1. All vinyl lettering to be reflective or opaque, as noted on the drawings, and to be die-cut.

2. No hand cut letters will be accepted.

3. Messages to be pre-spaced for application on site.

2.4 GRAPHIC REQUIREMENTS:

A. Typeface: The typeface shall conform to the type specifications in this sign package. Alternate type will not be accepted. Type for signs shall match Adobe Type Library fonts (Adobe Systems, Inc.):

1. Helvetica Medium

2. Helvetica Bold

3. Helvetica Regular

B. Letter and Word Spacing: shall be optical but in conformance with the examples shown on the drawings.

C. All Letterforms: shall be aligned to maintain a baseline parallel to the sign format.

D. Letter Size: to be determined by the height of the upper case ‘E’ of the letterform.

E. Messages: on drawings are for demonstration purposes only. In all cases refer to the Sign Schedule for messages to be used on the finished signs.

F. International Symbols: that are used are to be from the U.S. Department of Transportation current standards publication where applicable.

2.5 FABRICATION:

A. Fabricate sign units of graphic process, design, copy, dimensions and color indicated or specified.

B. Copy shall be as stated in message schedule.

1. Confirm "TBD”, to be determined, information before fabrication.

C. Artwork:

1. All artwork, unless specifically noted otherwise, shall be the sole responsibility of the Contractor.

2. Where noted on the drawings, the Contractor shall coordinate and obtain from the Connecticut Commuter Rail, artwork of the Connecticut Commuter Rail logo for reference only. Creation of production ready artwork is the sole responsibility of the contractor.

3. Full size color proofs of all artwork, printed on high quality paper, to be submitted for approval prior to fabrication.

PART 3 - EXECUTION

3.1 PRE-INSTALLATION:

A. The location of signs shown on the drawings is for general information only. Contractor to coordinate with the Owner to determine final location of signs in the field.

B. The Designer shall be notified of any discrepancies in the drawings, in field dimensions or conditions and/or changes in construction drawings prior to fabrication and/or installation.

C. The Contractor shall examine the areas and conditions under which work of this section will be performed and correct conditions detrimental to timely and proper completion of the work.

D. The Contractor shall not install signs until adjacent finish work is completed.

3.2 INSTALLATION:

A. Installation of components to be in compliance with manufacturer’s instructions, unless otherwise specified.

B. Signs shall be installed level and plumb with the orientation shown on the drawings, unless directed otherwise by the owner, with sign surfaces free from distortion or other defects in appearance.

C. Exposed surfaces of fasteners should be field coated with paint to match surrounding surface color, exposed threads to be protected from paint to allow future maintenance of signs.

D. Anchor bolts and nuts to be coated with corrosion-resistant grease to allow future maintenance of signs.

E. Contractor to provide repair and touch up prior to and after punch list inspection.

F. Contractor to be responsible for the removal of all crating and debris from the project site upon completion.

3.3 CLEANING AND PROTECTION:

A. After installation, clean soiled sign surfaces according to the manufacturer's instructions. Protect signs from damage until acceptance by the State.

END OF SECTION 104260

SECTION 142100 - ELECTRIC TRACTION ELEVATORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions of Division 1, State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, and Incidental Construction, Form 816 - 2004 and supplemental specifications thereto, shall be a part of this specification.

B. Work included in this section may require coordination with Amtrak regarding track outages, flagmen, or other issues related to work around railroad facilities. The Contractor shall pay special attention to the specification entitled “SAFETY AND PROTECTION OF RAILROAD TRAFFIC AND PROPERTY” and other Amtrak Specifications contained in the Contract.

1.2 SUMMARY

A. Section includes electric traction passenger elevators.

B. Related Requirements:
1. Section 033000 "Cast-in-Place Concrete" for setting sleeves, inserts, and anchoring devices in concrete.
2. Section 051200 "Structural Steel Framing" for the following:

a. Attachment plates, angle brackets, and other preparation of structural steel for fastening guide-rail brackets.
b. Hoist beams.
c. Structural-steel shapes for subsills.

3. Section 055000 "Metal Fabrications" for the following:

a. Attachment plates and angle brackets for supporting guide-rail brackets.
b. Pit ladders.
c. Cants in hoistways made from steel sheet.
4. Section 283111 "Digital, Addressable Fire-Alarm System" Fire-Alarm System" for smoke detectors in elevator lobbies to initiate emergency recall operation and heat detectors in shafts and machine rooms to disconnect power from elevator equipment and for connection to elevator controllers.

1.3 DEFINITIONS

A. Definitions in ASME A17.1/CSA B44 apply to work of this Section.

1.4 ACTION SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Product Data: Include capacities, sizes, performances, operations, safety features, finishes, and similar information. Include product data for car enclosures, hoistway entrances, and operation, control, and signal systems.

C. Shop Drawings:

1. Include plans, elevations, sections, and large-scale details indicating service at each landing, control closet layout, coordination with building structure, relationships with other construction, and locations of equipment.
2. Include large-scale layout of car-control station and standby power operation control panel.
3. Indicate maximum dynamic and static loads imposed on building structure at points of support, and maximum and average power demands.

D. Samples for Initial Selection: For finishes involving color selection.

E. Samples for Verification: For exposed car, hoistway door and frame, and signal equipment finishes; 3-inch- square Samples of sheet materials; and 4-inch lengths of running trim members.

1.5 INFORMATIONAL SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Qualification Data: For Installer.

C. Seismic Qualification Certificates: For elevator equipment, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

D. Manufacturer Certificates: Signed by elevator manufacturer certifying that hoistway, pit, and control closet layout and dimensions, as shown on Drawings, and electrical service including standby power generator, as shown and specified, are adequate for elevator system being provided.

E. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Operation and Maintenance Data: For elevators to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include diagnostic and repair information available to manufacturer's and Installer's maintenance personnel.

C. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted elevator use.

1.7 QUALITY ASSURANCE

A. Source Limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

B. Installer Qualifications: Elevator manufacturer or an authorized representative who is trained and approved by manufacturer.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Refer to Form 816 Article 1.06.03 and Form 816 Article 1.20-1.06.03 for additional information.

B. Deliver, store, and handle materials, components, and equipment in manufacturer's protective packaging. Store materials, components, and equipment off of ground, under cover, and in a dry location.

1.9 COORDINATION

A. Coordinate installation of sleeves, block outs, elevator equipment with integral anchors, and other items that are embedded in concrete or masonry for elevator equipment. Furnish templates, sleeves, elevator equipment with integral anchors, and installation instructions and deliver to Project site in time for installation.

B. Coordinate locations and dimensions of other work relating to electric traction elevators including pit ladders; sumps and floor drains in pits; entrance subsills; electrical service; and electrical outlets, lights, and switches in hoistways, pits, and machine rooms.

1.10 WARRANTY

A. Refer to Form 816 Article 1.20-1.06.08 and NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information.

B. Manufacturer's Special Warranty: Manufacturer agrees to repair, restore, or replace elevator work that fails in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, operation or control system failure, including excessive malfunctions; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.
2. Warranty Period: 1 year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Kone MonoSpace machine room-less elevator or comparable product by one of the following:
1. KONE Inc.
2. Otis Elevator Co.
3. Schindler Elevator Corp.
4. ThyssenKrupp Elevator.

B. Source Limitations: Obtain elevators, including hydraulic passenger elevators specified in another Section, from single manufacturer.

1. Major elevator components, including driving machines, controllers, signal fixtures, door operators, car frames, cars, and entrances, shall be manufactured by single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with ASME A17.1/CSA B44.

B. Accessibility Requirements: Comply with Section 407 in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and with ICC A117.1 and the Connecticut State Building Code.

2.3 ELEVATORS

A. Elevator System, General: Manufacturer's standard elevator systems. Unless otherwise indicated, manufacturer's standard components shall be used, as included in standard elevator systems and as required for complete system.

B. Elevator Description:
1. Machine Location: Hoistway; no machine room is provided.
2. Rated Load: 2500 lb.
3. Rated Speed: 200 fpm.
4. Operation System: Selective-collective automatic operation.
5. Auxiliary Operations:

a. Standby power operation.
b. Standby-powered lowering.
c. Earthquake Emergency Operation: Comply with requirements in ASME A17.1/CSA B44.
d. Automatic dispatching of loaded car.
e. Nuisance call cancel.

6. Car Enclosures:

a. Inside Width: 6’-8 ½” from side wall to side wall.
b. Inside Depth: 4’-3 ½” from back wall to front wall (return panels).
c. Inside Height: 94 inches to underside of ceiling.
d. Front Walls (Return Panels): Satin stainless steel, No. 4 finish.
e. Car Fixtures: Satin stainless steel, No. 4 finish.
f. Side and Rear Wall Panels: Textured stainless steel.
g. Reveals: Satin stainless steel, No. 4 finish.
h. Door Faces (Interior): Textured stainless steel.
i. Door Sills: Nickel silver, polished.
j. Ceiling: Satin stainless steel, No. 4 finish or approved equal.
k. Handrails: 1-1/2 inches round satin stainless steel, No. 4 finish, at sides and rear of car.
l. Floor: Rubber Tile.

7. Hoistway Entrances:

a. Width: 42 inches.
b. Height: 84 inches.
c. Type: Single-speed side sliding.
d. Frames: Satin stainless steel, No. 4 finish.
e. Doors: Textured stainless steel.
f. Sills: Nickel silver, polished.

8. Hall Fixtures: Satin stainless steel, No. 4 finish.
9. Additional Requirements:

a. Provide inspection certificate in each car, mounted under acrylic cover with frame made from satin stainless steel, No. 4 finish.
b. Provide hooks for protective pads in all cars and complete set(s) of full-height protective pads.

2.4 TRACTION SYSTEMS

A. Elevator Machines: Variable-voltage, variable-frequency, ac-type hoisting machines or variable-voltage dc-type hoisting machines and solid-state power converters.

1. Provide regenerative or nonregenerative system.
2. Limit total harmonic distortion of regenerated power to 5 percent per IEEE 519.
3. Provide means for absorbing regenerated power when elevator system is operating on standby power.
4. Provide line filters or chokes to prevent electrical peaks or spikes from feeding back into building power system.

B. Fluid for Hydraulic Buffers: If using hydraulic buffers, use only fire-resistant fluid.

C. Inserts: Furnish required concrete and masonry inserts and similar anchorage devices for installing guide rails, machinery, and other components of elevator work. Device installation is specified in another Section.

D. Machine Beams: Provide framing to support elevator hoisting machine and deflector sheaves from the building structure. Comply with Section 055000 "Metal Fabrications" for materials and fabrication.

E. Car Frame and Platform: Bolted- or welded-steel units.

F. Guides: Roller guides or polymer-coated, nonlubricated sliding guides. Provide guides at top and bottom of car and counterweight frames.

2.5 OPERATION SYSTEMS

A. General: Provide manufacturer's standard microprocessor operation systems as required to provide type of operation indicated.

B. Auxiliary Operations: In addition to primary operation system features, provide the following operational features for elevators where indicated:

1. Single-Car Standby Power Operation: On activation of standby power, car is returned to a designated floor and parked with doors open. Car can be manually put in service on standby power, either for return operation or for regular operation, by switches in control panel located at main lobby. Manual operation causes automatic operation to cease.
2. Single-Car Battery-Powered Lowering: If power fails and it is lowered to the bottom floor, opens its doors, and shuts down. System includes rechargeable battery and automatic recharging system.
3. Automatic Dispatching of Loaded Car: When car load exceeds 80 percent of rated capacity, doors begin closing.
4. Nuisance Call Cancel: When car calls exceed a preset number while car load is less than a predetermined weight, all car calls are canceled. Preset number of calls can be adjusted.

C. Security Features: Provide the following security features, where indicated. Security features shall not affect emergency firefighters' service.

1. Keyswitch Operation: Push buttons are activated and deactivated by security keyswitches at hall push-button stations. Key is removable in either position.

2. Car-to-Lobby Feature: Feature, activated by keyswitch at main lobby, that causes car to return immediately to lobby and open doors for inspection. On deactivation by keyswitch, calls registered before keyswitch activation are completed and normal operation is resumed.

2.6 DOOR REOPENING DEVICES

A. Infrared Array: Provide door reopening device with uniform array of 36 or more microprocessor-controlled, infrared light beams projecting across car entrance. Interruption of one or more light beams shall cause doors to stop and reopen.

B. Nudging Feature: After car doors are prevented from closing for predetermined adjustable time, through activating door reopening device, a loud buzzer shall sound and doors shall begin to close at reduced kinetic energy.

2.7 CAR ENCLOSURES

A. General: Provide steel-framed car enclosures with nonremovable wall panels, with removable car roof, access doors, power door operators, and ventilation.

1. Provide standard railings complying with ASME A17.1/CSA B44 on car tops where required by ASME A17.1/CSA B44.

B. Materials and Finishes: Manufacturer's standards, but not less than the following:

1. Subfloor: Exterior, underlayment grade plywood, not less than 5/8-inch nominal thickness.
2. Floor Finish: Rubber tile; color to be chosen from manufacturer’s full line.
3. Stainless-Steel Wall Panels: Flush, hollow-metal construction; fabricated from stainless-steel sheet.
4. Fabricate car with recesses and cutouts for signal equipment.
5. Fabricate car door frame integrally with front wall of car.
6. Stainless-Steel Doors: Flush, hollow-metal construction; fabricated from stainless-steel sheet or by laminating stainless-steel sheet to exposed faces and edges of enameled cold-rolled steel doors using adhesive that fully bonds metal to metal without telegraphing or oil-canning.
7. Sight Guards: Provide sight guards on car doors.
8. Sills: Extruded metal, with grooved surface, 1/4 inch thick.
9. Metal Ceiling: Flush panels, with minimum six low-voltage downlights in each panel.
10. Handrails: Manufacturer's standard handrails, of shape, metal, and finish indicated.

2.8 HOISTWAY ENTRANCES

A. Hoistway Entrance Assemblies: Manufacturer's standard horizontal-sliding, door-and-frame hoistway entrances complete with track systems, hardware, sills, and accessories. Frame size and profile shall accommodate hoistway wall construction.

1. Where gypsum board wall construction is indicated, frames shall be self-supporting with reinforced head sections.

B. Fire-Rated Hoistway Entrance Assemblies: Door and frame assemblies shall comply with NFPA 80 and be listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction based on testing at as close-to-neutral pressure as possible according to UL 10B.

1. Fire-Protection Rating: 1 hour.

C. Materials and Fabrication: Manufacturer's standards, but not less than the following:

1. Enameled-Steel Frames: Formed from cold- or hot-rolled steel sheet. Provide with factory-applied enamel finish; colors as selected by Architect from manufacturer's full range.
2. Stainless-Steel Frames: Formed from stainless-steel sheet.
3. Star of Life Symbol: Identify emergency elevators with star of life symbol, not less than 3 inches high, on both inside surfaces of hoistway door frames.
4. Stainless-Steel Doors and Transoms: Flush, hollow-metal construction; fabricated from stainless-steel sheet or by laminating stainless-steel sheet to exposed faces and edges of enameled cold-rolled steel doors using adhesive that fully bonds metal to metal without telegraphing or oil-canning.
5. Sight Guards: Provide sight guards on doors matching door edges.
6. Sills: Extruded metal, with grooved surface, 1/4 inch thick.
7. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M.

2.9 SIGNAL EQUIPMENT

A. General: Provide hall-call and car-call buttons that light when activated and remain lit until call has been fulfilled. Fabricate lighted elements with long-life lamps and acrylic or other permanent, non-yellowing translucent plastic diffusers or LEDs.

B. General: Provide signal equipment designed for destination-based system. Fabricate lighted elements with long-life lamps and acrylic or other permanent, nonyellowing translucent plastic diffusers or LEDs.

C. Car-Control Stations: Provide manufacturer's standard recessed or semirecessed car-control stations. Mount in return panel adjacent to car door unless otherwise indicated.

1. Mark buttons and switches for required use or function. Use both tactile symbols and Braille.
2. Provide "No Smoking" sign matching car-control station, either integral with car-control station or mounted adjacent to it, with text and graphics as required by authorities having jurisdiction.

D. Emergency Communication System: Two-way voice communication system, with visible signal, which dials preprogrammed number of monitoring station and does not require handset use. System is contained in flush-mounted cabinet, with identification, instructions for use, and battery backup power supply.

E. Firefighters' Two-Way Telephone Communication Service: Provide flush-mounted cabinet in each car and required conductors in traveling cable for firefighters' two-way telephone communication service.

F. Car Position Indicator: Provide illuminated, digital-type car position indicator, located above car door or above car-control station. Also, provide audible signal to indicate to passengers that

G. Hall Push-Button Stations: Provide one hall push-button station at each landing.

1. Provide manufacturer's standard wall-mounted units.
2. Equip units with buttons for calling elevator and for indicating desired direction of travel.
3. Equip units with buttons or touch screen for calling elevator and for indicating direction of travel or destination as required by system. Provide a signaling system to verify floor selection, where destination registration is required, and to direct passengers to appropriate car.

H. Provide telephone jack in each unit for firefighters' two-way telephone communication service specified.

1. Possibly insert a provision for either an "In Use" signal or a digital display of car position for single elevators.

I. Hall Lanterns: Units with illuminated arrows; but provide single arrow at terminal landings. Provide the following:

1. Manufacturer's standard wall-mounted units, for mounting above entrance frames.

J. Hall Annunciator: With each hall lantern, provide audible signals indicating car arrival and direction of travel. Signals sound once for up and twice for down.

1. At manufacturer's option, audible signals may be placed on cars.

K. Hall Position Indicators: Provide illuminated, digital-display-type position indicators, located above each hoistway entrance at ground floor. Provide units with flat faceplate for mounting and with body of unit recessed in wall.

1. Integrate ground-floor hall lanterns with hall position indicators.

L. Standby Power Elevator Selector Switches: Provide switches, as required by ASME A17.1/CSA B44, where indicated. Adjacent to switches, provide illuminated signal that indicates when normal power supply has failed. For each elevator, provide illuminated signals that indicate when they are operational and when they are at the designated emergency return level with doors open.

M. Fire-Command-Center Annunciator Panel: Provide panel containing illuminated position indicators for each elevator, clearly labeled with elevator designation; include illuminated signal that indicates when elevator is operational and when it is at the designated emergency return level with doors open. Provide standby power elevator selector switch(es), as required by ASME A17.1/CSA B44, adjacent to position indicators. Provide illuminated signal that indicates when normal power supply has failed.

N. Emergency Pictorial Signs: Fabricate from materials matching hall push-button stations, with text and graphics as required by authorities having jurisdiction, indicating that in case of fire, elevators are out of service and exits should be used instead. Provide one sign at each hall push-button station unless otherwise indicated.

2.10 FINISH MATERIALS

A. General: Provide the following materials for exposed parts of elevator car enclosures, car doors, hoistway entrance doors and frames, and signal equipment as indicated.

B. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, commercial steel, Type B, exposed, matte finish.

C. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, commercial steel, Type B, pickled.

D. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304.

E. Textured Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304 with embossed texture rolled into exposed surface.
   1. Metal surface is satin polished after texturing.

F. Stainless-Steel Bars: ASTM A 276, Type 304.

G. Stainless-Steel Tubing: ASTM A 554, Grade MT 304.

H. Aluminum Extrusions: ASTM B 221, Alloy 6063.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine elevator areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work. Examine hoistways, hoistway openings, pits, and machine rooms as constructed; verify critical dimensions; and examine supporting structure and other conditions under which elevator work is to be installed.

B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's written instructions.

B. Welded Construction: Provide welded connections for installing elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts. Comply with AWS standards for workmanship and for qualifications of welding operators.

C. Sound Isolation: Mount rotating and vibrating equipment on vibration-isolating mounts to minimize vibration transmission to structure and structure-borne noise due to elevator system.

D. Lubricate operating parts of systems, including ropes, as recommended by manufacturers.

E. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with car. Where possible, delay final adjustment of sills and doors until car is operable in shaft. Reduce clearances to minimum, safe, workable dimension at each landing.

F. Leveling Tolerance: 1/8 inch, up or down, regardless of load and travel direction.

G. Set sills flush with finished floor surface at landing. Fill space under sill solidly with nonshrink, nonmetallic grout.

H. Locate hall signal equipment for elevators as follows unless otherwise indicated:
   1. Place hall lanterns either above or beside each hoistway entrance.
   2. Mount hall lanterns at a minimum of 72 inches above finished floor.

3.3 FIELD QUALITY CONTROL

A. Acceptance Testing: On completion of elevator installation and before permitting elevator use (either temporary or permanent), perform acceptance tests as required and recommended by ASME A17.1/CSA B44 and by governing regulations and agencies.

B. Operating Test: Load each elevator to rated capacity and operate continuously for 30 minutes over full travel distance, stopping at each level and proceeding immediately to the next. Record temperature rise of elevator machine during 30-minute test period. Record failure to perform as required.

C. Advise Owner, Engineer, and authorities having jurisdiction in advance of dates and times that tests are to be performed on elevators.

3.4 PROTECTION

A. Temporary Use: Comply with the following requirements for elevator used for construction purposes:

   1. Provide car with temporary enclosure, either within finished car or in place of finished car, to protect finishes from damage.
   2. Provide strippable protective film on entrance and car doors and frames.
   3. Provide padded wood bumpers on entrance door frames covering jambs and frame faces.
   4. Provide other protective coverings, barriers, devices, signs, and procedures as needed to protect elevator and elevator equipment.
   5. Do not load elevators beyond their rated weight capacity.
   6. Engage elevator Installer to provide full maintenance service. Include preventive maintenance, repair or replacement of worn or defective components, lubrication, cleanup, and adjustment as necessary for proper elevator operation at rated speed and capacity. Provide parts and supplies same as those used in the manufacture and installation of original equipment.
   7. Engage elevator Installer to restore damaged work, if any, so no evidence remains of correction. Return items that cannot be refinished in the field to the shop, make required repairs and refinish entire unit, or provide new units as required.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to operate, adjust, and maintain elevator(s).

B. Check operation of each elevator with Owner's personnel present before date of Substantial Completion and again not more than one month before end of warranty period. Determine that operation systems and devices are functioning properly.

3.6 MAINTENANCE

A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include twelve (12) months' full maintenance by skilled employees of elevator Installer. Include monthly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper elevator operation at rated speed and capacity. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.

1. Perform maintenance during normal working hours.
2. Perform emergency callback service during normal working hours with response time of two hours or less.
3. Include 24-hour-per-day, 7-day-per-week emergency callback service with response time of two hours or less.

END OF SECTION 142100

SECTION 260400 - GENERAL CONDITIONS FOR ELECTRICAL TRADES

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including General Conditions of Division 1, State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, and Incidental Construction, Form 816 - 2004 and supplemental specifications thereto, shall be a part of this specification.

B. This section applies to all sections of Division 26, "Electrical" of this project specification unless specified otherwise in the individual sections.

C. The Drawings of other trades (Architectural, Landscape, Civil, and Plumbing) shall be examined for coordination and familiarity of work with other Contractors. Any duplication or omission of provisions in this project should be brought to the attention of the Owners prior to Bidding.

D. Work included in this section may require coordination with Amtrak regarding track outages, flagmen, or other issues related to work around railroad facilities. The Contractor shall pay special attention to the specification entitled “SAFETY AND PROTECTION OF RAILROAD TRAFFIC AND PROPERTY” and other Amtrak Specifications contained in the Contract.

1.2 DESCRIPTION

A. The General Conditions and Supplementary General Conditions are a part of this Division and are to be considered a part of this Contract.

B. Where items of the General Conditions and Supplementary General Conditions are repeated in other Sections of the Specifications, it is merely intended to qualify or to call particular attention to them. It is not intended that any other parts of the General Conditions and Supplementary General Conditions shall be assumed to be omitted if not repeated therein. This Section applies equally and specifically to all Contractors supplying labor and/or equipment and/or materials as required under each Section of this Division. Where conflicts exist between the drawings and the specifications or between this section of the specifications and other sections, the more stringent or higher cost option shall apply.

C. It is the intent of this Section of the Specifications to establish a standard of quality and performance characteristics for basic materials and installation methods used in building electrical systems.

1.3 INTENT

A. This contract is for all labor, materials and equipment required for installation. The system shall be complete and finished in all respects, tested and ready for operation. Work shall include calibration of equipment with factory settings. All materials, equipment and apparatus shall be new and of first class quality.

B. Any apparatus, appliance, material or work not shown on drawings but mentioned in the specifications, or vice versa, or any incidental accessories necessary to make the work complete and perfect in all respects and ready for operation as determined by good trade practice even if not particularly specified, shall be furnished, delivered and installed under their respective Divisions without any additional expense to the Owner.

C. Minor details not usually shown or specified but necessary for proper installation and operation shall be included in the work as though they were hereinafter shown or specified.

D. Work under each Section shall include giving written notice to the Owner and Engineer of any materials or apparatus believed inadequate or unsuitable; in violation of laws, ordinances, rules or regulations of authorities having jurisdiction; and any necessary items of work omitted. In the absence of such written notice, it is mutually agreed that work under each Section has included the cost of all required items for the accepted, satisfactory functioning of the entire system without extra compensation.

E. Location of all existing systems and equipment shown on floor plans is based on the best available information. The Contractor shall verify all dimensions and locations of existing systems and equipment in the field and adjust as necessary.

F. Certain items of existing equipment may be indicated for removal or relocation. Items noted for removal shall be disconnected and turned over to the Owner or disposed of by the Contractor if the Owner so requests. If instructed to dispose of items, the Contractor shall remove the items from the premises and dispose of them in a safe, legal and responsible manner and location. Items noted for relocation are intended for reuse in another location as designated on the Drawings. It shall be the responsibility of the Contractor to remove the material from its present location, store the material in a safe place and reinstall the material in its new location. Questions regarding the suitability of the material or equipment shall be brought to the attention of the Owner and Engineer in writing.

G. Wherever a particular piece of equipment, device or material is specifically indicated on the Drawings by model number, type, series or other means, that specification shall take precedence over equipment or materials specified herein. For example: If a particular switch is specified on the Drawings, its specification takes precedence over switch specified herein.

1.4 DEFINITIONS

A. Word “Subcontractor” means specifically the subcontractor working under this Division. Other Contractors are specifically designated “Plumbing Subcontractor”, “General Contractor” and so on. Note: Take care to ascertain limits of responsibility for connecting equipment which requires connections by two or more trades.

B. Word “install” shall mean set in place complete with all mounting facilities and connections as necessary ready for normal use or service.

C. Words “furnish” or “supply” shall mean purchase, deliver to, and off-load at the job site, all ready to be installed including where appropriate all necessary interim storage and protection.

D. Word “provide” shall mean furnish (or supply) and install as necessary.

E. Word “finished” refers to all rooms and areas scheduled to be painted in Room Finish Schedule on the drawings. All rooms and areas not covered in Schedule, including underground tunnels and areas above ceilings shall be considered not finished, unless otherwise noted.

F. Words “approved equal” mean any product which in the opinion of the Engineer is equal in quality, arrangement, appearance, and performance to the product specified.

G. Word “wiring” shall mean cable assembly, raceway, conductors, fittings and any other necessary accessories to make a complete wiring system.Word “product” shall mean any item of equipment, material, fixture, apparatus, appliance or accessory installed under this Division.

H. Substitutions: Requests for changes in products, materials, equipment, and methods of construction required by Contract Documents proposed by the Contractor after award of the Contract are considered requests for "substitutions."

I. Indicated: The term "indicated" refers to graphic representations, notes, or schedules on the Drawings, other paragraphs or schedules in the Specifications, and similar requirements in the Contract Documents. Where terms such as "shown," "noted," "scheduled," and "specified" are used, it is to help the reader locate the reference; no limitation on location is intended.

J. Directed: Terms such as "directed," "requested," "authorized," "selected," "approved," "required," and "permitted" mean "directed by the Engineer," "requested by the Engineer," and similar phrases.

K. Approve: The term "approved," where used in conjunction with the Engineer's action on the Contractor's submittals, applications, and requests, is limited to the Engineer's duties and responsibilities as stated in General and Supplementary Conditions.

L. Regulation: The term "Regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.

M. Remove: The term “remove” means “ to disconnect from its present position, remove from the premises and to dispose of in a legal manner.”

N. Standard Product Warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.

O. Special Warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

1.5 DRAWINGS

A. Drawings are diagrammatic and indicate the general arrangement of systems and work included in the Contract. Consult the Architectural Drawings and Details for exact location of fixtures and equipment; where same are not definitely located, obtain this information from the Architect. (Do not scale the drawings)

B. Work under each Section shall closely follow Drawings in layout of work; check Drawings of other Divisions to verify spaces in which work will be installed. Maintain maximum headroom; where space conditions appear inadequate, Owner and Engineer shall be notified before proceeding with installations.

C. The Owner may, without extra charge, make reasonable modifications in the layout as needed to prevent conflict with work of other trades and/or for proper execution of the work.

D. Where variances occur between the Drawings and Specifications or within either of the Documents, the item or arrangement of better quality, shall be included in the Contract price. The Owner and Engineer shall decide on the item and the manner in which the work shall be installed.

1.6 SURVEYS AND MEASUREMENTS

A. Before submitting his Bid, the Contractors shall visit the site and become thoroughly familiar with all existing conditions under which his work will be installed. This Contract includes all modifications of existing systems required for the installation of new equipment. This Contract includes all necessary offsets, transitions and modifications required to install all new equipment in existing spaces. All new and existing equipment and systems shall be fully operational under this Contract before the job is considered complete. The Contractors shall be held responsible for any assumptions he makes, any omissions or errors he makes as a result of his failure to become fully familiar with the existing conditions at the site and the Contract Documents.

B. The Contractor shall base all measurements, both horizontal and vertical, from established bench marks. All work shall agree with these established lines and levels. Verify all measurements at the site and check the correctness of same as related to the work.

C. Should the Contractor discover any discrepancies between actual measurements and those indicated which prevent following good practice or which interfere with the intent of the Drawings and Specifications, the Engineer will be notified and work will not proceed until instructions from the Engineer are received.

1.7 CODES AND STANDARDS

A. Reference Standard Compliance

1. Where equipment or materials are specified to conform to industry and technical society reference standards of the organizations such as American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), National Electrical Manufacturers Association (NEMA), and Underwriters Laboratories Inc. (UL), submit proof of such compliance. The

label or listing by the specified organization will be acceptable evidence of compliance.

2. Independent Testing Organization Certificate: In lieu of the label or listing, indicated above submit a certificate from an independent testing organization, competent to perform testing, and approved by the engineer. The certificate shall state that the item has been tested in accordance with the specified organization's test methods and that the item complies with the specified organization's reference standard.

B. The Following Codes and Standards listed below apply to all electrical work. Wherever Codes and/or Standards are mentioned in these Specifications, the latest applicable edition or revision shall be followed:
Connecticut State Building Code - Connecticut Supplement
The International Building Code
The International Mechanical Code
The International Plumbing Code
The BOCA National Code Supplement
The National Electrical Code
NFPA 101 Life Safety
Model Energy Code
ASHRAE 90.1 and International Energy Conservation Code

C. The following Standards shall be used where referenced by the following abbreviations:

AIA	American Institute of Architects
ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
ASTM	American Society of Testing and Materials
EPA	Environmental Protection Agency
FM	Factory Mutual
FSSC	Federal Specification
IEEE	Institute of Electrical and Electronics Engineers
NBS	National Bureau of Standards
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NSC	National Safety Council
OSHA	Occupational Safety and Health Administration
UL	Underwriters' Laboratories

D. All materials furnished and all work installed shall comply with the rules and recommendations of the NFPA, the requirements of the local utility companies, the recommendations of the fire insurance rating organization having jurisdiction and the requirements of all Governmental departments having jurisdiction.

E. The Contractor shall include in the work, without extra cost to the Owner, any labor, materials, services, apparatus and Drawings in order to comply with all applicable laws, ordinances, rules and regulations, whether shown on Drawings and/or specified or not.

1.8 PERMITS AND FEES

A. The Contractor shall give all necessary notices, obtain all permits; and pay all Government and State sales taxes and fees where applicable, and other costs, including

utility connections or extensions in connection with the work, file all necessary Drawings, prepare all documents and obtain all necessary approvals of all Governmental and State departments having jurisdiction, obtain all required certificates of inspection for his work, and deliver a copy to the Owner and Engineer before request for acceptance and final payment for the work.

1.9 EQUIPMENT SUBSTITUTIONS

A. In these Contract Documents, one or more makes of materials, apparatus or appliances may have been specified for use in this installation. These describe the basis of design and approved equivalents. This has been done for convenience in fixing the standard of workmanship, finish and design required for installation without consideration of any or all costs associated but not limited to (structural, mechanical, or electrical feeder, breaker, or transformer requirements). The Contractor acknowledges that not all requirements are shown for either alternate acceptable manufacturers listed or those alternates requiring a request for substitution and it is their responsibility to coordinate all requirements necessary to accommodate any change from the basis of design listed or scheduled. The contractor is required to submit any and all costs (including costs associated or required by all trades) along with performance differences as part of their request for substitution. The details of workmanship, finish and design, and the guaranteed performance of any material, apparatus or appliance which the Contractor desires to deviate for those mentioned herein shall also conform to these standards.

B. Where no specific make of material, apparatus or appliance is mentioned, any first-class product made by a reputable manufacturer may be submitted for the Engineers review.

C. Where two or more names are given as approved manufacturers of equivalents, the Contractor must use the specified item or one of the named equivalents which still must meet all of the performance characteristics of the basis of design make and model. Where one name only is used and is followed by the words “or approved equal”, the Contractor must use the item named or he is required to apply for a substitution. Where one name only is used, the Contractor must use that item named.

D. Where the Contractor proposes to deviate (provide an equivalent or request for substitution) from the equipment or materials as hereinafter specified, they are required to submit a requested for substitution in writing. The Contractor shall state in their request whether it is a substitution or a non approved equivalent to that specified and the amount of credit or extra cost involved. A copy of said request shall be included in the Base Bid with manufacturer’s equipment cuts. The Base Bid shall be based on using the materials and equipment as specified with no exceptions.

E. Where the Contractor proposes to use an item of equipment other than specified or detailed on the Drawings which requires any redesign of the structure, partitions, foundations, piping, wiring or any other part of the mechanical, electrical or architectural layout, all such redesign and all new drawings and detailing required therefore shall be prepared by the Engineers/Architects of Record at the expense of the Contractor and at no additional cost to the Owner.

F. Where such accepted deviation resulting from using an approved equivalent or substitution requires a different quantity and arrangement of piping, ductwork, valves, pumps, insulation, wiring, conduit and equipment from that specified or indicated on the

Drawings, the Contractor shall, after acceptance by the Engineer, furnish and install any such additional equipment required by the system at no additional cost to the Owner, including any costs added to other trades due to the deviation.

G. Equipment, material or devices submitted for review as an "equivalent" shall meet the following requirements:
   1. The equivalent shall have the same construction features such as, but not limited to:
      a. Material thickness, gauge, weight, density, etc.
      b. Welded, riveted, bolted, etc., construction
      c. Finish, undercoating, corrosion protection
   2. The equivalent shall perform with the same or better operating efficiency.
   3. The equivalent shall be locally represented by the manufacturer for service, parts and technical information.
   4. The equivalent shall bear the same labels of performance certification as is applicable to the specified item, such as UL or NEMA labels.

H. Equipment, material or devices submitted for review as a "substitution" shall meet the following requirements:
   1. Substitution Request Submittal: Requests for substitution will be considered if received in writing 14 days before the bid date. Requests received later than 14 days before the bid date may be considered or rejected at the discretion of the Engineer/Owner. Once the Contractor submits a complete request for substitution as determined by the engineer, the engineer reserves the right to request the time necessary to evaluate the request for substitution and review it with the Owner.
   2. Submit three (3) copies of each request for substitution for consideration.
   3. Identify the product, or the fabrication or installation method to be replaced in each request. Include related Specification Section and Drawing numbers. Provide complete documentation showing compliance with the requirements for substitutions, and the following information, as appropriate:
      a. Product Data, including Drawings and descriptions of products, fabrication and installation procedures.
      b. Samples, where applicable or requested.
      c. A detailed comparison of significant qualities of the proposed substitution with those of the Work specified. Significant qualities may include elements such as size, weight, durability, performance and visual effect.
      d. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by the Owner and separate Contractors, that will become necessary to accommodate the proposed substitution.
      e. A statement indicating the substitution's effect on the Contractor's Construction Schedule compared to the schedule without approval of the substitution. Indicate the effect of the proposed substitution on overall Contract Time.
      f. Cost information, including a proposal of the net change, if any in the Contract Sum.
      g. Certification by the Contractor that the substitution proposed is equal-to or better in every significant respect to that required by the Contract Documents, and that it will perform adequately in the application

indicated. Include the Contractor's waiver of rights to additional payment or time, that may subsequently become necessary because of the failure of the substitution to perform adequately.

h. Engineer's Action: Within one week of receipt of the request for substitution, the Engineer will notify the Contractor of acceptance or rejection of the proposed substitution. If a decision on use of a proposed substitute cannot be made or obtained within the time allocated, use the product specified by name. Acceptance of a product substitution will be in the form of an Addendum.

i. Other Conditions: The Contractor's substitution request will be received and considered by the Engineer when one or more of the following conditions are satisfied, as determined by the Engineer; otherwise requests will be returned without action except to record noncompliance with these requirements.

1) The request is directly related to an "or equal" clause or similar language in the Contract Documents.

2) The specified product or method of construction cannot be provided within the Contract Time. The request will not be considered if the product or method cannot be provided as a result of failure to pursue the Work promptly or coordinate activities properly.

3) A substantial advantage is offered the Owner, in terms of cost, time, energy conservation or other considerations of merit, after deducting offsetting responsibilities the Owner may be required to bear. Additional responsibilities for the Owner may include additional compensation to the Engineer for redesign and evaluation services, increased cost of other construction by the Owner or separate Contractors, and similar considerations.

1.10 SUBMITTAL PROCEDURES

A. Submit all submittals in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals and related activities that require sequential activity.

2. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination. The Engineer reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing: Allow sufficient review time so that installation will not be delayed as a result of the time required to process submittals, including time for resubmitals.

1. Allow two weeks for initial review. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. The Engineer will promptly advise the Contractor when a submittal being processed must be delayed for coordination.

2. If an intermediate submittal is necessary, process the same as the initial submittal.
3. Allow two weeks for reprocessing each submittal.
4. No extension of Contract Time will be authorized because of failure to transmit submittals to the Engineer sufficiently in advance of the Work to permit processing.

D. Submittal Preparation: Place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block.
1. Include the following information on the label for processing and recording action taken.
a. Project name.
b. Date.
c. Name and address of Engineer.
d. Name and address of Contractor.
e. Name and address of subcontractor.
f. Name and address of supplier.
g. Name of manufacturer.
h. Number and title of appropriate Specification Section.
i. Drawing number and detail references, as appropriate.

E. Submittal Transmittal: Package each submittal appropriately for transmittal and handling. Transmit each submittal from Contractor to Engineer using a transmittal form. Submittals received from sources other than the Contractor will be returned without action. On the transmittal, record relevant information and requests for data. On the form, or separate sheet, record deviations from Contract Document requirements, including minor variations and limitations. Include Contractor's certification that information complies with Contract Document requirements.

F. Except for submittals for record, information or similar purposes, where action and return is required or requested, the Engineer will review each submittal, mark to indicate action taken, and return promptly. Compliance with specified characteristics is the Contractor's responsibility.

G. Action Stamp: The Engineer will stamp each submittal with a uniform, self-explanatory action stamp. The stamp will be appropriately marked, to indicate the action taken.

1.11 SHOP DRAWINGS

A. Submit newly prepared information, drawn to accurate scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not considered Shop Drawings.

B. The Contractor shall submit for review detailed shop drawings of all equipment and material specified in each section and coordinated ductwork layouts. No material or equipment may be delivered to the job site or installed until the Contractor has received shop drawings for the particular material or equipment which have been properly reviewed. Shop drawings shall be submitted within 60 days after award of Contract

before any material or equipment is purchased. The Contractor shall submit for review copies of all shop drawings to be incorporated in the Electrical Contract. Refer to the General Conditions and Supplementary General Conditions for the quantity of copies required for submission. Where quantities are not specified, provide seven (7) copies for review.

C. Provide shop drawings for all devices specified under equipment specifications for all systems including fire alarm, switchgear, clock, lighting, etc., or where called for elsewhere in the Specifications. Shop drawings shall include manufacturers' names, catalog numbers, cuts, diagrams, dimensions, identification of products and materials included, compliance with specified standards, notation of coordination requirements, notation of dimensions established by field measurement and other such descriptive data as may be required to identify and accept the equipment. A complete list in each category (example: all fixtures) of all shop drawings, catalog cuts, material lists, etc., shall be submitted to the Engineer at one time. No consideration will be given to a partial shop drawing submittal.

D. Submittals shall be marked with the trade involved, i.e., Electrical, HVAC, Plumbing, Fire Protection, etc. when the submittal could involve more than one trade.

E. Where multiple quantities or types of equipment are being submitted, provide a cover sheet (with a list of contents) on the submittal identifying the equipment or material being submitted.

F. Failure to submit shop drawings in ample time for review shall not entitle the Contractor to an extension of Contract time. No claim for extension by reason of such default will be allowed, nor shall the Contractor be entitled to purchase, furnish and/or install equipment which has not been reviewed by the Engineer.

G. The Contractor shall furnish all necessary templates, patterns, etc., for installation work and for the purpose of making adjoining work conform; furnish setting plans and shop details to other trades as required.

H. Acceptance rendered on shop drawings shall not be considered as a guarantee of measurements or building conditions. Where drawings are reviewed, review does not mean that drawings have been checked in detail; said approval does not in any way relieve the Contractor from his responsibility or necessity of furnishing material or performing work as required by the Contract Drawings and Specifications. Verify available space prior to submitting shop drawings.

I. Acceptance of shop drawings shall not apply to quantity nor relieve Contractor of his responsibility to comply with intent of Drawings and Specifications.

J. Acceptance of shop drawings is final and no further changes will be allowed without the written consent of the Engineer.

K. Shop drawing submittal sheets which may show items that are not being furnished shall have those items crossed off to clearly indicate which items will be furnished.

L. Bidders shall not rely on any verbal clarification of the Drawings and/or Specifications. Any questions shall be referred to the Engineer in writing at least five (5) working days prior to Bidding to allow for issuance of an Addendum.

M. Do not use Shop Drawings without an appropriate final stamp indicating action taken in connection with construction.

1.12 COORDINATION DRAWINGS

A. Prepare coordination to a scale of 1/4"=1'-0" or larger; detailing major elements, components, and systems of electrical equipment and materials in relationship with other systems, installations, and building components. Indicate locations where space is limited for installation and access and where sequencing and coordination of installations are of importance to the efficient flow of the Work, including (but not necessarily limited to) the following:

1. Indicate the proposed locations of light fixtures, panelboards, conduits, cabinets, etc. Include the following:
2. Clearances for installing and maintaining insulation.
3. Clearances for servicing and maintaining equipment, including NEC requirements and space for equipment disassembly required for periodic maintenance.
4. Equipment connections and support details.
5. Exterior wall and foundation penetrations.
6. Fire-rated wall and floor penetrations.
7. Sizes and locations of required concrete pads and bases.

B. Indicate scheduling, sequencing, movement, and positioning of large equipment into the building during construction.

C. Prepare floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.

D. Prepare reflected ceiling plans to coordinate and integrate installations, air outlets and inlets, light fixtures, communication systems components, sprinklers, and other ceiling-mounted items.

E. Section Deleted.

1.13 COORDINATION WITH OTHER DIVISIONS

A. All work shall be carried out in conjunction with other trades and full cooperation shall be given in order that all work may proceed with a minimum of delay and interference. Particular emphasis is placed on timely installation of major apparatus and furnishing other Contractors, especially the Contractor or Construction Manager, with information as to openings, chases, sleeves, bases, inserts, equipment locations, panels, etc., required by other trades.

B. The Contractors are required to examine all of the Project Drawings and mutually arrange work so as to avoid interference with the work of other trades. In general, ductwork, heating, condenser, chilled water piping, sprinkler piping and drainage lines take precedence over water, gas and electrical conduits. The Engineer shall make final

decisions regarding the arrangement of work which cannot be agreed upon by the Contractors.

C. Where the work of the Contractor will be installed in close proximity to or will interfere with work of other trades, the Contractors will cooperate in working out space conditions to make a satisfactory adjustment.

D. If the work under a Section is installed before coordinating with other Divisions or Sections or so as to cause interference with work of other Sections, the necessary changes to correct the condition shall be made by the Contractor causing the interference without extra charge to the Owner.

E. If so directed in other Sections, the Contractor indicated shall prepare composite working drawings and sections clearly showing how the work is to be installed in relation to the work of other trades, at no extra charge to the Owner.

1.14 WORKMANSHIP

A. Service Support: The equipment items shall be supported by service organizations which are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

B. Modification of References: In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "shall" had been substituted for "should" wherever it appears.

C. The Contractor shall furnish the services of an experienced superintendent who shall be constantly in charge of the installation of the work together with all skilled workmen, journeymen, electricians, helpers and laborers required to unload, transfer, erect, connect, adjust, start, operate and test each system.

D. Unless otherwise specifically indicated on the Drawings or Specifications, all equipment and materials shall be installed with the acceptance of the Engineer and in accordance with the recommendations of the manufacturer. This includes the performance of such tests as the manufacturer recommends.

E. All labor for installation of electrical systems shall be performed by experienced, skilled tradesmen under the supervision of a licensed journeyman foreman. All work shall be of a quality consistent with good trade practice and shall be installed in a neat, workmanlike manner. The Engineer reserves the right to reject any work which, in his opinion, has been installed in a substandard, dangerous or unserviceable manner. The Contractor shall replace said work in a satisfactory manner at no extra cost to the Owner.

1.15 SHUTDOWNS

A. When installation of a new system requires the temporary shutdown of an existing operating system, the connection of the new system shall be performed at such time as designated by the Owner.

B. The Engineer and the Owner shall be notified in writing of the estimated duration of the shutdown period at least ten (10) days in advance of the date the work is to be performed.

C. Work shall be arranged for continuous performance whenever possible. The Contractor shall provide all necessary labor, including overtime if required, to assure that existing operating services will be shut down only during the time actually required to make necessary connections.

1.16 TEMPORARY UTILITIES

A. General: Provide new materials and equipment; if acceptable to the Engineer, undamaged previously used materials in serviceable condition may be used. Provide materials suitable for the use intended.

B. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Take necessary fire prevention measures. Do not overload facilities, or permit them to interfere with progress. Do not allow hazardous dangerous or unsanitary conditions, or public nuisances to develop or persist on the site.

C. First Aid Supplies: Comply with governing regulations.

D. Fire Extinguishers: Provide hand-carried, portable UL-rated, class "A" fire extinguishers for temporary offices and similar spaces. In other locations provide hand-carried, portable, UL-rated, class "ABC" dry chemical extinguishers, or a combination of extinguishers of NFPA recommended classes for the exposures.

E. Provide temporary lighting in all areas, throughout construction activities.
   1. Use Charges: Cost or use charges for temporary facilities are not chargeable to the Owner or Engineer, and will not be accepted as a basis of claims for a Change Order.
   2. Temporary Electric Power Service: Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period. Include meters, transformers, overload protected disconnects, automatic ground-fault interrupters, and main distribution switch gear.
      a. Except where overhead service must be used, install electric power service underground.
      b. Power Distribution System: Install wiring overhead, and rise vertically where least exposed to damage. Where permitted, wiring circuits not exceeding 125 Volts, AC 20 ampere rating, and lighting circuits may be nonmetallic sheathed cable where overhead and exposed for surveillance.
   3. Temporary Telephones: Provide temporary telephone service for all personnel engaged in construction activities, throughout the construction period.

F. Environmental Protection: Provide protection, operate temporary facilities and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways and subsoil might be contaminated or polluted, or that other undesirable effects might result. Avoid use of tools and equipment which produce harmful noise. Restrict use of noise making tools and equipment to hours that will minimize complaints from persons or firms near the site.

G. Termination and Removal: Unless the Engineer requires that it be maintained longer, remove each temporary facility when the need has ended, or when replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with the temporary facility. Repair damaged Work, clean exposed surfaces and replace construction that cannot be satisfactorily repaired. Materials and facilities that constitute temporary facilities are property of the Contractor. The Owner reserves the right to take possession of Project identification signs.

1.17 PROJECT PHASING

A. Work under each Section shall include all necessary temporary connections, equipment, conduit, wiring, fire alarm equipment and testing, lighting and emergency lighting, fire stopping, connection of necessary mechanical equipment, labor, and material as necessary to accommodate the phasing of Construction as developed by the General Contractor approved by the Owner and Amtrak. All existing systems that pass-thru an area of the building shall remain operational during all phases of construction. No extra compensation shall be granted the Contractor for work required to maintain existing systems operational or to accommodate the construction phasing of the project.

1.18 PROTECTION OF MATERIALS AND EQUIPMENT

A. Work under each Section shall include protecting the work and material of all other Sections from damage by work or workmen and shall include making good all damage thus caused.

B. The Contractor shall be responsible for work and equipment until the facility has been accepted by the Owner. Protect work against theft, injury or damage and carefully store material and equipment received on site which is not immediately installed. Close open ends of work with temporary covers or plugs during construction to prevent entry of foreign material.

C. Work under each Section includes receiving, unloading, uncrating, storing, protecting, setting in place and completely connecting equipment supplied under each Section. Work under each Section shall also include exercising special care in handling and protecting equipment and fixtures, and shall include the cost of replacing any of the equipment and fixtures which are missing or damaged.

D. Equipment and material stored on the job site shall be protected from the weather, vehicles, dirt and/or damage by workmen or machinery. Insure that all electrical or absorbent equipment or material is protected from moisture during storage.

1.19 ADJUSTING AND TESTING

A. After all the equipment and accessories to be furnished are in place, they shall be put in final adjustment and subjected to such operating tests so as to assure the Engineer that they are in proper adjustment and in satisfactory, permanent operating condition.

B. Where requested by the Engineer, a factory-trained service representative shall inspect the installation and assist in the initial startup and adjustment to the equipment. The period of these services shall be for such time as necessary to secure proper installation

and adjustments. After the equipment is placed in permanent operation, the service representative shall supervise the initial operation of the equipment and instruct the personnel responsible for operation and maintenance of the equipment. The service representative shall notify the Contractor in writing, that the equipment was installed according to manufacturers recommendations and is operating as intended by the manufacturer.

1.20 CLEANING

A. The Contractor shall thoroughly clean all equipment of all foreign substances, oils, dust, dirt, etc., inside and out before final acceptance by the Engineer.

B. If any part of a system should be stopped or damaged by any foreign matter after being placed in operation, the system shall be disconnected, cleaned and reconnected wherever necessary to locate and/or remove obstructions. Any work damaged in the course of removing obstructions shall be repaired or replaced when the system is reconnected at no additional cost to the Owner.

C. During the course of construction, all conduits shall be capped in an acceptable manner to insure adequate protection against the entrance of foreign matter.

D. Upon completion of all work under the Contract, the Contractor shall remove from the premises all rubbish, debris and excess materials left over from his work.

E. Complete the following cleaning operations before requesting inspection for Certification of Substantial Completion.
   1. Remove labels that are not permanent labels.
   2. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compound and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.
   3. Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition, free of stains, films and similar foreign substances. Restore reflective surfaces to their original reflective condition. Leave concrete floors broom clean. Vacuum carpeted surfaces and panelboard interiors.
   4. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean light fixtures and lamps.

F. Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Owner's property. Do not discharge volatile, harmful or dangerous materials into drainage systems. Remove and dispose of ALL waste materials, packaging material, skids etc. from the site and dispose of in a lawful manner in accordance with municipal, state and federal regulations.

G. Where extra materials of value remaining after completion of associated Work have become the Owner's property, arrange for disposition of these materials as directed.

1.21 OPERATING AND MAINTENANCE

A. Upon completion of all work and tests, the Contractor shall furnish the necessary skilled labor and helpers for operating his system and equipment for a period specified under each applicable Section of this Division. During this period, he shall fully instruct the Owner or the Owner's representative in the operation, adjustment and maintenance of all equipment furnished. The Contractor shall give at least seven (7) days notice to the Owner and the Engineer in advance of this period.

B. The Contractor shall include the maintenance schedule for the principal items of equipment furnished under this Division.

C. The Contractor shall physically demonstrate procedures for all routine maintenance of all equipment furnished under each respective Section to assure accessibility to all devices.

D. An authorized manufacturer's representative shall attest in writing that the equipment has been properly installed prior to startup of any major equipment. The following equipment will require this inspection: fire alarm system, elevator, UPS and associated lighting, lighting timeclock, CCTV system, and Amtrak train approach message system (TAMS). These letters will be bound into the operating and maintenance books.

E. Refer to individual trade Sections for any other particular requirements related to operating instructions.

F. Demonstration shall be recorded on video with two copies turned over to the Owner.

1.22 OPERATING AND MAINTENANCE MANUALS

A. Prepare operating and maintenance manuals in accordance with the requirements of Form 816 Article 1.20-1.08.14 subsection 2 and described in <u>NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS</u> and as follows. The Contractor shall prepare six (6) copies of a complete maintenance and operating instructions manual, bound in booklet form. Organize operating and maintenance data into suitable sets of manageable size. Bind properly indexed data in individual heavy-duty, 3-ring, vinyl-covered binders, with pocket folders for folded sheet information. Mark appropriate identification on front and spine of each binder.

B. Manual shall include the following:
   1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.
   2. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
   3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
   4. Servicing instructions and lubrication charts and schedules.
   5. Emergency instructions.
   6. Spare parts list.

7. Copies of warranties.
8. Wiring diagrams.
9. Recommended "turn around" cycles.
10. Inspection procedures.
11. Shop Drawings and Product Data.
12. Equipment start-up reports.

C. Include in the manual, a tabulated equipment schedule for all equipment. Schedule shall include pertinent data such as: make, model number, serial number, voltage, normal operating current, belt size, filter quantities and sizes, bearing number, etc. Schedule shall include maintenance to be done and frequency.

D. Maintenance and instruction manuals shall be submitted to the Owner at the same time as the seven (7) day notice is given prior to the instruction period.

1.23 ACCEPTANCES

A. The equipment, materials, workmanship, design and arrangement of all work installed under the Electrical Sections shall be subject to the review of the Engineer.

B. Within 30 days after the awarding of a Contract, the Electrical Contractor shall submit to the Engineer, for review, a list of manufacturers of equipment proposed for the work under the Electrical Sections. The intent to use the exact makes specified does not relieve the Contractor of the responsibility of submitting such a list.

C. If extensive or unacceptable delivery time is expected on a particular item of equipment specified, the Contractor shall notify the Owner and Engineer, in writing, within 30 days of the awarding of the Contract. In such instances, deviations may be made pending acceptance by the Engineer or the Owner's representative.

D. Where any specific material, process or method of construction or manufactured article is specified by reference to the catalog number of a manufacturer, the Specifications are to be used as a guide and are not intended to take precedence over the basic duty and performance specified or noted on the Drawings. In all cases, the Electrical Contractor shall verify the duty specified with the specific characteristics of the equipment offered for review. Equipment characteristics are to be used as mandatory requirements where the Contractor proposes to use an acceptable equivalent.

E. If material or equipment is installed before it is reviewed and/or approved, the Contractor shall be liable for its removal and replacement at no extra charge to the Owner if, in the opinion of the Engineer, the material or equipment does not meet the intent of, or standard of quality implied by, the Drawings and Specifications.

F. Failure on the part of the Engineer to reject shop drawings or to reject work in progress shall not be interpreted as acceptance of work not in conformance with the Drawings and/or Specifications. Work not in conformance with the Drawings and/or Specifications shall be corrected whenever it is discovered.

1.24 RECORD DRAWINGS

A. General: Do not use record documents for construction purposes; protect from deterioration and loss in a secure, fire-resistive location; provide access to record documents for the Engineer's reference during normal working hours.

B. Record Drawings: Maintain a clean, undamaged set of blue or black line white-prints of Contract Drawings and Shop Drawings. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown. Mark whichever drawing is most capable of showing conditions fully and accurately; where Shop Drawings are used, record a cross-reference at the corresponding location on the Contract Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date.
   1. Mark record sets with red erasable pencil; use other colors to distinguish between variations in separate categories of the Work.
   2. Mark new information that is important to the Owner, but was not shown on Contract Drawings or Shop Drawings.
   3. Note related Change Order numbers where applicable.
   4. Organize record drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates and other identification on the cover of each set. Final record documents shall be provided in pdf format on CD ROM and shall be turned over to the Owner at the completion of the work.

1.25 WARRANTIES AND BONDS

A. Refer to Form 816 Article 1.20-1.06.08 and NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information.

B. The following general administrative and procedural requirements for warranties and bonds required by the Contract Documents, including manufacturers standard warranties on products and special warranties are to be included:
   1. General close-out requirements included in Section "Project Close-out."
   2. Specific requirements for warranties for the Work and products and installation that are specified to be warranted, are included in the individual Sections of Divisions 2 through 16.
   3. Certifications and other commitments and agreements for continuing services to Owner are specified elsewhere in the Contract Documents.

C. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

D. Separate Prime Contracts: Each prime Contractor is responsible for warranties related to its own Contract.

1.26 WARRANTY REQUIREMENTS

A. Related Damages and Losses: When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.

B. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

C. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.

D. Owner's Recourse: Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, right and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.

E. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents.

F. The Owner reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment is required on such Work or part of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.

G. Submit written warranties to the Engineer prior to the date certified for Substantial Completion. If the Engineer's Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the Work, or a designated portion of the Work, submit written warranties upon request of the Engineer.

H. When a designated portion of the Work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Engineer within fifteen days of completion of that designated portion of the Work.

I. When a special warranty is required to be executed by the Contractor, or the Contractor and a subcontractor, supplier or manufacturer, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Owner through the Engineer for approval prior to final execution.

J. Form of Submittal: At Final Completion compile two copies of each required warranty and bond properly executed by the Contractor, or by the Contractor, subcontractor, supplier, or manufacturer. Organize the warranty documents into an orderly sequence.

K. Bind warranties and bonds in heavy-duty, commercial quality, durable 3-ring vinyl covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2" by 11" paper.

1. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed

description of the product or installation, including the name of the product, and the name, address and telephone number of the installer.

2. Identify each binder on the front and the spine with the typed or printed title "WARRANTIES," the Project title or name, and the name of the Contractor.
3. When operating and maintenance manuals are required for warranted construction, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

1.27 GUARANTEES

A. The Contractor shall guarantee all material and workmanship under these Specifications and the Contract for a period of one (1) year from the date of final acceptance by Owner. During this guarantee period, all defects developing through faulty equipment, materials or workmanship shall be corrected or replaced immediately by this Contractor without expense to the Owner. Such repairs or replacements shall be made to the Engineers satisfaction.

B. Contractor shall provide name, address, and phone number of all contractors and subcontractors and associated equipment they provided

1.28 PROJECT CLOSE-OUT

A. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications and similar documents.

B. Deliver tools, spare parts, extra stock, and similar items.

C. Complete start-up testing of systems, and instruction of the Owner's operating and maintenance personnel. Discontinue or change over and remove temporary facilities from the site, along with construction tools, mock-ups, and similar elements.

D. Complete final clean up requirements, including touch-up painting. Touch-up and otherwise repair and restore marred exposed finishes.

E. Inspection Procedures: On receipt of a request for inspection, the Engineer will either proceed with inspection or advise the Contractor of unfilled requirements. The Engineer will prepare the Certificate of Substantial Completion following inspection, or advise the Contractor of construction that must be completed or corrected before the certificate will be issued.

1. The Engineer will repeat inspection when requested and assured that the Work has been substantially completed.
2. Results of the completed inspection will form the basis of requirements for final acceptance.

END OF SECTION

SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions of Division 1, State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, and Incidental Construction, Form 816 - 2004 and supplemental specifications thereto, shall be a part of this specification.

B. Work included in this section may require coordination with Amtrak regarding track outages, flagmen, or other issues related to work around railroad facilities. The Contractor shall pay special attention to the specification entitled "SAFETY AND PROTECTION OF RAILROAD TRAFFIC AND PROPERTY" and other Amtrak Specifications contained in the Contract.

1.2 SUMMARY

A. This section specifies furnishing, installing and testing complete grounding and bonding systems for newly installed structures as shown on the contract drawings including, but not limited to along track counterpoises, fences, guardrails, sign posts and passenger station structures.

B. The contractor shall be responsible for bonding and grounding all permanent and temporary structures as indicated herein and shown on the contract drawings. The contractor shall maintain the integrity of the existing structures' grounding and bonding systems during all phases of demolition and construction until the new system is in place. Contractor shall submit detailed grounding and bonding plans for all proposed temporary configurations to the engineer for approval.

C. Section Includes:
1. Rod electrodes.
2. Active electrodes.
3. Wire.
4. Exothermic connections.
5. Mechanical grounding connections.

D. Related Sections:
1. Section 03 20 00 - Concrete Reinforcing: Bonding or welding bars when reinforcing steel is used for electrodes.
2. Section 09 69 00 - Access Flooring: Grounding systems for access flooring.
3. Section 26 41 00 - Facility Lightning Protection: Grounding of lightning protection system.
4. Section 33 79 00 - Site Grounding: Site related grounding components for buildings and facilities.

1.3 REFERENCES

A. Institute of Electrical and Electronics Engineers:
   1. IEEE 142 - Recommended Practice for Grounding of Industrial and Commercial Power Systems.
   2. IEEE 1100 - Recommended Practice for Powering and Grounding Electronic Equipment.

B. International Electrical Testing Association:
   1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

C. National Fire Protection Association:
   1. NFPA 70 - National Electrical Code.

1.4 QUALITY ASSURANCE:

A. Source Limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

B. Source limitations; comply with form 816 Article 1.20-1.06.01.

C. Testing agency qualifications: member company of NETA or an NRTL.

D. Electrical components, devices and accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

E. Comply with UL 467 for grounding and bonding materials and equipment.

1.5 SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Shop drawings:
   1. Locations of ground rods, connectors, cables, etc, and details of connections, terminations and access points.
   2. Manufacturers catalog data for all proposed materials with installation recommendations.
   3. Procedures and equipment for testing resistances and electrical continuity.

C. Test Reports: Indicate overall resistance to ground and resistance of each electrode.

D. Manufacturer's Certificate.

E. Qualification data: for qualified testing agency and testing agencies field supervisor.

F. Certification: certified test reports verifying that ground resistance, when grounding and bonding is installed to the ground grid, counterpoise or ground rods, does not exceed the values specified in Article 3.2.

G. Operation and maintenance data:
   1. Instructions for periodic testing and inspection of grounding features at ground rings based on NETA.
      a. Tests shall determine if ground-resistance or impedance values remain within specified maximums, and instructions shall recommend corrective action if values do not.
      b. Include recommended testing intervals.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Refer to Form 816 Article 1.06.03 and Form 816 Article 1.20-1.06.03 for additional information.

PRODUCTS

1.7 CONDUCTORS:

A. Insulated conductors: copper wire or cable insulated for 600V unless otherwise required by applicable code or authorities having jurisdiction.

B. Bare copper conductors:
   1. Solid conductors: ASTM B3.
   2. Stranded conductors: ASTM B8.
   3. Tinned conductors: ASTM B33.
   4. Bonding cable:28 kcmil, 14 strand of No. 17 AWG conductor, ¼ inch in diameter.
   5. Bonding conductor: No.4 or No.6 AWG, stranded conductor.
   6. Bonding jumper: copper tape, braided conductors terminated with copper ferrule; 1-5/8 inches wide and 1/16 inch thick.
   7. Tinned bonding jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

1.8 CONNECTORS

A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

B. Terminal lugs:
   1. For 4/0 AWG and smaller conductors: copper compression terminal lugs.
   2. For 250 MCM and larger: long barrel, copper, double-compression terminal lugs.

C. Ground connectors:
   1. O-Z Gedney, type KG or equal.
   2. Copper alloy body and silicon bronze bolt, nut and washer with interlocking clamp.
   3. Exothermic welds: size and type per manufacturer's recommendations.
   4. Burndy, type GAR or equal for connection to railings.

D. Jumpers: copper braided or leaf-type flexible jumper, size as shown on the drawings.

E. Coal Tar Epoxy: Polyamide cured coal tar epoxy, Dupont corlar 823 CTE, Koppers Company No. 300M, PPG Industries 97-640 or 97-641 or equal, applied to a dry film thickness of 8 mils per coat.

1.9 ROD ELECTRODES

A. Manufacturers:
   1. Copperweld, Inc.
   2. Erico, Inc.
   3. O-Z Gedney Co.
   4. Thomas & Betts, Electrical
   5. Substitutions: Section 01 60 00 - Product Requirements

B. Product Description:
   1. Material: Copper-clad steel.
   2. Diameter: 3/4 inch.
   3. Length: 10 feet.

C. Connector: Connector for exothermic welded connection.

1.10 WIRE

A. Material: Stranded copper.

B. Foundation Electrodes: 4 AWG.

C. Grounding Electrode Conductor: Copper conductor bare.

D. Bonding Conductor: Copper conductor bare.

1.11 EXOTHERMIC CONNECTIONS

A. Manufacturers:

1. Cadweld, Erico, Inc.
2. Copperweld, Inc.
3. ILSCO Corporation.
4. O-Z Gedney Co.
5. Thomas & Betts, Electrical.
6. Substitutions: Section 01 60 00 - Product Requirements

B. Product Description: Exothermic materials, accessories, and tools for preparing and making permanent field connections between grounding system components.

PART 2 EXECUTION

2.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.

B. Verify final backfill and compaction has been completed before driving rod electrodes.

2.2 PREPARATION

A. Remove paint, rust, mill oils, surface contaminants at connection points.

2.3 EXISTING WORK

A. Modify existing grounding system to maintain continuity to accommodate renovations.

B. Extend existing grounding system using materials and methods compatible with existing electrical installations, or as specified.

2.4 CONNECTIONS

A. Ground connections:
1. Exothermically weld buried ground connections. These connections shall be coated in accordance with the manufacturer's recommendations or as follows, whichever is more stringent. Clean and coat with a minimum of 4 coats of coal tar epoxy applied with a 32 mils dry thickness per coat. Allow drying between coats and before backfilling. Encapsulate with epoxy resin buried connections of grounding electrode conductors running to ground buses.
2. Use terminal lugs to connect grounding conductors to equipment enclosures. Secure connector or terminal lugs to the conductors in order to engage all strands equally by using tools and pressure recommended by the manufacturer.
3. Splices in grounding conductors are not permitted.

2.5 APPLICATIONS

A. Conductors: Install stranded conductor for No.8 AWG and smaller, and stranded conductors for No.6 AWG and larger unless otherwise indicated.

B. Underground grounding conductors: Install bare copper conductor,250kcmil minimum.
   1. Bury at least 24 inches below grade.

C. Conductor terminations and connections:

   1.Pipe and equipment grounding conductor terminations: Bolted connectors.

   2. Underground connections: Welded connectors except at test wells and as otherwise indicated.

   3. Connections to ground rods at test wells: bolted connectors.

   4. Connections to structural steel: Welded connectors.

2.6 INSTALLATION

A. Platform grounding system and counterpoise for grounding in passenger areas:
   1. All metallic and miscellaneous items located on passenger located on passenger platforms shall be isolated from the static wire and connected to the platform grounding system with a 4/0 AWG bare copper conductor.
   2. A 4/0 AWG bare copper counterpoise shall be installed along the entire length of the platform with extensions beyond the end of platform. The counterpoise shall be buried. A grounding loop shall attach at each end of the counterpoise wire and run along the back of the platform.
   3. Grounding rods shall be installed at 10-foot intervals.
   4. The OCS structures for each track shall not be connected to the adjacent counterpoise. Amtrak forces will connect the OCS structures to track drain bonds.
   5. Proper isolation will be verified during construction.
   6. Structural steel I-beams shall be drilled to allow the construction of a 2-hole NEMA lug approximately 6 inches above the platform.
   7. Tubular lighting poles, shelter supports, telephone pedestals, etc., shall be supplied with a 2-hole NEMA grounding pad approximately 6 inches above the platform.
   8. Tubular fence posts and miscellaneous items 3 inches in diameter or less shall be connected to the grounding conductor with a U-bolt type grounding clamp approximately 6 inches above the platform. Posts along continuous runs of fencing should be connected to the grounding conductor with 2/0 AWG bare copper at each end and at 50’-0” intervals, minimum. Install 2/0 AWG bare

9. Underground connections to counterpoise conductors and ground rods shall be of the exothermic weld type.
10. Connections to rebar and ground rods to be cast in concrete shall be of the exothermic weld type.

B. Grounding conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

C. Bond together reinforcing steel and metal accessories in platform fountain structures.

D. Ground bonding common with Lightning Protection System: Comply with NFPA 780 and UL 96 when interconnecting with lightning protection. Bond electrical power system ground directly to lightning protection system grounding conductor at closest point to electrical service grounding electrode. Use bonding conductor sized same as system grounding electrode conductor, and install in conduit.

E. Permanently ground entire light and power system in accordance with NEC, including panelboards, UPS, grounding type receptacles, and other exposed non-current carrying metal parts of electrical equipment.

F. Accomplish grounding of electrical system by using insulated grounding conductor installed with feeders and branch circuit conductors in conduits. Size grounding conductors in accordance with NEC. Install from grounding bus of serving panel to ground bus of served panel, grounding screw of receptacles, lighting fixture housing, light switch outlet boxes or metal enclosures of service equipment. Ground conduits by means of grounding bushings on terminations at panelboards with installed number 12 conductor to grounding bus.

G. Ground rods: Drive rods until tops are 2 inches(50mm) below finished floor or final grade unless otherwise indicated.
1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
2. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes ,and connect to the service grounding electrode conductor.

H. Bonding straps and jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.
1. Bonding to structure: Bond to structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.

I. Permanently attach equipment and grounding conductors prior to energizing equipment.

2.7 FIELD QUALITY CONTROL

A. Testing agency: Engage a qualified testing agency to perform tests ans inspections.

B. Manufacturer's field service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

C. Perform tests and inspections.
   1. Manufacturer's field service: engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

D. Tests and inspections:
   1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
   2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
   3. Test complete grounding system at each location where a maximum ground resistance level is specified, at service disconnect enclosure grounding terminal at ground test wells and at individual ground rods. Make test at ground rods before any conductors are connected.
      a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
      b. Perform tests by fall-of-potential method according to IEEE 81.

E. Grounding system will be considered defective if it does not pass tests and inspections.

F. Conduct tests in the presence of Amtrak and prepare inspection reports.

G. Report measured ground resistances that exceed the following values:
   1. Ground grid at passenger stations shall not exceed 5 ohms.

H. Excessive ground resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance. Install additional ground rods of counterpoise as necessary.

END OF SECTION

SECTION 260533 - RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions of Division 1, State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, and Incidental Construction, Form 816 - 2004 and supplemental specifications thereto, shall be a part of this specification.

1.2 SUMMARY

A. Section includes conduit and tubing, surface raceways, wireways, outlet boxes, pull and junction boxes.

B. Related Sections:
1. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
2. Section 26 05 53 - Identification for Electrical Systems.
3. Section 26 27 26 - Wiring Devices.

1.3 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Raceway:

1. Basis of Measurement: By linear foot (meter).

2. Basis of Payment: Includes materials, delivery, handling, and installing.

B. Boxes:

1. Basis of Measurement: By cubic foot (mm).

2. Basis of Payment: Includes materials, delivery, handling, and installing.

1.4 REFERENCES

A. American National Standards Institute:

1. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.

2. ANSI C80.3 - Specification for Electrical Metallic Tubing, Zinc Coated.

3. ANSI C80.5 - Aluminum Rigid Conduit - (ARC).

B. National Electrical Manufacturers Association:

1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

2. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.

3. NEMA OS 1 - Sheet Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.

4. NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers, and Box Supports.

5. NEMA RN 1 - Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.

6. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Tubing and Conduit.

7. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing.

1.5 SYSTEM DESCRIPTION

A. Raceway and boxes located as indicated on Drawings, and at other locations required for splices, taps, wire pulling, equipment connections, and compliance with regulatory requirements. Raceway and boxes are shown in approximate locations unless dimensioned. Provide raceway to complete wiring system.

B. Underground: Provide rigid galvanized steel conduit or PVC coated rigid steel conduit. Provide nonmetallic handhole.

C. All Outdoor Locations: Provide PVC coated rigid steel conduit. Provide cast metal outlet, pull, and junction boxes.

1.6 DESIGN REQUIREMENTS

A. Minimum Raceway Size: 3/4 inch (19 mm) unless otherwise specified.

1.7 SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Product Data: Submit for the following:
1. Flexible metal conduit.

2. Liquidtight flexible metal conduit.

3. Nonmetallic conduit.

4. Flexible nonmetallic conduit.

5. Nonmetallic tubing.

6. Raceway fittings.

7. Conduit bodies.

8. Surface raceway.

9. Wireway.

10. Pull and junction boxes.

C. Manufacturer's Installation Instructions: Submit application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

1.8 CLOSEOUT SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Project Record Documents:

1. Record actual routing of conduits larger than 2 inch (53 mm).
2. Record actual locations and mounting heights of outlet, pull, and junction boxes.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Refer to Form 816 Article 1.06.03 and Form 816 Article 1.20-1.06.03 for additional information.

B. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

C. Protect PVC conduit from sunlight.

1.10 COORDINATION

A. Section Deleted.

B. Coordinate installation of outlet boxes for equipment connected under Section 26 05 03.

C. Coordinate mounting heights, orientation and locations of outlets mounted above counters, benches, and backsplashes.

PART 2 PRODUCTS

2.1 METAL CONDUIT

A. Manufacturers:

1. Allied Tube and Conduit.

2. Western Tube and Conduit.

3. Wheatland Tube Company.

4. Substitutions: Section 01 60 00 - Product Requirements.

B. Rigid Steel Conduit: ANSI C80.1.

C. Rigid Aluminum Conduit: ANSI C80.5.

D. Intermediate Metal Conduit (IMC): Rigid steel.

E. Fittings and Conduit Bodies: NEMA FB 1; material to match conduit.

2.2 PVC COATED METAL CONDUIT

A. Manufacturers:

1. Allied Tube and Conduit

2. Western Tube and Conduit.

3. Wheatland Tube Company.

4. Substitutions: Section 01 60 00 - Product Requirements.Product Description: NEMA RN 1; rigid steel conduit with external PVC coating,40 mil (0.1 mm) thick.

B. Fittings and Conduit Bodies: NEMA FB 1; steel fittings with external PVC coating to match conduit.

2.3 FLEXIBLE METAL CONDUIT

A. Manufacturers:

1. Allied Tube and Conduit

2. Western Tube and Conduit.

3. Wheatland Tube Company.

4. Substitutions: Section 01 60 00 - Product Requirements.Product Description: Interlocked steel construction.

B. Fittings: NEMA FB 1.

2.4 LIQUIDTIGHT FLEXIBLE METAL CONDUIT

A. Manufacturers:

1. Carlon Electrical Products.

2. Anamet Electrical.

3. Allied Tube and Conduit.

4. Section Deleted.

B. Product Description: Interlocked [steel] [aluminum] construction with PVC jacket.

C. Fittings: NEMA FB 1.

2.5 ELECTRICAL METALLIC TUBING (EMT)

A. Manufacturers:

1. Allied Tube and Conduit.

2. Western Tube and Conduit.

3. Wheatland Tube Company.

4. Section Deleted.

B. Fittings and Conduit Bodies: NEMA FB 1; steel, compression type.

2.6 OUTLET BOXES

A. Manufacturers:

1. Erico Products.

2. Raco.

3. Thomas & Betts Corp.

4. Section Deleted.

B. Sheet Metal Outlet Boxes: NEMA OS 1, galvanized steel.

1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; furnish 1/2 inch (13 mm) male fixture studs where required.

2. Concrete Ceiling Boxes: Concrete type.

C. Nonmetallic Outlet Boxes: NEMA OS 2.

D. Cast Boxes: NEMA FB 1, Type FD, aluminum. Furnish gasketed cover by box manufacturer.

E. Wall Plates for Finished Areas: As specified in Section 26 27 26.

F. Wall Plates for Unfinished Areas: Furnish gasketed cover.

2.7 PULL AND JUNCTION BOXES

A. Manufacturers:

1. Carlon Electrical Products.

2. Hubbell Wiring Devices.

3. Thomas & Betts Corp.

4. Substitutions: Section 01 60 00 - Product Requirements.

B. Sheet Metal Boxes: NEMA OS 1, galvanized steel.

C. Hinged Enclosures: As specified in Section 26 27 16.

D. Surface Mounted Cast Metal Box: NEMA 250, Type 4; flat-flanged, surface mounted junction box:

1. Material: Galvanized cast iron.

2. Cover: Furnish with ground flange, neoprene gasket, and stainless steel cover screws.

E. In-Ground Cast Metal Box: NEMA 250, Type 6, inside flanged, recessed cover box for flush mounting:

1. Material: Galvanized cast iron.

2. Cover: Smooth cover with neoprene gasket and stainless steel cover screws.

3. Cover Legend: "ELECTRIC".

PART 3 EXECUTION

3.1 EXAMINATION

A. Section Deleted.

B. Verify outlet locations and routing and termination locations of raceway prior to rough-in.

3.2 INSTALLATION

A. Ground and bond raceway and boxes in accordance with Section 26 05 26.

B. Fasten raceway and box supports to structure and finishes in accordance with Section 26 05 29.

C. Identify raceway and boxes in accordance with Section 26 05 53.

D. Arrange raceway and boxes to maintain headroom and present neat appearance.

3.3 INSTALLATION - RACEWAY

A. Raceway routing is shown in approximate locations unless dimensioned. Route to complete wiring system.

B. Arrange raceway supports to prevent misalignment during wiring installation.

C. Support raceway using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.

D. Group related raceway; support using conduit rack. Construct rack using steel channel provide space on each for 25 percent additional raceways.

E. Do not support raceway with wire or perforated pipe straps. Remove wire used for temporary supports

F. Do not attach raceway to ceiling support wires or other piping systems.

G. Construct wireway supports from steel channel specified in Section 26 05 29.

H. Route exposed raceway parallel and perpendicular to walls.

I. Route raceway installed above accessible ceilings parallel and perpendicular to walls.

J. Route conduit in and under slab from point-to-point.

K. Maximum Size Conduit in Slab Above Grade: 3/4 inch (19 mm). Do not cross conduits in slab.

L. Maintain clearance between raceway and piping for maintenance purposes.

M. Maintain 12 inch (300 mm) clearance between raceway and surfaces with temperatures exceeding 104 degrees F (40 degrees C).

N. Cut conduit square using saw or pipe cutter; de-burr cut ends.

O. Bring conduit to shoulder of fittings; fasten securely.

P. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for minimum 20 minutes.

Q. Install conduit hubs or sealing locknuts to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes.

R. Install no more than equivalent of three 90 degree bends between boxes. Install conduit bodies to make sharp changes in direction, as around beams. Install hydraulic one-shot bender to fabricate bends in metal conduit larger than 2 inch (50 mm) size.

S. Avoid moisture traps; install junction box with drain fitting at low points in conduit system.

T. Install fittings to accommodate expansion and deflection where raceway crosses seismic and expansion joints.

U. Install suitable pull string or cord in each empty raceway except sleeves and nipples.

V. Install suitable caps to protect installed conduit against entrance of dirt and moisture.

W. Surface Raceway: Install flat-head screws, clips, and straps to fasten raceway channel to surfaces; mount plumb and level. Install insulating bushings and inserts at connections to outlets and corner fittings.

X. Close ends and unused openings in wireway.

3.4 INSTALLATION - BOXES

A. Adjust box location up to 10 feet (3 m) prior to rough-in to accommodate intended purpose.

B. Orient boxes to accommodate wiring devices oriented as specified in Section 26 27 26.

C. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.

D. Install stamped steel bridges to fasten flush mounting outlet box between studs.

E. Install flush mounting box without damaging wall insulation or reducing its effectiveness.Support boxes independently of conduit.

F. Install gang box where more than one device is mounted together. Do not use sectional box.

G. Install gang box with plaster ring for single device outlets.

3.5 INTERFACE WITH OTHER PRODUCTS

A. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.

3.6 ADJUSTING

A. Section Deleted.

B. Adjust flush-mounting outlets to make front flush with finished wall material.

C. Install knockout closures in unused openings in boxes.

3.7 CLEANING

A. Section Deleted.

B. Clean interior of boxes to remove dust, debris, and other material.

C. Clean exposed surfaces and restore finish.

END OF SECTION

SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions of Division 1, State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, and Incidental Construction, Form 816 - 2004 and supplemental specifications thereto, shall be a part of this specification.

1.2 SUMMARY

A. Section Includes:

1. Identification for raceways.

2. Identification of power and control cables.

3. Identification for conductors.

4. Underground Warning Tape.

5. Warning labels and signs.

6. Instruction signs.

7. Equipment identification labels.

8. Miscellaneous identification products.

B. Related Sections:

1. Section 09 90 00 - Painting and Coating: Execution requirements for painting specified by this section.
2. Section 27 05 53 - Identification for Communications Systems.
3. Section 28 05 53 - Identification for Electronic Safety and Security.

1.3 SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRCTOR-SUBMITTALS.

B. Product Data: Comply with the “Product Data” requirements of Form 816 Article 1.20-1.05.02 for each electrical identification product.

C. Identification Schedule: An index of nomenclature of electrical equipment and system components used in identification signs and labels.

D. Samples:

1. Submit two tags, actual size.

2. Submit two labels, actual size.

E. Manufacturer's Installation Instructions: Indicate installation instructions, special procedures, and installation.

1.4 QUALITY ASSURANCE:

A. Source Limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

B. Comply with ANSI A13.1 and IEEE C2

C. Comply with NFPA 70.

D. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.

E. Comply with ANSI Z535.4 for safety signs and labels.

F. Adhesive –attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

1.5 CLOSEOUT SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Project Record Documents: Record actual locations of tagged devices; include tag numbers.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Refer to Form 816 Article 1.06.03 and Form 816 Article 1.20-1.06.03 for additional information.

B. Accept identification products on site in original containers. Inspect for damage.

C. Accept materials on site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.

D. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.

B. Install labels only when ambient temperature and humidity conditions for adhesive are within range recommended by manufacturer.

1.8 COORDINATION

A. Coordinate identification names, abbreviations, colors and other features with requirements in other Sections requiring identification applications, drawings, shop drawings, manufacturer's wiring diagrams, and the operation and maintenance manual and with those required by codes, standards and 29 CFR 1910.145. Use consistent designations throughout project.

B. Coordination installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

C. Coordinate installation of identifying devices with location of access panels and doors.

D. Install identifying devices before installing acoustical ceiling and similar concealment.

1.9 EXTRA MATERIALS

A. No spare parts are required.

PART 2 PRODUCTS

2.1 POWER RACEWAY IDENTIFICATION MATERIALS:

A. Comply with ANSI A 13.1 for minimum size of letters for legend and for minimum length of color field for each raceway size.

B. Colors for raceways carrying circuits at 600V or less:
1. Black letters on an orange field.
2. Legend: Indicate voltage

C. Self-adhesive vinyl labels for raceways carrying circuits at 600V or less: preprinted, flexible label laminated with a clear, weather and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

D. Snap around labels for raceways carrying circuits at 600V or less: slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

E. Snap-around, color-coding bands for raceways carrying circuits at 600V or less: slit, pretensioned, flexible,solid-colored acrylic sleeve, 2 inches long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

F. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch, with stamped legend, punched for use with self-locking cable tie fastener.

G. Write-on tags: polyster tag, 0.015 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.
   1. Maker for tags: Permanent, waterproof, black ink marker recommended by tag manufacturer
   2. Marker for tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

2.2 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.

B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather and chemical resistant coating and matching wraparound adhesive tape for securing ends of legend label.

C. Metal tags: brass or aluminum, 2 by 2 by 0.05 inch, with stamped legend, punched for use with self-locking cable tie fastener.

D. Write on tags: polyester tag, 0.015 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.
   1. Marker for tags: permanent, waterproof, black ink marker recommended by tag manufacturer.
   2. Marker for tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

2.3 CONDUCTOR IDENTIFICATION MATERIALS

A. Color-coding conductor tape: colored, self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide.

B. Self-adhesive vinyl labels: preprinted, flexible label laminated with a clear, weather and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

C. Snap-around labels: slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

D. Snap-around color coding bands: slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

E. Marker tapes:Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

F. Write-on tags: polyester tag, 0.015 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.

2.4 WARNING LABELS AND SIGNS

A. Comply with NFPA 70 and 29 CFR 1910.145.

B. Self-adhesive warning labels: factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door or other access to equipment unless otherwise indicated.

C. Metal-backed, butyrate warning signs for exterior use:
   1. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch galvanized-steel backing; and with colors,legend, and size required for application.
   2. ¼-inch grommets in corners for mounting
   3. Nominal size, 10 by 14 inches.

2.5 INSTRUCTION SIGNS

A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch thick for signs up to 20 sq. inches and 1/8 inch thick for larger sizes

B. Adhesive film label: machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch.

C. Adhesive film label with clear protective overlay: machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch. Overlay shall provide a weatherproof and UV-resistant seal for label.

2.6 EQUIPMENT IDENTIFICATION LABELS:

A. Adhesive film label: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter shall be 3/8 inch.

B. Adhesive film label with clear protective overlay: machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch. Overlay shall provide a weatherproof and UV-resistant seal for label.

C. Self-adhesive, engraved, laminated acrylic or melamine label: adhesive backed, with white letters on a dark-gray background. Minimum letter height shall be 3/8 inch.

D. Engraved, laminated acrylic or melamine label: punched or drilled for screw mounting. White letters on a dark-gray background. Minimum letter height shall be 3/8 inch.

E. Stenciled legend: In nonfading, black ink or paint. Minimum letter height shall be 1 inch.

2.7 CABLE TIES:

A. General-purpose cable ties: fungus inert, self extinguishing, one piece, self locking type 6/6 nylon.

B. UV-stabilized cable ties: fungus inert, designed for continuous exposure to exterior sunlight, self extinguishing, one piece, self locking, type 6/6 nylon.

2.8 NAMEPLATES

A. Manufacturers:

1. Seton.

2. Brady.

3. Ideal Industries

4. Substitutions: Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.1 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

B. Prepare surfaces in accordance with Section 09 90 00 for stencil painting.

3.2 INSTALLATION

A. Install identifying devices after completion of painting.

B. Nameplate Installation:

1. Install nameplate parallel to equipment lines.

2. Install nameplate for each electrical distribution and control equipment enclosure with corrosive-resistant mechanical fasteners, or adhesive.

3. Install nameplates for each control panel and major control components located outside panel with corrosive-resistant mechanical fasteners, or adhesive.

4. Secure nameplate to equipment front using adhesive.

5. Secure nameplate to inside surface of door on recessed panelboard in finished locations.

6. Install nameplates for the following:

a. Panelboard.

C. Label Installation:

1. Install label parallel to equipment lines.

2. Install labels for permanent adhesion and seal with clear lacquer.

D. Wire Marker Installation:

1. Install wire marker for each conductor at panelboard gutters, pull boxes, outlet and junction boxes and each load connection.

E. Conduit Marker Installation:

1. Install conduit marker for each conduit longer than 6 feet.

2. Conduit Marker Spacing: 20 feet on center.

3. Raceway Painting: Identify conduit using field painting in accordance with Section 09 90 00.

3.3 IDENTIFICATION SCHEDULE

A. Power circuit conductor identification,600V or less: for conductors in junction boxes, use color coding conductor tape to identify the phase.

1. Color-coding for phase and voltage level identification, 600V or less: use colors listed below for ungrounded service, feeder and branch-circuit conductors.

a. Color shall be factory applied.

b. Color for 208/120V circuits:

1) Phase A: Black.

2) Phase B: Red

3) Phase C: Blue

c. Field applied, color coding conductor tape: apply in half-lapped turns for a minimum distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.

B. Equipment to be labeled:

a. Panelboard.

b. UPS equipment.

END OF SECTION

SECTION 262416 - PANELBOARDS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions of Division 1, State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, and Incidental Construction, Form 816 - 2004 and supplemental specifications thereto, shall be a part of this specification.

1.2 SUMMARY

A. Section includes lighting panelboard.

B. Related Sections:
1. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
2. Section 26 05 53 - Identification for Electrical Systems.

1.3 REFERENCES

A. Institute of Electrical and Electronics Engineers:

1. IEEE C62.41 - Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits.

B. National Electrical Manufacturers Association:

1. NEMA AB 1 - Molded Case Circuit Breakers and Molded Case Switches.

2. NEMA FU 1 - Low Voltage Cartridge Fuses.

3. NEMA ICS 2 - Industrial Control and Systems: Controllers, Contactors, and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC.

4. NEMA ICS 5 - Industrial Control and Systems: Control Circuit and Pilot Devices.

5. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).

6. NEMA PB 1 - Panelboards.

7. NEMA PB 1.1 - General Instructions for Proper Installation, Operation, and Maintenance of Panelboards Rated 600 Volts or Less.

C. International Electrical Testing Association:

1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

D. National Fire Protection Association:

1. NFPA 70 - National Electrical Code.

E. Underwriters Laboratories Inc.:

1. UL 67 - Safety for Panelboards.

2. UL 1283 - Electromagnetic Interference Filters.

3. UL 1449 - Transient Voltage Surge Suppressors.

1.4 SUBMITTALS

A. Submit the following in compliance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR-CLOSEOUT DOCUMENTS.

B. Product data: For lighting panelboard. Include dimensions and manufacturer's technical data on features, performance, electrical characteristics, ratings, and finishes.

C. Shop drawings: For each panelboard and related equipment.
1. Include dimension plans, elevations, sections, and details.
2. Detail enclosure types and details for types other than NEMA 250, Type 1.
3. Detail bus configuration, current, and voltage ratings.
4. Short-circuit current rating of panelboards and over current protective devices.
5. Include evidence of NRTL listing for series rating of installed devices.
6. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
7. Include wiring diagrams for power, signal and control wiring.
8. Include time-current coordination curves for each type and rating of over current protective device included in panelboards.
9. Submit final versions after load balancing.

D. Quality assurance submittals:
1. Seismic qualification certificates: Submit certificate that panelboards, overcurrent protective devices, accessories, and components will withstand seismic forces in seismic zone 2b defined seismic building zone map of USA.
2. Field quality control reports:
   a. Test procedures used.
   b. Test results that comply with requirements.
   c. Results of failed tests and corrective action taken to achieve test results hat comply with requirements.

E. Product Data: Submit catalog data showing specified features of standard products.

1.5 CLOSEOUT SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Project Record Documents: Record actual locations of panelboards and record actual circuiting arrangements.

C. Operation and Maintenance Data: Submit spare parts listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.7 QUALITY ASSURANCE

A. Source Limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

B. Testing agency qualifications: Member company of NETA or an NRTL.

C. Electrical components, devices, and accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. Comply with NEMA PB1.

E. Comply with NFPA 70.

1.8 WARRANTY

A. Refer to Form 816 Article 1.20-1.06.08 and NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information.

1.9 SPARE PARTS:

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

B. Refer to NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PANELBOARDS

A. Fabricate and test panelboard according to IEEE 344 to withstand seismic forces of seismic zone 2b.

B. Enclosures: surface-mounted cabinets.
   1. Rated for environmental conditions at installed location:

a. Outdoor locations: NEMA 250, Type 3R.

2. Front: Secured to box with concealed trim clamps.
3. Hinged front cover: Entire front trim hinged to box and with standard door within hinged trim cover.
4. Finishes:
   a. Panels and trim: Galvanized steel, factory finished immediately after cleaning and pre treating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.
   b. Back boxes: Same finish as panels and trim.
   c. Fungus proofing: Permanent fungicidal treatment for overcurrent protective devices and other components.
5. Directory card: Inside panelboard door, mounted in metal frame with transparent protective cover.

C. Incoming mains location: Bottom.

D. Phase, Neutral, and Ground buses:
1. Material: Hard-drawn copper, 98 percent conductivity
2. Equipment ground bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.

E. Conductor connections: Suitable for use with conductor material and sizes.
1. Material: Hard-drawn copper, 98 percent conductivity.
2. Main and neutral lugs: Mechanical type.
3. Ground Lugs and bus configured terminators mechanical type.

F. Panelboard short circuit current rating: Fully rated to interrupt symmetrical short circuit current available at terminals.

2.2 LIGHTING PANELBOARD

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the work include, but are not limited to the following
1. Eaton electrical Inc.; Cutler-Hammer Business Unit.
2. General Electric Company;
3. Siemens;
4. Square D;

B. Panelboards: NEMA PB1, lighting and appliance branch circuit type.

C. Mains: Circuit breaker

D. Branch over current protective devices: Bolt-on circuit breakers, replacement without disturbing adjacent units.

E. Contactors in main bus: NEMA ICS 2, Class A, mechanically held, general purpose controller, with same short circuits interrupting ratings as panelboard.

F. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed like.

2.3 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the work include, but are not limited to the following
   1. Eaton electrical Inc.; Cutler-Hammer Business Unit.
   2. General Electric Company;
   3. Siemens;
   4. Square D;

B. Molded case circuit breaker(MCCB): Comply with UL 489, interrupting capacity to meet available fault currents.
   1. Thermal magnetic circuit breakers: Inverse time- current element for low level overloads, and instantaneous magnetic trip element for short circuits.

PART 3 EXECUTION

3.1 EXAMINATION:

A. Receive, inspect, handle, and store panelboards according to NEMA PB 1.1.

B. Examine panelboards before installation. Reject panelboards that are damaged or rusted or have been subjected to water saturation.

C. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the work.

3.2 INSTALLATION

A. Install panelboards in accordance with NEMA PB 1.1.

B. Equipment mounting: Install panelboards on concrete floor bases. 4-inch nominal thickness. Comply with requirements for concrete base specified in DIV 03 Section “Miscellaneous Case-in-place concrete.”

C. Temporary lofting provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from panelboards.

D. Comply with mounting and anchoring requirements specified in Div 26 section “Vibration and Seismic controls for electric systems”.

E. Install panelboards plumb and rigid without distortion of box

F. Install overvurrent protective devices and controllers not already factory installed.

G. Install filler plates for unused spaces in panelboards.

H. Provide typed circuit directory for each branch circuit panelboard. Revise directory to reflect circuiting changes to balance phase loads.

I. Install engraved plastic nameplates in accordance with Section 26 05 53.

J. Ground and bond panelboard enclosure according to Section 26 05 26. Connect equipment ground bars of panels in accordance with NFPA 70.

3.3 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements, 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.

B. Inspect and test in accordance with NETA ATS, except Section 4.

C. Perform circuit breaker inspections and tests listed in NETA ATS, Section 7.6.

D. Perform switch inspections and tests listed in NETA ATS, Section 7.5.

E. Perform controller inspections and tests listed in NETA ATS, Section 7.16.1.

3.4 ADJUSTING

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for starting and adjusting.

B. Measure steady state load currents at each panelboard feeder; rearrange circuits in panelboard to balance phase loads to within 20 percent of each other. Maintain proper phasing for multi-wire branch circuits.

END OF SECTION

SECTION 262726 - WIRING DEVICES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions of Division 1, State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, and Incidental Construction, Form 816 - 2004 and supplemental specifications thereto, shall be a part of this specification.

1.2 SUMMARY

A. Section includes receptacles.

B. Related Sections:
1. Section 26 05 33 - Raceway and Boxes for Electrical Systems: Outlet boxes for wiring devices.
2. Section 26 05 34 - Floor Boxes for Electrical Systems: Service fittings for receptacles installed on floor boxes.

1.3 REFERENCES

A. National Electrical Manufacturers Association:

1. NEMA WD 1 - General Requirements for Wiring Devices.

2. NEMA WD 6 - Wiring Devices-Dimensional Requirements.

1.4 SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Product Data: Submit manufacturer's catalog information showing dimensions, colors, and configurations.

C. Samples: Submit two samples of each wiring device and wall plate illustrating materials, construction, color, and finish.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years [documented] experience.

1.6 EXTRA MATERIALS

A. Section 01 70 00 - Execution and Closeout Requirements: Spare parts and maintenance products.

B. Furnish two of each style, size, and finish wall plate.

C. Refer to NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information.

PART 2 PRODUCTS

2.1 RECEPTACLES

A. Manufacturers:

1. Hubbell Wiring Products.

2. Leviton.

3. Bryant.

4. Pass and Seymour.

5. Section Deleted.

B. Device Body: Ivory plastic.

C. Configuration: NEMA WD 6, type [as indicated on Drawings].

D. Convenience Receptacle: Type 5-20.

E. GFCI Receptacle: Convenience receptacle with integral ground fault circuit interrupter to meet regulatory requirements. GFCI Receptacle shall have indicator light indicating when the GFCI is tripped.

F. Provide weatherproof box for the receptacle with lockable tamper resistant cover.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section Deleted.

B. Verify outlet boxes are installed at proper height.

C. Verify wall openings are neatly cut and completely covered by wall plates.

D. Verify branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

3.2 PREPARATION

A. Clean debris from outlet boxes.

3.3 INSTALLATION

A. Install devices plumb and level.

B. Install switches with OFF position down.

C. Install wall dimmers to achieve full rating specified and indicated after derating for ganging as instructed by manufacturer.

D. Install receptacles with grounding pole on top.

E. Connect wiring device grounding terminal to outlet box with bonding jumper.

3.4 INTERFACE WITH OTHER PRODUCTS

A. Coordinate locations of outlet boxes provided under Section 26 05 33 to obtain mounting heights as indicated on drawings.

3.5 FIELD QUALITY CONTROL

A. Section Deleted.

B. Inspect each wiring device for defects.

C. Operate each wall switch with circuit energized and verify proper operation.

D. Verify each receptacle device is energized.

E. Test each receptacle device for proper polarity.

F. Test each GFCI receptacle device for proper operation.

3.6 ADJUSTING

A. Section Deleted.

B. Adjust devices and wall plates to be flush and level.

3.7 CLEANING

A. Section Deleted.

B. Clean exposed surfaces to remove splatters and restore finish.

END OF SECTION

SECTION 263353 - STATIC UNINTERRUPTIBLE POWER SUPPLY

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions of Division 1, State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, and Incidental Construction, Form 816 - 2004 and supplemental specifications thereto, shall be a part of this specification.

1.2 SUMMARY

A. Section includes the furnishing and installation of a static uninterruptible power supply system for the purpose of providing emergency lighting.

1.3 REFERENCES

A. Institute of Electrical and Electronics Engineers:
   1. IEEE 1184 - Guide for the Selection and Sizing of Batteries for Uninterruptible Power Systems.

B. National Electrical Manufacturers Association:
   1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
   2. NEMA PE 1 - Uninterruptible Power Systems.

C. International Electrical Testing Association:
   1. NETA ATS - Acceptance Testing Specifications for Electrical Power. Distribution Equipment and Systems.

1.4 SUBMITTALS

A. Submit the following in accordance with Form 816, Section 1.20 and NOTICE TO CONTRACTOR-SUBMITTALS.

B. Shop Drawings: Indicate electrical characteristics and connection requirements. Indicate battery rack dimensions; battery type, size, dimensions, and weight; detailed equipment outlines, weight, and dimensions; location of conduit entry and exit; single-line diagram indicating metering, control, and external wiring requirements; heat rejection and air flow requirements.

C. Product Data: Submit catalog sheets and technical data sheets to indicate physical data and electrical performance, electrical characteristics, and connection requirements.

D. Manufacturer's Field Reports: Indicate inspections, findings, and recommendations.

E. Quality assurance submittals:

1. Manufacturer's certification letter in accordance with NOTICE TO CONTRACTOR POTENTIAL FOR ASBESTORS CONTAINING MATERIALS.
2. Seismic qualifications certificates.
3. Field quality control reports.

1.5 CLOSEOUT SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Operation and Maintenance Data: Submit description of operating procedures; servicing procedures; list of major components; recommended remedial and preventive maintenance procedures; and spare parts list.

1.6 QUALITY ASSURANCE

A. Source Limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01

B. Source limitations: Obtain the UPS system from a single manufacturer in accordance with the requirements of Form 816 article 1.20-1.05.24. Manufacturer: Company specializing in manufacturing products specified in this section with minimum twenty years of documented experience.

C. Conduct and pre-installation meeting at the project site.

D. Testing agency qualifications: Member of NETA or and NRTL.

E. Comply with the requirements of the following standards:
1. CSA Listing C22.2 No107.1-95, UL 1778, UL924/A- Underwriters Laboratories Inc. standard for UPS systems and rectifying equipment and specialty transformers.
2. IEEE C62.41-1991- IEEE Recommended Practice on Surge Voltages in Low-voltage AC Power Circuits
3. ANSI NFPA 70-National Electrical Code.
4. UL50 and NEMA 250-1991- Enclosures for electrical Equipment
5. CSA C22.1-94_Canadian Electrical Code, Part I
6. UL1449_UL Standard for Safety Transient Voltage Surge Suppressors.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Refer to Form 816 Article 1.06.03 and Form 816 Article 1.20-1.06.03 for additional information.

B. Comply with Form 816 Article 1.06.03 and Form 816 Article 1.20-1.06.03 for additional information.

C. Protect equipment from extreme temperature and humidity by storing in conditioned space.

D. Protect equipment from dust and debris by wrapping unit in dust tight cover and storing away from construction activity.

1.8 WARRANTY

A. Refer to Form 816 Article 1.20-1.06.08 and NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information.

B. Furnish one year manufacturer warranty for parts and labor.

PART 2 PRODUCTS

2.1 SCOPE:

A. The UPS shall be a solid-state single phase UPS system designed to provide regulated and conditioned sinusoidal power to both linear and non-linear type loads. The UPS shall provide uninterruptible power during all modes of operation. There shall be no interruption of power to the critical load when the UPS transfer to and from battery operation. The specified equipment herein shall be referred to as Harsh Environment UPS or HE UPS.

B. The UPS and batteries shall be designed to fit into a NEMA 4X enclosure intended for outdoor installations. It shall be of modular construction for ease of servicing in the field.

C. The primary input power source to the UPS shall be utility power.

2.2 MODES OF OPERATION

A. NORMAL: During normal operation, utility power is converted to DC, drawing sinusoidal input AC current at utility power factor under all load conditions, this converter supplies DC power to the Inverter and Battery Charger sections. The inverter supplied the load through the Static Bypass Switch without using the energy stored in the battery.

B. EMERGENCY: Upon loss of input power or when power exceeds the specified input limits, the control logic shall allow the inverter to draw energy from the battery without interruption to the load and disconnect the input line. The transfer to battery shall be uninterrupted-“NO BREAK” power transfer. The inverter shall supply power from the batteries, through the Static Bypass Switch, to the critical load. The output shall be sinusoidal and within specified limits. If power is not restored before the batteries have

C. FALURE: In the event of a component failure in either the Rectifier/Converter or the Inverter the unit's SBS will transfer the load, without interruption to the utility power and will alarm providing visual and closed contacts for remote annunciation.

D. RECHARGE: Upon restoration of input utility power and before the batteries are completely exhausted, the UPS shall automatically return to normal operation. This retransfer to normal operation shall be uninterrupted. The battery charger shall automatically recharge the batteries to full capacity.

2.3 MAJOR SYSTEM COMPONENTS:

A. The UPS and batteries shall be designed to fit into NEMA 4X enclosure intended for outdoor installation.

B. The NEMA 4X cabinet is made of stainless steel ensuring suitability for outdoor harsh environments.

C. BATTERY SUBSYSTEM: Sealed, maintenance-free batteries shall be provided. The batteries shall have an expected life of ten(10) years. The batteries shall be fully wired and contained within either the UPS cabinet or a separate battery cabinet. Battery run time(based on 100%) full load) shall be no less than the specified time. Optional extended battery run times shall be available.

D. INVERTER: The inverter shall convert power supplied, from the utility, when within specified limits or from the batteries, when within the battery manufacturer's specified limits, to AC power. It should be a pulse width modulation(PWM) type design without the need of a transformer. The unit shall have a single power PCB for maximum reliability.

E. STATIC BYPASS SWITCH: The unit shall contain a static Bypass Switch as a standard feature.

F. CHARGER: The battery charger shall maintain the batteries at full charge. The standard battery charger shall recharge the battery in 10 times the discharge time maximum.

G. POWER CONNECTIONS: The UPS shall be hard wired input and output.

H. SYSTEM OPTIONS:
1. Provide the system with the following options:
   a. Internal manual maintenance bypass switch
   b. Five(5) form "c" contacts alarms
   c. Heater strip with thermostat control
   d. TVSS
   e. Computer monitoring via RS 232.
   f. Stainless Steel Cabinet for UPS and battery

2.4 INPUT SPECIFICATIONS

A. System Ratings and Operating Characteristics:

1. System Continuous Rating: As indicated on Drawings, over entire battery voltage range at specified power factor. Maintain output voltage within specified limits at load from full load to no-load.
2. Battery Capacity: As indicated on drawings.
3. Voltage Rating: 120/208 volts, 3 phase, 4wire.
4. Input Voltage Operating Range: Plus or minus 3 percent.
5. Input Frequency Operating Range: 60 Hz, plus or minus 0.5 Hz.
6. Input Current Limit: Adjustable to maximum of 125 percent required to operate at full load with battery bank on float charge.
7. Current Walk-in: 25 to 100 percent in fifteen seconds.
8. UPS Power Factor Over Full Range of Loads and Input Voltages: 95 percent, lagging.
9. Harmonic Distortion of Input Current Wave Form: 5 percent maximum at full load.
10. Output Free Running Frequency: 60 Hz Plus or minus 0.5 percent.
11. Output Harmonic Distortion: Maximum 5 percent rms total harmonic distortion (THD) and maximum 3 percent any single harmonic, at rated frequency and voltage, from 10 percent load to full load and over battery voltage range, measured into linear load.
12. Voltage Transient Response for Application of 0 to 50 Percent, 50 to 100 Percent, 100 to 50 Percent, and 50 to 0 Percent Step Loads, and Transfer To and From Bypass Line:
    a. Plus 8, minus 10 percent for maximum of 8.3 milliseconds.
    b. Plus or minus 5 percent for maximum of 25 milliseconds.
    c. Plus or minus 3 percent for maximum of 50 milliseconds.
13. Phase Displacement:
    a. 120 plus or minus 1 degrees for balanced loads.
    b. 120 plus or minus 4 degrees for 50 percent unbalanced loads.
14. Three-phase Overload Ratings:
    a. 1000 percent for 5 cycles; via static switch.
    b. 150 percent for 10 seconds.
    c. 125 percent for 10 minutes.
15. Output Current Limit: 150 percent of rated output current.
16. Voltage Unbalance: 3 percent maximum line-line with 100 percent load unbalance.
17. Efficiency: 92 percent at full load.
18. Standard Run time: 7~12 minutes(Unit dependent)
19. Optional run time: 180 minutes
20. Battery type: Sealed, Maintenance free, lead acid.
21. Expected life: 10 years.
22. Protection: Circuit Breaker.

2.5 MONITORING AND COMMUNICATION

A. Computer Communications

1. RS-232 Interface Port
2. RS-485 Interface Port

B. Agency Listings:
1. UL 1778, CSA Listed to UL924/A for outdoor application

C. Surge Withstand ability: ANSI C62.41-1980 Categories A & B.

D. Temperature:
1. 0~40ºC (Operating)
2. -20~40ºC (Storage)

E. Relative Humidity: 0 to 95% Non-condensing

2.6 MANUFACTURERS:

A. OnLine Power

B. Crucial Power Products

C. Liebert

2.7 FABRICATION

A. All materials and components making up the UPS shall be new, of current manufacturer, and shall not have been in prior service except as required during factory testing. The UPS shall be constructed of replaceable subassemblies. All active electronic devices shall be solid state.

B. Wiring: Wiring practices, and cooling shall be in accordance with the requirements of National Electrical Code(NFPA 70) and other applicable codes and standards.

C. Cabinet: The UPS unit shall comprised of: power module, battery module, control module, system interconnect module and user interface module housed in a single freestanding enclosure and meets the requirements if IP20. The UPS cabinet shall be stainless steel to meet the NEMA 3R requirements.

D. Cooling: The UPS and battery cabinets shall be forced air cooled by internally mounted fans. The fans shall be redundant in nature to ensure maximum reliability. The fans shall be easily replaceable without the use of special tools.

2.8 COMPONENTS

A. Input Converter:
1. General: Incoming AC power shall be converted to a regulated DC output by the input converter for supplying DC power to the inverter. The input converter shall provide input power factor correction to 0.95 or greater regardless of the nature of the load and input current shall be sinusoidal with less than 7% total harmonic distortion regardless of load.

2. AC Input current limit: The input converter shall be provided with AC input over current protection. The unit has the input circuit breaker.
3. Input protection: The UPS shall have built-in protection against under voltage, overcurrent, and over voltage conditions including low energy surges introduced on the primary AC source and the bypass source. The UPS cabinet shall contain an input breaker sized to supply full rated load and to recharge the battery at the same time.
4. Input converter: Input converter shall automatically monitor and correct the input current to be sinusoidal with power factor correction.
5. Battery recharge: To prolong battery life, the UPS shall contain battery charging. When an equal number of power modules and battery modules are fitted the battery charger shall be able to recharge the internal batteries to 90% charge in less than ten hours at normal input voltage and normal ambient temperature.

B. Inverter:
1. General: The inverter shall convert DC power from the input converter output, or the battery, into precise regulated sine wave AC power for supporting the critical AC load.
2. Overload: The inverter shall be capable of supplying current and voltage for overloads exceeding 100% and up to 125% of full load current. A visual indicator/alarm shall indicate overload operation. For greater currents or longer time duration, the inverter shall have electronic current-limiting protection to prevent damage to components. The inverter shall be self-protecting against any magnitude of connected output overload. Inverter control logic shall sense and disconnect the inverter from the critical AC load without the requirement to clear protective fuses. The load shall be transferred to bypass when any of the above conditions are exceeded.
3. Maximum load alarm: The user receives an alarm when the unit is overloaded(greater than 100%) such that the UPS will alarm before an overload condition.
4. Output frequency: A microprocessor-controlled oscillator shall maintain the output frequency of the inverter. The oscillator shall hold the inverter output frequency to +/- 0.5% for steady state and transient conditions. The inverter shall track the bypass continuously providing the bypass source maintains a frequency within the user selected synchronization range. If the bypass source fails to remain within the selected range, the inverter shall revert to the internal oscillator.
5. Output protection: The UPS inverter shall employ electronic current limiting.
6. Battery over discharge protection: To prevent battery damage from over discharging, the UPS control logic shall control the shutdown voltage set point. This point is dependent on the levels set by the manufacturer of particular battery system employed.

C. Display and controls
1. General: An internal panel will consist of a four line by twenty-character LCD display for additional alarm/configuration. The unit shall also provide data via RS232/RS485. If there is a fault condition, the UPS shall attempt to maintain conditioned power to the load, or at minimum transfer bypass. There shall also be

D. Automatic battery test:

1. The UPS shall initiate an automatic battery testing periodically, at a programmed day and time of day.

E. Bypass:

1. General: A bypass circuit shall be provided as an internal part of the UPS. The bypass shall have an overload rating of 300% rated full load for 10 cycles and 1000% for sub-cycle fault clearing. The bypass control logic shall contain an automatic transfer control circuit that senses the status of the inverter logic signals, and operating and alarm conditions. This control circuit shall provide a transfer of the load to the bypass source, without exceeding the transient limits specified herein, when an overload or malfunction occurs within the UPS.
2. Automatic transfers: The transfer control logic shall automatically activate the bypass, transferring the critical AC load to the bypass source, after the transfer logic senses one of the following conditions:
   a. Inverter overload capacity exceeded
   b. Inverter over temperature
   c. UPS fault condition
3. For inverter overload conditions, the transfer control logic shall inhibit an automatic transfer of the critical load to the bypass source if one of the following conditions exists:
   a. Inverter/Bypass voltage difference exceeding preset limits(±15% of nominal)
   b. Bypass frequency out of preset limits(±5% of nominal frequency)
   c. UPS fault condition present.

F. Internal battery:

1. General: Flame retardant, valve regulated, gas recombination, lead acid batteries shall be used as a stored-energy source for the specified UPS system.

2.9 COMMUNICATIONS

A. General: The UPS shall allow for flexibility in communications. The UPS shall be able to communicate through two communications ports simultaneously; the media of either communications port may change without affecting the operation of the UPS. The use of relay contacts shall not affect the operation of the two communications ports.

B. Relay contacts: The relay contacts shall be available through at least one DB-9F communication connector, and shall be compatible with the AS 400 system. The UPS shall communicate via relay contact closure the following information: Low battery, on bypass, summary alarm, UPS on and input fail. One connector to provide relay contacts shall be fitted on all UPS models as standard. Relay contacts shall be rated 48VDC, 1A. Additional signals such as on bypass and summary alarm shall be provided.

C. UPS status information: The software shall be able to retrieve all status information present in the UPS(and available on the display). Retrieval of data shall be through either serial communications or through a network connection via RS 232/RS485.SOURCE QUALITY CONTROL

D. Furnish shop inspection and testing of components and completed UPS assembly.

E. Make completed UPS available for inspection at manufacturer's factory prior to packaging for shipment. Notify Owner at least seven days before inspection is allowed.

F. Allow witnessing of factory inspections and tests at manufacturer's test facility. Notify Owner at least seven days before inspections and tests are scheduled.

PART 3 EXECUTION

3.1 FIELD QUALITY CONTROL

A. Factory trained field service personnel shall perform the following inspections and test procedures during the UPS start-up.

B. Inspect and test in accordance with NETA ATS, except Section 4.

C. Perform inspections and tests listed in NETA ATS, Section 7.22.

D. Verify specification performance criteria.

E. Measure battery discharge and recharge times.

F. Simulate fault in each system component and utility power.

G. Operate unit at 77 degrees F for eight hours.

H. Perform other tests as recommended by manufacturer.

3.2 MANUFACTURER'S FIELD SERVICES

A. Section Deleted.

B. Prepare and start up UPS.

3.3 ADJUSTING

A. Section Deleted.

B. Adjust output voltage to within 1 percent of nominal.

C. Adjust output frequency to within 0.6 percent of nominal.

3.4 MANUFACTURER'S FIELD SERVICE

A. Service personnel: The UPS manufacturer shall directly employ a nationwide service organization, consisting of factory trained customer engineers or 3rd party dedicated to the start up, maintenance and repair of UPS and power equipment. The organization shall consist of factory-trained customer engineers working out of district office in most major cities.

B. Replacement parts stocking parts shall be available through an extensive network to ensure around the clock parts availability throughout the country. Customer support

C. Parts coordinators shall be on-call 24hours a day, 7 days a week, 365 days a year for immediate parts availability.

D. UPS maintenance training: Maintenance training courses for customer employees shall be available by the UPS manufacturer. This training is in addition to the basic operator training conducted as a part of the system start up.

E. Maintenance contracts: A complete offering of preventive and full service maintenance contracts for both the UPS system and battery system shall be available. An extended warranty and preventive maintenance package shall be available.

3.5 Section Deleted.

END OF SECTION

SECTION 26 56 00 – INTERIOR AND EXTERIOR LIGHTING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions of Division 1, State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, and Incidental Construction, Form 816 - 2004 and supplemental specifications thereto, shall be a part of this specification.

B. Work included in this section may require coordination with Amtrak regarding track outages, flagmen, or other issues related to work around railroad facilities. The Contractor shall pay special attention to the specification entitled “SAFETY AND PROTECTION OF RAILROAD TRAFFIC AND PROPERTY” and other Amtrak Specifications contained in the Contract.

1.2 SUMMARY

A. Section includes:
   1. Interior and Exterior luminaries, lamps and ballasts;
   2. Light poles and accessories;

1.3 DEFINITIONS

A. CCT: Correlated color temperature.

B. CRI: Color-rendering index.

C. HID: High-intensity discharge.

D. LED: Light-emitting diode.

E. LER: Luminaire efficacy rating.

F. Luminaire: Complete lighting fixture, including ballast housing if provided.

G. Pole: Luminaire support structure, including tower used for large area illumination.

H. Standard: Same definition as "Pole" above.

1.4 STRUCTURAL ANALYSIS CRITERIA FOR POLE SELECTION

A. Dead Load: Weight of luminaire and its horizontal and vertical supports, lowering devices, and supporting structure, applied as stated in AASHTO LTS-4-M.

B. Ice Load: Load of 3 lbf/sq. ft., applied as stated in AASHTO LTS-4-M Ice Load Map.

C. Wind Load: Pressure of wind on pole and luminaire and banners and banner arms, calculated and applied as stated in AASHTO LTS-4-M.

1. Basic wind speed for calculating wind load for poles exceeding 49.2 feet in height is 120 mph.
   a. Wind Importance Factor: 1.0.
   b. Minimum Design Life: 50 years.
   c. Velocity Conversion Factors: 1.0.
2. Basic wind speed for calculating wind load for poles 50 feet high or less is 120 mph.
   a. Wind Importance Factor: 1.0
   b. Minimum Design Life: 25 years.
   c. Velocity Conversion Factors: 1.0.

1.5 SUBMITTALS:

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR-SUBMITTALS.

B. Product Data: For each luminaire, pole, and support component, arranged in order of lighting unit designation. Include data on features, accessories, finishes, and the following:

1. Physical description of luminaire, including materials, dimensions, effective projected area, and verification of indicated parameters.

2. Details of attaching luminaires and accessories.

3. Details of installation and construction.

4. Luminaire materials.

5. Photometric data based on laboratory tests of each luminaire type, complete with indicated lamps, ballasts, and accessories.

6. Ballasts, including energy-efficiency data.

7. Lamps, including life, output, CCT, CRI, lumens and energy-efficient data.

8. Materials, dimensions, and finishes of poles.

9. Means of attaching luminaires to supports, and indication that attachment is suitable for components involved.

10. Anchor bolts for poles.

11. Manufactured pole foundations.

C. Shop drawings: Include plans, elevations, sections, details, and attachments to other work.

D. Photometric test reports based on the IESNA LM-79-08 test procedure.

E. Pole and support component certificates: Signed by manufacturers of poles, certifying that products are designed for indicated load requirements in AASHTO LTS-4-M and that load imposed by luminaire and attachments has been included in design. The certification shall be based on design calculations by a professional engineer registered in the State of Connecticut.

F. Maintenance Data: Include operation and maintenance manuals specified in Form 816 Article 1.20-1.08.14 subsection 2 and described in NOTICE TO CONTRACTOR-OPERATION AND MAINTENANCE MANUALS.

1.6 QUALITY ASSURANCE:

A. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by manufacturers' laboratories that are accredited under the National Volunteer Laboratory Accreditation Program for Energy Efficient Lighting Products.

B. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. Comply with IEEE C2, "National Electrical Safety Code."

E. Comply with NFPA 70.

F. Source limitations: Obtain from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

1.7 DELIVERY, STORAGE AND HANDLING:

A. Package aluminum poles for shipping according to ASTM B660.

B. Store poles on decay-resistant skids at least 12 inches above grade and vegetation. Support poles to prevent distortion and arrange to provide free air circulation.

C. Retain factory-applied pole wrappings on metal poles until right before pole installation.

For poles with nonmetallic finishes, handle with web fabric straps.

D. Refer to Form 816 Article 1.06.03 and Form 816 article 1.20-1.06.03 for additional information.

1.8 WARRANTY:

A. Refer to Form 816 Article 1.20-1.06.08 and NOTICE TO CONTRACTOR-WARRANTIES for additional information.

B. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace products that fail in materials or workmanship; that corrode; or that fade, stain, perforate, erode, or chalk due to effects of weather or solar radiation within specified warranty period. Manufacturer may exclude lightning damage, hail damage, vandalism, abuse, or unauthorized repaired repairs or alterations from special warranty coverage.
   1. Warranty period for luminaires: Five years from the date of substantial completion.
   2. Warranty period for metal corrosion: Five years from the date of substantial completion.
   3. Warranty period for color retention: Five years from date of substantial completion.
   4. Warranty period for poles: repair or replace lighting poles and standards that fail in finish, materials and workmanship within manufacturer's standard warranty period, but not less than three years from the date of substantial completion.

1.9 SPARE PARTS:

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified labels.
   1. Lamps: 10 for every 100 of each type and rating installed. Furnish at least one of each type.
   2. Glass and plastic lenses, covers and other optical parts:1 for every 100 of each type and rating installed. Furnish at least one of each type.

3. Ballast: 1 for every 100 of each type and rating installed. Furnish at least one of each type.
4. Globes and guards: 1 for every 20 of each type and rating installed. Furnish at least one of each type.

1.10 COORDINATION

A. Furnish bolt templates and pole mounting accessories to installer of pole foundations.

PART 2 PRODUCTS

2.1 MANUFACTURERS:

A. Products: Subject to compliance with requirements, available products that may be incorporated into the work include, but are not limited to, products indicated on drawings.

2.2 LUMINARIES

A. Luminaires shall comply with UL 1598 and be listed labeled for installation in wet locations by an NRTL acceptable to authorities having jurisdiction.
1. LER tests HID fixtures: Where LER is specified, test according to NEMA LE 5B.

B. Lateral light distribution patterns: Comply with IESNA RP-8 for parameters of lateral light distribution patterns indicated for luminaires.

C. Metal parts: Free of burrs and sharp corners and edges.

D. Sheet metal components: Corrosion-resistant aluminum unless otherwise indicated. Form and support to prevent warping and sagging.

E. Housings: Rigidly formed, weather-and light –tight enclosures that will not wrap, sag, or deform in use. Provide filter/breather for enclosed luminaires.

F. Doors, frames, and other internal access: smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position. Doors shall be removable for cleaning or replacing lenses. Designed to disconnect ballast when door opens.

G. Exposed hardware material: Stainless steel.

H. Plastic parts: High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.

I. Light shields: Metal baffles, factory installed and filed adjustable, arranged to block light distribution to indicated of normal illuminated area or field.

J. Reflecting surfaces shall have minimum reflectance as follows unless otherwise indicated:
   1. White surface: 85 percent
   2. Specular surfaces:83 percent
   3. Diffusing specular surfaces:75 percent

K. Lenses and refractors gaskets: Use heat and aging resistant resilient gaskets to seal and cushion lenses and refractors in luminaire doors.

L. Luminaire finish: manufacturer's paint (as selected by Designer from manufacturer's full range of available colors) applied to factory-assembled and tested luminaire before shipping. Match finish process and color with pole or support materials.

M. Factory-applied finish for steel luminaires: comply with NAAMM's "Metal finishes manual for Architectural and metal products" for recommendations for applying and designating finishes.
   a. Color: *Submit color samples for approval of color selection to match existing exterior station lighting.*

N. Factory-Applied Finish for Aluminum Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
   1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
   2. Class I, Color Anodic Finish: AA-M32C22A42/A44 (Mechanical Finish: medium satin; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 611.
      a. Color: *Submit color samples for approval of color selection to match existing exterior station lighting.*

O. Factory-applied labels: Comply with UL1598. Include recommended lamps and ballasts. Labels shall be located where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.

2.3 BALLASTS FOR HID LAMPS

A. Comply with ANSI C82.4 and UL 1029 and capable of open-circuit operation without reduction of average lamp life. Include the following features unless otherwise indicated:
   1. Ballast circuit: Constant-wattage autotransformer or regulating high-power-factor type.
   2. Minimum starting temperature: Minus 22 deg F.
   3. Normal Ambient operating temperature: 104 deg F.
   4. Ballast fuses: One in each ungrounded power supply conductor. Voltage and current ratings as recommended by ballast manufacturer.

B. Minimum starting temperature: Minus 40 deg F.
   1. Metal Halide lamps: ANSI C78.43, with minimum CRI 70, and CCT color temperature 3600 degree K.

2.4 LED FIXTURES

A. The complete system shall be capable of starting and operating the light engine within the limits specified by the LED manufacturer. The luminaire shall contain completely prewired integral drivers and an optical assembly that shall provide a distribution type, specified according to the drawings.

B. Labeling shall be in accordance with ANSI standards. All units shall be UL Certified.

C. Light Engine: Composed of 4 main components:
   1. LED lamp
   2. Optical System
   3. Heat Sink
   4. Driver

D. Electrical components shall be RoHS compliant.

E. Lens: Made of soda lime tempered glass lens, mechanically assembled and sealed onto the lower part of the heat sink.

F. Lamp: (Included), Composed of high performance white LEDs. Color temperature of 4000 Kelvin nominal, 70 CRI. Operating lifespan, 70 000 hours after which the system emits 70% of its original lumen output, all of those parameters are tested for 100% of light engines. Provide metal core board to insure greater heat transfer and longer lifespan of the light engine

G. Optical System: Composed of high performance collimators, optimized with varying acrylic beam angles to achieve desired distribution. System is rated IP66.

H. Heat Sink: Made of cast aluminum optimizing the LEDs efficiency and life. Product shall not use any cooling device with moving parts (passive cooling device)

I. Driver: High power factor of 90%. Electronic driver, 60 Hz. Auto adjusting to a voltage between 120 and 277 volt AC, Class II, THD of 20% max. Maximum ambient operating temperature from 40F to 130F degrees. Certified in compliance to CUL requirement. Weather tightness rating IP66. Assembled on a unitized removable tray with Tyco quick disconnect plug resisting to 221F degrees.

J. The current supplying the LEDs shall be reduced by the driver if the internal temperature exceeds 185F, as a protection to the LEDs and the electrical components. Output is protected from short circuits, voltage overload and current overload. Automatic recovery after correction.

K. Surge Protector: LED Driver 3 poles surge Protectors that protect Line Ground, Line Neutral, and Neutral Ground in accordance with IEEE / ANSI C62.41.2 guidelines.

2.5 GENERAL REQUIREMENTS FOR POLES AND SUPPORT COMPONENTS

A. Structural characteristics; Comply with AASHTO LTS-4-M.
   1. Wind-Load Strength of Poles: Adequate at indicated heights above grade without failure, permanent deflection, or whipping in steady winds of speed indicated in "Structural Analysis Criteria for Pole Selection" Article.
   2. Strength Analysis: For each pole, multiply the actual equivalent projected area of luminaries and brackets by a factor of 1.1 to obtain the equivalent projected area to be used in pole selection strength analysis.

B. Luminaire attachment provisions: comply with luminaire manufacturer’ mounting requirements. Use stainless-steel fasteners and mounting bolts unless otherwise indicated.

C. Mountings, fasteners, and appurtenances: corrosion-resistant items compatible with support components.

D. Power installed screw foundations: Factory fabricated by pole manufacturer, with structural steel complying with ASTM A 36/A 36M and hot-dip galvanized according to ASTM A123/A 123M; and with top-plate and mounting bolts to match pole base flange and strength required to support pole, luminaire, and accessories.

2.6 STEEL POLES:

A. Poles: ASTM A572, Galvanized Steel with access handhole in pole wall.
   1. Shape: Round, tapered/Round, straight
   2. Mounting provisions: Butt flange for bolted mounting on foundation or breakaway support.

B. Pole-top tenons: Fabricated to support luminaire or luminaires and brackets indicated, and securely fastened to pole top.

C. Grounding and bonding lugs: welded ½-inch threaded lug, complying with requirements in Division 26 section “Grounding and Bonding for electrical Systems, “listed for attaching grounding and bonding conductors of type and size listed in that section, and accessible through handhole.

D. Brackets for luminaires: Detachable, with pole and adapter fittings of Galvanized Steel. Adapter fitting welded to pole and bracket, then bolted together with stainless-steel bolts.
   1. Tapered oval cross section, with straight tubular end section to accommodate luminaire.
   2. Finish: Same as luminaire.

E. Finish: manufacturer’s standard prime-coat and paint (as selected by Designer from manufacturer’s full range of available colors) applied to poles before shipping. Match finish process and color with luminaries finishes.

F. Steel finish: Comply with NAAMM’s “Metal Finishes Manual for Architectural and Metal Products” for recommendations for applying and designating finishes.

PART 3 EXECUTION

3.1 LUMINAIRE INSTALLATION

A. Install lamps in each luminaire.

B. Fasten luminaire to indicated structural supports.
   1. Use fastening methods and materials selected to resist seismic forces defined for the application and approved by manufacturer.

C. Adjust luminaires that require field adjustment or aiming.

3.2 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and Project conditions.

B. Verify foundations are ready to receive fixtures.

3.3 POLE INSTALLATION

A. Alignment: Align pole foundations and poles for optimim directional alignment of luminaires and their mounting provisions on the pole.

B. Foundation-mounted poles: mount pole with leveling nuts, and tighten top nuts to torque level recommended by pole manufacturer.

C. Poles and pole foundations set in concrete paved areas: install poles with minimum of 6-inch wide, unpaved gap between the pole or pole foundation and the edge of adjacent concrete slab.

3.4 INSTALLATION OF INDIVIDUAL GROUND-MOUNTING LUMINAIRES

A. Install on concrete base per the contract drawings. Mount pole with leveling nuts, and tighten top nuts to torque level recommended by pole manufacturer.

B. Cast conduit into base, and finish by troweling and rubbing smooth. Concrete materials, installation, and finishing are in Division 03.

3.5 BOLLARD LUMINAIRE INSTALLATION

A. Align units for optimum directional alignment of light distribution.

B. Install on concrete base with top 4 inches above finished grade or surface at bollard location. Cast conduit into base, and shape base to match shape of bollard base. Finish by troweling and rubbing smooth. Concrete materials, installation, and finishing are specified in Section 033000 "Cast-in-Place Concrete."

3.6 CORROSION PREVENSION

A. Aluminum: Do not use in contact with earth concrete. When in direct contact with a dissimilar metal, protect aluminum by insulating fittings or treatment.

B. Steel conduits: Comply with Div 26 section “raceway and boxes for Electrical systems. “ In concrete foundations, wrap conduit with 0.010-inch thick, pipe-wrapping plastic tape applied with a 50 percent overlap.

3.7 GROUNDING:

A. Ground metal poles and support structures according to Div 26 section “Grounding and bonding for electrical systems”

3.8 FIELD QUALITY CONTROL

A. Inspect eachinstalled fixture for damage. Replace damaged fixtures and components.

B. Illumination observations: verify normal operation of lighting units after installing luminaires and energizing circuits with normal power source.

C. Illumination tests:
   1. Measure light intensitiesat night. Use photometers with calibration referenced to NIST standards. Comply with the following IESNA testing guides:
      a. IESNA LM-64, "Photometric Measurements of Parking Areas."
      b. IESNA LM-50, “Photometric Measurements of Roadway Lighting Installations”
      c. IESNA LM-72, "Directional Positioning of Photometric Data."

D. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

E. Operate each luminaire after installation and connection. Inspect for improper connections and operation.

F. Take measurements during night sky, without moon or with heavy overcast clouds effectively obscuring moon.

3.9 ADJUSTING

A. Section 01 70 00 - Execution and Closeout Requirements: Testing, adjusting, and balancing.

B. Aim and adjust luminaries to provide illumination levels and distribution [as indicated on Drawings].

3.10 CLEANING

A. Clean photometric control surfaces as recommended by manufacturer.

B. Clean finishes and touch up damage.

3.11 PROTECTION OF FINISHED WORK

A. Protect surfaces from contact with contaminating substances and from damage resulting from construction operations or other causes so surfaces are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, remove damaged or deteriorated components immediately and replace.

END OF SECTION 26 56 00

SECTION 282300 - VIDEO SURVEILLANCE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions of Division 1, State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, and Incidental Construction, Form 816 - 2004 and supplemental specifications thereto, shall be a part of this specification.

B. Work included in this section may require coordination with Amtrak regarding track outages, flagmen, or other issues related to work around railroad facilities. The Contractor shall pay special attention to the specification entitled "SAFETY AND PROTECTION OF RAILROAD TRAFFIC AND PROPERTY" and other Amtrak Specifications contained in the Contract.

1.2 SUMMARY

A. Section includes a stand alone, onsite video surveillance recording system consisting of IP Megapixel digital cameras, digital network video recorder, data transmission wiring, and a control station with its associated equipment.

1.3 DEFINITIONS

A. AGC: Automatic gain control.

B. BNC: Bayonet Neill-Concelman - type of connector.

C. B/W: Black and white.

D. CCD: Charge-coupled device.

E. FTP: File transfer protocol.

F. IP: Internet protocol.

G. LAN: Local area network.

H. MPEG: Moving picture experts group.

I. NTSC: National Television System Committee.

J. PC: Personal computer.

K. PTZ: Pan-tilt-zoom.

L. RAID: Redundant array of independent disks.

M. TCP: Transmission control protocol - connects hosts on the Internet.

N. UPS: Uninterruptible power supply.

O. WAN: Wide area network.

1.4 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Video surveillance system shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified.

1.5 ACTION SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS

B. Product Data: For each type of product indicated. Include dimensions and data on features, performance, electrical characteristics, ratings, and finishes.

C. Shop Drawings: For video surveillance. Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Functional Block Diagram: Show single-line interconnections between components for signal transmission and control. Show cable types and sizes.
3. Dimensioned plan and elevations of equipment racks, control panels, and consoles. Show access and workspace requirements.
4. UPS: Sizing calculations.
5. Wiring Diagrams: For power, signal, and control wiring.

D. Equipment List: Include every piece of equipment by model number, manufacturer, serial number, location, and date of original installation. Add pretesting record of each piece of equipment, listing name of person testing, date of test, set points of adjustments, name and description of the view of preset positions, description of alarms, and description of unit output responses to an alarm.

1.6 INFORMATIONAL SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS

B. Seismic Qualification Certificates: For video surveillance, cameras, camera-supporting equipment, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

C. Field quality-control reports.

D. Warranty: Sample of special warranty.

1.7 CLOSEOUT SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS.

B. Operation and Maintenance Data: For cameras, power supplies, infrared illuminators, monitors, videotape recorders, digital video recorders, video switches, and control-station components to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

1. Lists of spare parts and replacement components recommended to be stored at the site for ready access.

1.8 QUALITY ASSURANCE

A. Source Limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Comply with NECA 1.

D. Comply with NFPA 70.

1.9 PROJECT CONDITIONS

A. Environmental Conditions: Capable of withstanding the following environmental conditions without mechanical or electrical damage or degradation of operating capability:

1. Exterior Environment: System components installed in locations exposed to weather shall be rated for continuous operation in ambient temperatures of minus 30 to plus 122 deg F, dry bulb and 20 to 90 percent relative humidity, condensing. Rate for continuous operation when exposed to rain as specified in NEMA 250, winds up to 85 mph and snow cover up to 24 inches thick. Refer to drawings for enclosure type and requirements.
2. Security Environment: Camera housing for use in high-risk areas where surveillance equipment may be subject to physical violence.

1.10 WARRANTY

A. Refer to Form 816 Article 1.20-1.06.08 and NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information.

B. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of cameras, equipment related to camera operation, and control-station equipment that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Three years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SYSTEM REQUIREMENTS

A. Video-signal format shall comply with NTSC standard, composite interlaced video. Composite video-signal termination shall be 75 ohms.

B. Surge Protection: Protect components from voltage surges originating external to equipment housing and entering through power, communication, signal, control, or sensing leads. Include surge protection for external wiring of each conductor's entry connection to components.

1. Minimum Protection for Power Connections 120 V and More: Auxiliary panel suppressors complying with requirements in Section 264313 "Transient-Voltage Suppression for Low-Voltage Electrical Power Circuits."
2. Minimum Protection for Communication, Signal, Control, and Low-Voltage Power Connections: Comply with requirements in Section 264313 "Transient-Voltage Suppression for Low-Voltage Electrical Power Circuits" as recommended by manufacturer for type of line being protected.

C. Tamper Protection: Tamper switches on enclosures, control units, pull boxes, junction boxes, cabinets, and other system components shall initiate a tamper-alarm signal when unit is opened or partially disassembled. Control-station, control-unit alarm display shall identify tamper alarms and indicate locations.

2.2 CAMERAS

A. Manufacturers: Subject to compliance with requirements provide cameras as manufactured by Pelco, or equal in accordance with the following .

B. Platform Cameras: Pelco IX-10 Sarix HD1.3MP.
1. Fixed color/day-night high definition digital megaplex network camera.
2. Power over Ethernet (PoE) or 24VAC.
3. Resolution: 1.3Megapixel (1280x1024) in color and day/night.
4. Sensitivity down to 0.03 lux.
5. Two Simultaneous video streams.
6. Cabling: Cat6.
7. Vandal resistant and weatherproof heated enclosure (PelcoEH3512 or Equal).

8. Provide surge protector for platform mounted cameras (at each camera).
9. Cameras shall be rigidly mounted to Canopy with stainless steel fasteners. Wiring shall be in armored flexible cable to local junction box (within 3'). Provide PVC coated rigid steel conduit mounted to underside of canopy back to head-end equipment.
10. Field calibrated variable focal lense. Pelco 13M2.8-12
    a. Varifocal, 1/3inch.
    b. Focal Length 2.8 – 12.0mm
    c. Zoom ration 4.3x
    d. Image size: 6mm diameter
    e. 3 Megapixel.
    f. Auto Iris, Manual focus and zoom.

C. Vestibules, Stairtowers and Overpass: Pelco IP111-LD
1. Fixed color/day-night high definition digital megaplex, minidome, network camera.
2. Power over Ethernet (PoE) or 24VAC.
3. Vandal resistant and weatherproof heated enclosure with smoked enclosure.(Pelco Mini Dome or Equal).
4. Three Simultaneous video streams.
5. Cabling: Cat6.
6. Field calibrated variable focal lens (9.0-20mm).

D. Elevator Cab Cameras: PelcoIP111-LD, 8mm Camclosure
1. Fixed color/day-night high definition digital megaplex network camera.
2. Low voltage (24Volt AC)
3. Vandal resistant and weatherproof heated "wedge" enclosure (PelcoICS210-CM Wedge).
4. Provide surge protector for platform mounted cameras (at each camera).
5. Field calibrated variable focal lens.

E. Cameras shall be rigidly mounted to structure with stainless steel fasteners. Wiring shall be in armored flexible cable to local junction box (within 3'). Provide PVC coated rigid steel conduit mounted to underside of canopy back to head-end equipment.

2.3 EQUIPMENT RACK

A. Provide a wall mounted rack to house surge suppressor, Network switch (qty 2), NVR Server/DVD burner, power supply, fold out keyboard and 17"LCD monitor.

B. Rack shall be open 70"high, 22" deep, 28"wide, nominal and include 40 rack units. Mount rack within stainless steel free standing enclosure.

C. Provide service light, vertical power strip (entire height of rack), cable management ladder, and temperature monitor and thermostat.

2.4 NETWORK SWITCH

A. Quasar.

B. Cisco .

C. Product Description:
   1. IQ ring copper SFP: Gigabit Copper SFP, 100 meter distance;
   2. Ethernet Connections: 24 ports or 12 ports RJ-45 10/100/1000Mbps Autosensing
   3. Uplink Ports using SFP's: Accepts Single Mode, multimode and Copper SFPs
   4. Ring Break and Power Loss Signals: Ring Break Alarm Relay: relay closed when configured as ring, Power Loss Relay: relay closed when power on.
   5. Power Over Ethernet on 24 or 12 Service Ports: 15.4 Watts max per port. Dual zone power – separate power supply for each group of 24 Ethernet ports

2.5 NETWORK VIDEO RECORDER WITH DVD BURNER

A. Video recorder shall have 2TB of storage.

2.6 UNINTERRUPTIBLE POWER SUPPLY (UPS): American Power Conversion (APC) or equal.

A. UPS shall be sized to provide 90 minutes operation of the security system under normal operating conditions (recording).

B. Provide a static bypass switch with the UPS.

C. Provide load calculations, including each piece of security equipment, that indicates propoer sizing of the UPS to support same equipment for 90 minutes.

D. UPS and batteries shall be housed in a separate enclosure than the security equipment.

2.7 ENCLOSURE

A. Provide Stainless Steel, mechanically cooled, freestanding, NEMA 3R enclosure. Enclosure shall house the equipment rack, and associated rack mounted equipment such as surge protection, network switch, Network video recorder, power supply, slide out keyboard and folding 17" LCD monitor.

B. Cooling unit shall be externally mounted and provide 3/4ton of cooling capacity. Provide dedicated 30A, 120V circuit back to power panel for cooling unit.

C. There shall be a separate enclosure to house the Uniterruptible power supply. This enclosure shall also be stainless steel, freestanding, NEMA 4X.

2.8 RACK MOUNTED POWER SUPPLIES

A. Provide two rack mounted power supplies Pelco RCS series or equal to power the cameras. Power supply shall have the following features:
   1. 26 volt output AC.
   2. Main LED indicator
   3. Self resetting circuit breakers.
   4. Removable terminal strips with clamp down connectors.

2.9 NETWORK VIDEO RECORDERS: Pelco DX8100 or Equal

A. Internal storage: 2 Terabyte hard disk drive.

1. Video and audio recording over TCP/IP network.
2. Video recording of MPEG-2 and MPEG-4 streams.
3. Video recording up to 48 Mbps for internal storage and up to 100 Mbps for external storage.
4. Duplex Operation: Simultaneous recording and playback.
5. Continuous and alarm-based recording.
6. Full-Featured Search Capabilities: Search based on camera, time, or date.
7. Automatic data replenishment to ensure recording even if network is down.
8. Digital certification by watermarking.
9. Internal RAID storage or non-RAID storage of up to 1500 GB.
10. Capable of adding external RAID storage up to 7000 GB for models with no internal storage.
11. Full integration with LAN, Intranet, or Internet through standard Web browser or video management software.
12. Integrated Web server FTP server functionality.
13. Supports up to 32 devices.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine pathway elements intended for cables. Check raceways and other elements for compliance with space allocations, installation tolerance, hazards to camera installation, and other conditions affecting installation.

B. Examine roughing-in for LAN, WAN, and IP network before device installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 WIRING

A. Comply with requirements in Section 260533 "Raceways and Boxes for Electrical Systems."

B. Wiring Method: Install cables in PVC-coated RGS conduit unless otherwise indicated.

C. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

D. Splices, Taps, and Terminations: For power and control wiring, use numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

E. Grounding: Provide independent-signal circuit grounding recommended in writing by manufacturer.

3.3 VIDEO SURVEILLANCE SYSTEM INSTALLATION

A. Install cameras and infrared illuminators level and plumb.

B. Install cameras with 84-inch minimum clear space below cameras and their mountings. Change type of mounting to achieve required clearance.

C. Set pan unit and pan-and-tilt unit stops to suit final camera position and to obtain the field of view required for camera. Connect all controls and alarms, and adjust.

D. Install power supplies and other auxiliary components at control stations unless otherwise indicated.

E. Install tamper switches on components indicated to receive tamper switches, arranged to detect unauthorized entry into system-component enclosures and mounted in self-protected, inconspicuous positions.

F. Avoid ground loops by making ground connections only at the control station.

1. For 12- and 24-V dc cameras, connect the coaxial cable shields only at the monitor end.

G. Identify system components, wiring, cabling, and terminals according to Section 260553 "Identification for Electrical Systems."

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

B. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

C. Tests and Inspections:

1. Inspection: Verify that units and controls are properly installed, connected, and labeled, and that interconnecting wires and terminals are identified.
2. Pretesting: Align and adjust system and pretest components, wiring, and functions to verify that they comply with specified requirements. Conduct tests at varying lighting levels, including day and night scenes as applicable. Prepare video-surveillance equipment for acceptance and operational testing as follows:

a. Prepare equipment list described in "Informational Submittals" Article.
b. Verify operation of auto-iris lenses.

c. Set back-focus of fixed focal length lenses. At focus set to infinity, simulate nighttime lighting conditions by using a dark glass filter of a density that produces a clear image. Adjust until image is in focus with and without the filter.
d. Set back-focus of zoom lenses. At focus set to infinity, simulate nighttime lighting conditions by using a dark glass filter of a density that produces a clear image. Additionally, set zoom to full wide angle and aim camera at an object 50 to 75 feet away. Adjust until image is in focus from full wide angle to full telephoto, with the filter in place.
e. Set and name all preset positions; consult Owner's personnel.
f. Set sensitivity of motion detection.
g. Connect and verify responses to alarms.
h. Verify operation of control-station equipment.

3. Test Schedule: Schedule tests after pretesting has been successfully completed and system has been in normal functional operation for at least 14 days. Provide a minimum of 10 days' notice of test schedule.
4. Operational Tests: Perform operational system tests to verify that system complies with Specifications. Include all modes of system operation. Test equipment for proper operation in all functional modes.

D. Video surveillance system will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

3.5 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose. Tasks shall include, but are not limited to, the following:

1. Check cable connections.
2. Check proper operation of cameras and lenses. Verify operation of auto-iris lenses and adjust back-focus as needed.
3. Adjust all preset positions; consult Owner's personnel.
4. Recommend changes to cameras, lenses, and associated equipment to improve Owner's use of video surveillance system.
5. Provide a written report of adjustments and recommendations.

3.6 CLEANING

A. Clean installed items using methods and materials recommended in writing by manufacturer.

B. Clean video-surveillance-system components, including camera-housing windows, lenses, and monitor screens.

3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain video-surveillance equipment.

END OF SECTION 282300

SECTION 28 31 00 - FIRE DETECTION AND ALARM

PART 1 GENERAL

1.1 SUMMARY

A. This section includes:
   1. Fire alarm control panels.
   2. Manual fire alarm stations.
   3. Automatic smoke and heat detectors.
   4. Fire alarm signaling appliances.

1.2 REFERENCES

A. Division 1: Requirements for references and standards.

B. NFPA 70 - National Electrical Code.

C. NFPA 72 - Installation, Maintenance, and Use of Protective Signaling Systems.

D. NFPA 72E - Automatic Fire Detectors.

E. NFPA 72G - Notification Appliances for Protective Signaling Systems.

F. NFPA 72H - Guide for Test Procedures for Protective Signaling Systems.

G. NFPA 101 - Life Safety Code.

1.3 SYSTEM DESCRIPTION

A. Fire Alarm System: NFPA 72, automatic local fire alarm system.

1.4 SUBMITTALS FOR REVIEW

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.
   1. Product Data: Provide electrical characteristics and connection requirements.
   2. Shop Drawings: Indicate annunciator layout and system wiring diagram showing each device and wiring connection required.
   3. Scaled drawing indicating proposed layout of control panel and enclosure. Indicate proposed construction of enclosure and finishes to be used.

1.5 SUBMITTALS FOR INFORMATION

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.
   1. Test Reports: Indicate satisfactory completion of required tests and inspections.

2. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

1.6 QUALITY ASSURANCE

A. Source Limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

B. Conform to requirements of NFPA 70 and NFPA 101.

C. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience, and with service facilities within 100 miles of Project.

D. Supplier Qualifications: Authorized distributor of specified manufacturer with minimum three years documented experience.

E. Installer Qualifications: Company specializing in installing the products specified in this section with minimum three years documented experience, and certified by State of Connecticut as fire alarm installer.

F. Products: Listed and classified by Underwriters Laboratories, Inc as suitable for the purpose specified and indicated.

1.7 MAINTENANCE SERVICE

A. Provide service and maintenance of fire alarm equipment for one year from Date of Substantial Completion.

1.8 SCOPE OF WORK

A. A new intelligent reporting, microprocessor controlled fire detection system shall be installed in accordance with the specifications and drawings.

B. Basic Performance
1. Alarm, trouble and supervisory signals from all intelligent reporting devices shall be encoded onto an NFPA Style 4 (Class B) Signaling Line Circuit (SLC).
2. Initiation device circuits shall be wired Class B (NFPA Style B).
3. Notification Appliance Circuits shall be wired Class B (NFPA Style Y).
4. Digitized electronic signals shall employ check digits or multiple polling.
5. A single ground or open on any system signaling line circuit, initiating device circuit, or notification appliance circuit shall not cause system malfunction, loss of operating power or the ability to report an alarm.
6. Alarm signals arriving at the main FACP shall not be lost following a power failure (or outage) until the alarm signal is processed and recorded.

1.9 BASIC SYSTEM FUNCTIONAL OPERATION

A. When a fire alarm condition is detected and reported by one of the system initiating devices or appliances, the following functions shall immediately occur:
   1. The system alarm LED shall flash.
   2. A local signal in the control panel shall sound.
   3. The display shall indicate all information associated with the fire alarm condition, including the type of alarm point and its location within the protected premises.
   4. History storage equipment shall log the information associated with each new fire alarm control panel condition, along with time and date of occurrence.
   5. All system output programs assigned via control-by-event equations to be activated by the particular point in alarm shall be executed, and the associated system outputs (alarm notification appliances and/or relays) shall be activated.

1.10 EXTRA PRODUCTS

A. Deliver extra stock to warehouse designated by Engineer. Furnish new materials from same manufactured lot as materials installed and enclose in protective packaging with appropriate identification. For more information refer to NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS.
   1. Furnish ten manual station break-glass rods.
   2. Furnish six keys of each type.
   3. Furnish three of each type of automatic smoke detector.

1.11 DELIVERY, STORAGE AND HANDLING

A. Refer to Form 816 Article 1.06.03 and Form 816 Article 1.20-1.06.03 for additional information.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Siemens Model XLS
   2. Notifier.
   3. EST
   4. Simplex Grinnell

2.2 CONTROL PANEL

A. The fire alarm control panel shall be microprocessor based using the multiple microprocessors throughout the system providing rapid processing of smoke detector and other initiation device information to control system output

functions. There shall be a watchdog circuit, which shall verify the system processors and the software program. Problems with either the processors or the system program shall activate a trouble signal, and reset the panel. The system modules shall communicate with an RS 485 network communications protocol. All module wiring shall be to terminal blocks, which will plug into the system card cage. The blocks shall be color coded to prevent accidental crossing of wiring.

B. The basic system shall have capabilities for 252 intelligent initiation devices and can be expanded up to 2500 intelligent initiation devices

C. The Device Loop Card (DLC) shall be capable of 252 intelligent devices distributed between two SLC circuits. Any trouble on one circuit shall not affect the other circuit. This module controls the signaling from the initiation devices reporting alarms and troubles to the control panel. This module shall also provide the signaling to the field devices for controlling the output of specific initiation devices. The circuit shall be capable of being connected with polarity insensitive intelligent initiation devices. The circuits shall have the ability to be wired, Style 4, Style 6. The on board microprocessor provides the DLC with the ability to function even if the main microprocessor fails. LED's on the board shall provide annunciation for the following; Power, Card Failure, Network Failure, Gnd. Fault, Alarm, Trouble, Short Zone 1, Short Zone 2, Style 6 Open Zone 1, Style 6 Open Zone 2. This card shall plug into the system card cage.

D. The Signal Line Circuits (SLC) shall be tested for opens, shorts and communications with all addressable devices installed before connection to the control panel. Systems without this capability shall have a test panel installed for initial testing to eliminate any possible damage short term or long term to the control panel. After initial testing replace the test panel and proceed with complete testing.

E. The Zone Indicating Card (ZIC) shall contain 4 NAC circuits rated at 4 amps each with power-limited outputs. The zone inputs for the card shall be isolated and independently supervised. There shall be at least 3 unique codes/signals for each circuit based on system logic. These signals shall be Temporal Code 3 (Evacuation), Steady (Such as "Recall"), and Alert (Such as "Tornado Alert"). The card shall be listed for notification appliances, horns, strobes. The card shall have the ability to wire the circuits Style Y or Style Z with outputs synchronized. The card shall have the following LED's to provide trouble shooting and annunciation; Power, Card Failure, Network Failure, Gnd. Fault, Zone Activation or Trouble. This card shall plug into the system card cage.

F. The system card cage shall provide the mounting of all system cards, field wiring, and panel's inter-card wiring. The terminal strips for the cards shall be color-coded to eliminate the possibility of making the wrong connection. All power limited field wiring shall connect to the top of the card cage. All non-power limited internal wiring shall be connected to the bottom of the card cage. The

card cage shall hold the systems cards and have capability of connecting multiple card cages to meet system demands.

G. System response time from alarm to output shall not exceed four (4) seconds.

H. To expedite system troubleshooting, the system cards shall have ground fault detection, and diagnostic LED's by card.

I. All system cards and modules shall have Flash memory for downloading the latest module firmware.

J. Batteries
   1. The battery shall have sufficient capacity to power the fire alarm system for not less than twenty-four hours plus 5 minutes of alarm upon a normal AC power failure.
   2. The batteries are to be completely maintenance free. No liquids are required. Fluid level checks for refilling, spills, and leakage shall not be required.
   3. If necessary to meet standby requirements, external battery cabinet and charger systems may be used. Note: Battery configuration/sizes and charging shall be adjusted for outdoor use. No areas of the project will have heating/cooling; all areas are to be assumed as 'exterior'.

K. The system Power Supply/Charger (PSC) shall be a 12-amp supply with battery charger. The power supply shall be filtered and regulated. The power supply shall have a minimum of 1 power limited output rated at 4 amps, and a minimum of 1 output rated at 12 amps. The system power supply can be expanded up to 48 amps. The auxiliary power supply module shall share common batteries with the primary power supply. The system power supply shall have 4 relays, 1 for common alarm, one for common trouble and two programmable relays. The power supply shall be rated for 120/240 VAC 50/60 Hz.

L. The battery charger shall be able to charge the system batteries up to 100 AH batteries. Battery charging shall be microprocessor controlled and programmed with a special software package to select charging rates and battery sizes. An optional Thermistor for monitoring battery temperature to control charging rate shall be available.

M. The power supply shall have a plug for an AC adapter cable, which allows a technician to plug in a laptop computer for up or down loading program information or test equipment.

N. Transfer from AC to battery power shall be instantaneous when AC voltage drops to a point where it is not sufficient normal operation.

O. The control panel will be mounted in the elevator lobby in a non-conditioned exterior space. Provide a NEMA 4X stainless steel brushed finish enclosure

needed to hold all the cards and modules as specified with at least spare capacity for two cards. The enclosures shall have a stainless steel hinged front enclosure door painted red, and shall include a laminated glass front vision panel appropriately sized to view the front of the panel. The enclosure door shall be capable of being a left hand open or a right hand open. The inner control panel door shall have a left hand opening. System enclosure doors shall provide ventilation for the modules or cards in the enclosure in required by the manufacturer.

P. An off-site dialer shall be provided. The dialer shall be listed with the system and shall have a minimum of 4 channels. The dialer shall be mounted externally. The auto-dial feature shall be connected to an emergency phone number provided by the Engineer.

Q. The programming tool shall program the intelligent devices with usage and device addresses. The unit shall test both the loop wiring for grounds, opens and shorts. Systems not having this ability shall, tests all the above items and provide a written report documenting the testing procedure as required in the submittal section.

R. The system programmer shall print labels for all addressable devices and contain the complete SLC circuit and device numbers.

2.3 INITIATING DEVICES

A. Manual Pull Station: Provide double action addressable manual stations where shown on the drawings, to be surface mounted. Manual stations shall contain the intelligence for reporting address, identity, alarm and trouble to the fire alarm control panel. The manual station shall be equipped with terminal strip and pressure style screw terminals for the connection of field wiring. Surface mounted stations where indicated on the drawings shall be mounted using a manufacturer's prescribed matching red enamel outlet box.

B. Intelligent heat detectors shall be rated at 135 degrees fixed temperature and 15 degrees per minute rate of rise. Detectors shall be constructed to compensate for the thermal lag inherent in conventional type detectors due to the thermal mass, and alarm at the set point of 135 degrees Fahrenheit. The choice of alarm reporting as a fixed temperature detector or a combination of fixed and rate of rise shall be made in system software and be changeable at any time without the necessity of hardware replacement. The detectors furnished shall have a listed spacing for coverage up to 2,500 square feet and shall be installed according to the requirements of NFPA 72 for open area coverage.

C. The ceiling mounted smoke detectors shall be an intelligent digital photoelectric detector with a programmable heat detector. Detectors shall be listed for use as open area protective coverage, Detectors shall be programmable as application specific, selected in software for environmental fire profiles unique to the

installed location. These fire profiles shall eliminate the possibility of false indications caused by dust, moisture, RFI/EMI, chemical fumes and air movement while factoring in conditions of ambient temperature rise, obscuration rate changes and hot/cold smoke phenomenon into the alarm decision to give the earliest possible real alarm condition report. The intelligent smoke detector shall be capable of providing three distinct outputs from the control panel. The outputs shall be from an input of smoke obscuration, a thermal condition or a combination of obscuration and thermal conditions. The detector shall be designed to eliminate calibration errors associated with field cleaning of the chamber. The detector shall support the use of a relay, or LED remote indicator. Low profile, white case shall not exceed 2.5 inches of extension below the finish ceiling. Detector wiring shall not require any special shielded cable.

2.4 SIGNALING APPLIANCES

A. Horns
   1. All Horns shall operate on 25 VRMS or with field selectable output taps from 0.5 to 2.0 Watts.
   2. Sound Rating: 87dB at 10 feet.
   3. Integral strobe lamp and flasher with red lettered "FIRE" on white lens.

B. The strobe only appliance as indicated on the drawings shall be a synchronized strobe light with multiple candela taps to meet the intended application. The strobe light taps shall be adjustable for 15/75, 30/75, 75, and 110 candela. The appliance shall be red.

2.5 FIRE ALARM WIRE AND CABLE

A. Fire Alarm Power Branch Circuits: Building wire as specified in Section 26 05 05.

B. Initiating Device and Indicating Appliance Circuits: Building wire in conduit. Power limited fire-protective signaling cable classified for fire and smoke characteristics, copper conductor, 300 volts insulation rated 105 degrees C.

C. Fire alarm circuit conductors have insulation color or coded as follows:
   1. Power Branch Circuit Conductors: Black, red, white.
   2. Initiating Device Circuit: Black, red.
   3. Detector Power Supply: Violet, brown.
   4. Signal Device Circuit: Blue (positive), white (negative).
   5. Door Release: Gray, gray.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install manual station with operating handle 4 feet 6 inches above finished floor. Install audible and visual signal devices 7 feet 6 inches above finished floor.

B. Install 14 AWG minimum size conductors for fire alarm detection and signal circuit conductors.

C. Connect conduit and wire to door release devices, sprinkler flow switches, sprinkler valve tamper switches, fire suppression system control panels, duct smoke detectors and fire protection storage tank level sensor.

D. Automatic Detector Installation: Conform to NFPA 72E.

3.2 FIELD QUALITY CONTROL

A. Test in accordance with NFPA 72H and local fire department requirements.

3.3 MANUFACTURER'S FIELD SERVICES

A. Prepare and start systems.

B. Include services of certified technician to supervise installation, adjustments, final connections, and system testing.

3.4 TYPICAL OPERATION

A. Actuation of any manual station, smoke detector, heat detector or water flow switch shall cause the following operations to occur unless otherwise specified:
   1. Activate all programmed notification circuits until silenced. Activate all Horns.
   2. Actuate all strobe and horn units until the panel is reset.
   3. Annunciate the active initiating devices and zones.
   4. Release all magnetic door holders to doors to adjacent zones on the floor from that the alarm was initiated.
   5. Return all elevators to the primary or alternate floor of egress.
   6. Close all fire shutters.
   7. A smoke detector in any elevator lobby shall, in addition to the above functions, return all elevators to the primary or alternate floor of egress.
   8. Smoke detectors in the elevator machine room or top of hoistway shall return all elevators in to the primary or alternate floor. Smoke detectors or heat detectors installed to shut down elevator power shall do so in accordance with ANSI A17.1 requirements and be coordinated with the electrical contractor.

3.5 DEMONSTRATION AND INSTRUCTIONS

A. Demonstrate normal and abnormal modes of operation, and required responses to each.

END OF SECTION

SECTION 285110 – STATION CONTROL UNIT

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions of Division 1, State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, and Incidental Construction, Form 816 - 2004 and supplemental specifications thereto, shall be a part of this specification.

B. Work included in this section may require coordination with Amtrak regarding track outages, flagmen, or other issues related to work around railroad facilities. The Contractor shall pay special attention to the specification entitled "SAFETY AND PROTECTION OF RAILROAD TRAFFIC AND PROPERTY" and other Amtrak Specifications contained in the Contract.

1.2 SUMMARY

A. This Section includes Station Control Units.

1.2 SUBMITTALS

A. Product Data: For each Station Control Unit indicated, Include data on features, accessories, and the following:

1. Dimensions.
2. Certified results of independent laboratory tests

B. Shop Drawings: Show details of nonstandard or custom fixtures. Indicate dimensions, weights, and method of field assembly, components, features, and accessories.

PART 2- PRODUCTS

2.1 Station Control Unit (SCU)

A. The SCU shall provide for data acquisition and control of the PA and VMS subsystems. The SCU Shall interface to the LAN using 10/100 base TTCP/IP to the Network interface (see sec. 6.0) The SCU shall interface to the Audio interface Board through an RS-232 link at TBD Board through an RS-232 link at TBD baud. Network audio messages (wav files) will be loaded to and stored in the SCU over the LAN and output for the TBD sound card to the Audio Interface Board serial interface. The Audio interface will provide for optional local microphone input. Type TBD. Audio messages form the SCU shall be applied to the audio input. The audio interface shall provide for ambient noise level control as well as manual and scheduled level control. The Audio Interface shall accept a dry contract closure input to signal Train Approaching (TA). The unit shall provide for internal storage of the train Approaching message and will output a minimum of 15 seconds audio upon receipt to the TA signal. This will minimize the delay of the TA

B. The Audio Interface for the manned station shall provide the option for local control and messaging over the local microphone input. Station Control Unit (SCU)- The SCI processor located in each station shall control that portion of the VMS system. The SCU shall be responsible
for the following tasks.

- Control the Carrier Transmission System modem and communications interface.
- Distribute control commands form the VMS Control System to the VMS displays, and route VMS responses back to the control system.
- Provide SCU status reports back to the VMS Control System which collate the VMS status reports for the station.
- Because of its open architecture, the SCU shall be suitable for expansion to additional inputs, outputs and system functions. For example, it can easily be adapted to read or generate switch closure, or to read or issues serial data.

The SCU at unmanned stations shall be a microcomputer in a rack mount enclosure utilizing a flash memory card instead of rotating hard drive. The SCU at unmanned stations is not itself a point of local control and will not be equipped with a keyboard or monitor. For troubleshooting purposed, a Diagnostic Test Set can be connected to SCU to provide status information and full control of the VMS network wothin the station Characteristics of SCU at manned stations are as follows:

- Desktop PC
- Pentium PC, 400 mhz or better
- 128 megabytes random access memory
- Hard disk capacity to provide at least 80% excess capacity after sign control software is loaded (6.4 gigabyte minimum)
- One 3.5” floppy disk drive
- One CD ROM
- Sound Blaster 32 sound card
- Local bus video
- SVGA 17” video monitor
- Contact Closure Interface Panel with capability to accept inputs form a minimum of 4 track contact closure and two sparks.
- Network interface card
- Windows NT operating system software
- TAMS Station Control Unit applications software for manned station

Characteristics of the SCU unmanned stations are as follows:

- Rack mounted ruggedized PC
- Pentium PC, 400 mhz or better
- 128 megabytes random access memory

- Flash memory 1 gigabyte capacity
- One 3.5 floppy disk drive
- Soundblaster 32 Sound card
- Local Bus Video
- Network interface card
- Windows NT operating system software

D. TAMS Station Control Unit application software for both manned and unmanned station will be Windows NT Operating System and Penta Corporations Public Address Software.

E. Product Certificates: Signed by the manufactor certifying that products comply with requirements.

F. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

G. Maintenance Data: For Station Control Units to include in maintenance specified in Division 1.

Part 3- EXECUTION

3.1 INSTALLATION

A. Install Station Control Unit as indicated on the contract drawings.

END OF SECTION 285110

SECTION 285116 – TRAIN APPROACH MESSAGE SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Drawings and general provisions of the Contract, including General Conditions of Division 1, State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, and Incidental Construction, Form 816 - 2004 and supplemental specifications thereto, shall be a part of this specification.

B. The Work specified in this Section consists of furnishings and installing Communication conduit and cables, power conduit and cables, and speakers and LED matrix displays for the Train Approach Message System (TAMS) as indicated.

1.2 SUMMARY:

A. Section Deleted.

B. The Contractor shall furnish and install all speakers, communication conduit and cable and power conduit and cable associated with the Train Approach Message System (TAMS) including final terminations at field devices.

C. The Contractor shall furnish and install all LED matrix displays and all communications conduit and power conduit and cable associated with the Train Approach Message System (TAMS).

D. Amtrak shall furnish and install the communication fiber for the Train Approach Message System (TAMS). Amtrak shall make final terminations to the head-end equipment.

1.3 SUBMITTALS:

A. Section Deleted.

B. Product data for each type of product specified.

C. Maintenance data for materials and products, for inclusion in Operating and Maintenance Manual. Provide complete manual material concurrently with system submittal and provide updated final versions of manuals one month before completion of construction and final system turnover.

1.4 QUALITY ASSURANCE::

A. Electrical Component Standard: Provide work complying with applicable requirements of NFPA 70 “National Electrical Code”.

B. Source Limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

1.5 DELIVERY, STORAGE AND HANDLING

A. Refer to Form 816 Article 1.06.03 and Form 816 Article 1.20-1.06.03 for additional information.

PART 2 - PRODUCTS

A. PA system speakers shall be:

1. Section Deleted.
2. Exterior: Atlas Sound Model APF-15T installed in Model VP410-S vandal-proof enclosure with FAMT-6 adapter plate.

B. PID system LED matrix displays shall be:

1. Single Face: Daktronics Galaxy Model AF-65121-32x144-8-A-SF.
2. Double Face: Daktronics Galaxy Model AF-6121-32x144-8-A-DF.

C. Where pole-mounted TAMS display units are to be installed, provide a 10’-6” tall single arm pole (tube 4” x 4” x 5/16” minimum thick) with a 9” x 9” x ¾” baseplate, and self-leveling pole mounting hardware. Pole shall permit the installation of conduit within the pole.

D. Mounting hardware, and fasteners: Provide hardware, brackets and fasteners as required to install the equipment as shown on the contract drawings and/or as directed by Amtrak.

E. Finish: Where not otherwise indicated on contract drawings, all equipment and hardware shall be type 316 stainless steel or painted with the high performance paint system specified under section 099600 “High Performance Coatings”. Mounting poles shall be painted with the high performance paint system specified under section 099600 “High Performance Coatings”.

PART 3 - EXECUTION

3.1 EXAMINATION:

A. Examine conditions, with the Installer present, for compliance with requirements and other conditions affecting the performance of the system work.

B. Do not proceed until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install system in accordance with NFPA 70 and other applicable codes.

B. In accordance with Section 260533 “Raceways and Boxes for Electrical Systems.”

3.3 TESTING:

A. Perform all Train Approach Message System (TAMS) field tests and provide all labor, equipment, and incidentals required for testing.

B. After installation has been completed and Amtrak have installed, terminated, and made otherwise operational, the Contractor shall conduct and operating test of the TAMS. The equipment shall be demonstrated to operate in accordance with the requirements of this Section and to the satisfaction of Amtrak.

C. The Contractor shall show by demonstration in service that circuits and field devices are in good operating condition. The Contractor shall give the Engineer 5 days advance notice of the dates and times for tests and inspections.

D. All defective material and workmanship disclosed as the result of the tests given herein shall be corrected at no cost to the owner.

3.4 CLEANING AND PROTECTION:

A. Prior to final acceptance, clean system components and protect from damage and deterioration.

END OF SECTION 285116

SECTION 285223 – EMERGENCY SPEAKERPHONE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions of Division 1, State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, and Incidental Construction, Form 816 - 2004 and supplemental specifications thereto, shall be a part of this specification.

1.2 SUMMARY:

A. This section includes the following:
   1. Free-standing, ANSI A117.1-2003-compliant steel emergency phone tower mount emergency phone with built-in combination blue light/strobe and lighted faceplate.

B. The system shall consist of all necessary hardware equipment and software programming to perform the following functions:
   1. Single touch on the communications device button shall immediately and automatically dial a preprogrammed number. This shall simultaneously activate the blue strobe integral unit.
   2. Immediately after establishing the phone connection with the receiving party, the communications device shall be capable of sending a signal identifying the specific unit being activated.

1.3 RELATED DOCUMENTS

A. The work covered by this section is to be coordinated with related work as specified elsewhere in the specifications. Requirements of the following sections apply:
   1. Division 26: "Basic Electrical Materials and Methods."

B. The system and all associated operations shall be in accordance with the following:
   1. Guidelines of the following Building Code: Building Code of the State of Connecticut.
   2. NFPA 70, National Electrical Code.
   3. NFPA 101, Life Safety Code.
   4. ANSI A117.1-2003 Accessibility Guidelines

1.4 SUBMITTALS:

A. Comply with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Product Data: Product data sheets for system components highlighted to indicate the specific products, features, or functions required to meet this specification. Alternate or as-equal products submitted under this contract must provide a detailed line-byline comparison of how the submitted product meets, exceeds, or does not comply.

C. Wiring schematics from manufacturer.

D. Shop Drawings showing system details including location of all devices, circuiting and details of installation.

E. System operation description including method of operation and supervision of each type of circuit and sequence of operations for all manually and automatically initiated system inputs and outputs. A list of all input and output points in the system shall be provided with a label indicating location.

F. Operating instructions for system. Operation and maintenance data to include in the operation and maintenance manuals specified in Form 816 Article 1.20-1.08.14 subsection 2 and described in NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS.

G. Include data for each type product, including all features and operating sequences, both automatic and manual. Provide the names, addresses, and telephone numbers of service organizations.

H. Product certification signed by the manufacturer of the components certifying that their products comply with indicated requirements.

I. Manufacturer Certification Letter in accordance with NOTICE TO CONTRACTOR – POTENTIAL FOR ASBESTOS CONTAINING MATERIALS.

1.5 QUALITY ASSURANCE:

A. Installer Qualifications: A factory-authorized installer is to perform the work of this section.

B. Source Limitations: Obtain system components from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

C. Conduct a Pre-Installation Meeting at the Project Site in compliance with the requirements of Form 816 Article 1.20-1.05.24 subsection 2.

D. Each and all items of the system shall be FM Global approved and listed as a product of a single fire manufacturer under the appropriate category by Underwriters Laboratories, Inc. (UL), and shall bear the "UL" label.

E. Conduct a Pre-Installation Meeting at the Project Site in compliance with the requirements of Form 816 Article 1.20-1.05.24 subsection 2.

1.6 DELIVERY, STORAGE, AND HANDLING:

A. Comply with Form 816 Article 1.06.03 and Form 816 Article 1.20-1.06.03 for additional information.

1.7 WARRANTY:

A. Comply with Form 816 Article 1.20-1.06.08 and NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information.

1. Special Warranty:
   a. Equipment shall be warranted against any defects in material and workmanship, under normal use, for a period of five years from date of installation. In the event system is found by manufacturer to be defective within the warranty period, manufacturer shall repair and/or replace any defective parts, provided the equipment is returned to manufacturer.
   b. Supplier shall warrant that any software supplied under this contract, as well as that software contained in or sold as part of any product supplied, will conform to its published specifications in effect at the time of delivery and for one year after final project acceptance.

1.8 SPARE PARTS:

A. Furnish to the Engineer spare parts described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents. Comply with NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information.

1. Bulbs: One full set of spare bulbs.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

A. Subject to compliance with specification requirements, suitable products by one of the following manufacturers will be considered by the CONNDOT and Engineer:
   1. Talk-A-Phone Co. (773) 539-1100, 7530 N. Natchez Ave, Niles, Illinois 60714, www.talkaphone.com. Model: ETP-MT/R.
   2. Approved Equal.

2.2 SPEAKERPHONE CONSTRUCTION

A. The unit shall be constructed of 0.25" thick steel.

B. A multi-coat, rust-inhibitive coating shall be applied to withstand prolonged exposure to harsh environments.

C. An internal base plate shall be fully welded within the tower 2" above the tower base. The base plate shall be fabricated of 0.75" A-36 steel. There shall be a 4" diameter center hole for wiring access and four 1" diameter holes for anchor bolt clearance.

D. Tower shall have a wiring access opening measuring 11" H x 8" W, located 15" above the base of the tower. The opening shall have a flush cover plate with a wall thickness of 0.25", held in place by two 10-24 countersunk, tamper-resistant spanner screws.

E. An opening shall be cut in the face of the column for mounting any flush-mounting, 400-Series emergency phone models. The lower edge of the opening shall slope down 30º from rear to front, making the edge difficult to use as a shelf yet convenient as a writing surface.

F. The word "EMERGENCY" shall be emblazoned on all four sides in 3.25" high reflective white letters (custom lettering, sizes and colors available).

G. Lighting:
   1. Atop the tower shall be a combination blue light and strobe.
   2. The blue light shall be a 7 watt high efficiency, compact fluorescent light with a 10,000 hour lifetime. It shall be lit at all times.
   3. The strobe shall provide 1.5 million candlepower and flash 70 times per minute when the emergency phone is activated and continue flashing until the call has been completed.
   4. The polycarbonate refractor/housing shall have a prismatic pattern to increase visibility at greater distances.
   5. Refractor housing shall further be enclosed in a clear polycarbonate security enclosure.
   6. The tower shall have a concealed 7-watt high efficiency, long life compact fluorescent light illuminating the emergency phone face plate at all times.

H. Electrical
   1. The communication device shall require no external power. It shall be powered by the phone line, PBX extension, or a wireless communication interface.

2. Standard 120VAC power shall be required for the blue light/strobe and face plate light.
3. All lamps and fixtures shall be UL and C.S.A. listed. All electrical components shall be hard wired and concealed within the tower. All wiring and electrical fixtures comply with the standards of the National Electrical Code, UL and C.S.A.

I. Mounting
1. The tower shall include 24 inch J-bolts for mounting into a 24" x 24" concrete foundation, depth as specified on the Contract Drawings or as directed by engineer. J-bolts shall protrude approximately 5 inches from surface of foundation.

PART 3 - EXECUTION

3.1 INSTALLATION – GENERAL:

A. Install system components and all associated devices in accordance with applicable NFPA Standards and manufacturer's recommendations.

B. Installation personnel shall be supervised by persons who are qualified and experienced in the installation, inspection, and testing of fire alarm systems. Examples of qualified personnel shall include, but not be limited to, the following:
1. Factory trained and certified personnel.
2. National Institute of Certification in Engineering Technologies (NICET) fire alarm level II certified personnel.
3. Personnel licensed or certified by state or local authority.

3.2 EQUIPMENT INSTALLATION:

A. Install a complete System as described herein and as shown on the plans. Include all other necessary material for a complete operating system.

B. Speaker Phones: Install so that the top of the cabinet is not more than 72 inches above the finished grade. Pushbutton mounting height shall meet minimum ANSI A117.1-2003 mounting requirements.

3.3 WIRING INSTALLATION:

A. System Wiring: Wire and cable shall be a type listed for intended use by an approval agency acceptable to the Authority Having Jurisdiction and shall be installed in accordance with the appropriate articles from the latest edition of NFPA 70: National Electric Code (NEC).

B. Contractor shall obtain from the System Manufacturer written instruction regarding the appropriate wire/cable to be used for this installation. The Contractor shall make no deviation from the written instruction without the prior written approval of the System Manufacturer.

C. Color Coding: Color-code fire alarm conductors differently from the normal building power wiring. Use one color code for alarm initiating device circuits wiring and a different color code for supervisory circuits.

3.4 ADJUSTING:

A. Field Adjustments: When requested by the Engineer within 12-months of the issuance of the Certificate of Compliance, the Contractor shall provide on-site assistance in adjusting sound levels and adjusting controls and sensitivities to suit actual occupied conditions. The Contractor shall provide a maximum of 3 visits to the Project Site outside of normal occupancy hours for this purpose at no additional cost to the Department.

3.5 FIELD QUALITY CONTROL:

A. Inspect the system in compliance with Form 816 Article 1.20-1.05.10.

B. Manufacturer's Field Services: Provide services of a factory-authorized service representative to supervise the field assembly and connection of components and the pre-testing, final testing, and adjustment of the system.

C. Pre-testing: Determine, through pre-testing, the conformance of the system to the requirements of the Drawings and Specifications. Correct deficiencies observed in pre-testing. Replace malfunctioning or damaged items with new and retest until satisfactory performance and conditions are achieved.

D. Final Test Notice: Provide a 10-day minimum notice in writing when the system is ready for final acceptance testing.

E. Retesting: Correct deficiencies indicated by tests and completely retest work affected by such deficiencies. Verify by the system test that the total system meets the Specifications and complies with applicable standards.

F. Report of Tests and Inspections: Provide a written record of inspections, tests, and detailed test results in the form of a test log.

3.6 TRAINING:

A. Comply with Form 816 Article 1.20-1.08.14 subsection 3 for additional information.

B. Provide the services of a factory-authorized service representative to demonstrate the system and train Owner's maintenance personnel as specified below:
   1. Train Owner's maintenance personnel in the procedures and schedules involved in operating, troubleshooting, servicing, and preventive maintaining of the system.
   2. Provide a minimum of 4 training sessions each two hours long in duration.
   3. Schedule training with the Owner at least seven days in advance.

END OF SECTION 285223

PERMITS AND/OR PERMIT APPLICATIONS

Army Corps of Engineers Programmatic General Permit Inland Wetland Category Determination Form – Branford	No 404 permit required (May 19, 2011)
Environmental Review Form – Branford	Dated January 31, 2011
General Permit Registration Form for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities – Branford	Acquisition occurs during construction
Flood Management Certification Technical Revision to grading and drainage Plan – Branford	Dated May 23, 2011
Flood Management Certification Application – Branford	Dated on January 23, 2009
Army Corps of Engineers Programmatic General Permit Inland Wetland Category Determination Form – Guilford	No 404 permit required (May 19, 2011)
Coastal Consistency Review Form – Guilford	Approved on April 18, 2011
Flood Management General Certification Application – Guilford	
Flood Management General Certification – Guilford	Approved on May 4, 2011
Environmental Review Form – Guilford	Dated April 8, 2011
General Permit Registration Form for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities – Guilford	Acquisition occurs during construction

Army Corps of Engineers Programmatic General Permit
Inland Wetland Category Determination Form

THIS SECTION TO BE COMPLETED BY INITIATING UNIT

Project Number: 310-0056 Submittal Date: May 20, 2011

☒ Please attach project description (including wetland impacts), location map and plans.

Town: Branford Coordinates: Long. W 72° 49' 02.08"

Waterway: N/A Lat. N 41° 16' 28.62"

It has been determined that there: ☐ are ☒ are not threatened or endangered species in the project area based upon NDDB mapping.

Fill[1] ☐ will ☒ will not be placed within any FEMA established Floodway.

Waters and wetland impacts[2]: 0 acres permanent impact (include all fill & excavation in wetlands & watercourses) 0 acres temporary impact (include temporary structures, clearing, access to site, draining, flooding, etc.). Total waters and wetland impacts: 0 acres

SECTION A

Please check all applicable requirements under Sections B and C and skip Section D if the project meets the following:

☒ Total waters and wetland impact is less than 5000 s.f.

☐ The tributary watershed to the culvert crossing is ≤1 sq. mile (640 acres). ☒ N.A. Project does not involve a culvert crossing

If the project does not meet the above requirements and the total waters and wetland impact is ☒ ≤1 acre, please skip Section B and check all applicable requirements under Sections C and D. Projects with waters and wetland impacts >1 acre are not PGP eligible and require submission of an application for an Individual Permit to the Corps.

SECTION B: CATEGORY 1 PROJECTS ONLY

- **For replacement of an existing roadway crossing using BRIDGES & OPEN-BOTTOM STRUCTURES, the structure:**

☐ Does not result in a change in the normal surface elevation[3] of the upstream waters, waterway or wetland

- **For new construction or replacement of an existing roadway crossing using a CULVERT:**

☐ The culvert gradient (slope) is ≤ the streambed gradient immediately upstream or downstream of the culvert

- **For STREAM BANK STABILIZATION projects:**

☐ Stabilization involves ≤200 total feet of stream bank, calculated as the sum of the lengths of work along each bank

☐ No fill within the streambed beyond the toe of slope of the stream bank

SECTION C: CATEGORY 1 AND CATEGORY 2 PROJECTS

- **For new construction or replacement of an existing roadway crossing using BRIDGES & OPEN-BOTTOM STRUCTURES, the structure:**

☐ Spans at least 1.2 times the watercourse bank full width[4]

☐ Has an openness ratio[5] ≥ 0.25 meters

☐ Allows for continuous flow[6] of the 50-year frequency storm flows

☐ Has a riparian bank on one or both sides for wildlife passage

- **For new construction or replacement of an existing roadway crossing using a CULVERT:**

☐ For a crossing consisting of a single box or pipe arch culvert, the inverts are set ≥ 12" below the streambed elevation

☐ For a crossing constructed using multiple box or pipe arch culverts, the inverts of one of the boxes or pipe arch culverts are set ≥ 12" below the streambed elevation ☐ N.A. Project does not meet the requirements in Section A and is not new construction

☐ The culvert is backfilled with natural substrate material matching upstream and downstream streambed substrate

☐ The structure allows for continuous flow[6] of the 50-year frequency storm flows

☐ For a crossing constructed using a pipe culvert, the inverts are set such that ≥ 25% of the pipe or 12", whichever is less, is set below the natural streambed elevation ☐ N.A. Project does not meet Section A requirements and is not new construction

☐ The structure does not impede the passage of fish and other aquatic organisms. Please attach copies of reports of meetings and/or other correspondence with DEP Fisheries ☐ N.A. Project is new construction and does not meet the requirements in Section A

- **For STREAM BANK STABILIZATION projects**

☐ There is an average of 1 cubic yard of fill or less per linear foot below ordinary high water[7]

SECTION D: CATEGORY 2 PROJECTS ONLY

- **For new construction or replacement of an existing roadway crossing using a CULVERT:**

☐ The use of a bridge or open-bottom structure is determined to be not practicable ☐ N.A. Project is not new construction

☐ There is no practicable alternative location for the crossing that would have less environmental impacts ☐ N.A. Project is not new construction

☐ The existing culvert is to be replaced using a box or pipe arch culvert

☐ Total waters and wetland impact is ≤1 acre

☐ The culvert has an openness ratio[5] ≥ 0.25 meters ☐ N.A. Project is not a culvert replacement

☐ The new structure does not result in a change in the normal surface elevation[3] of the upstream waters, waterway or wetland ☒ N.A. Project is not a culvert replacement

Special concerns / Notes: _____

Contact person: Bruce A. Olmstead Extension: X-3186

THIS SECTION TO BE COMPLETED BY ENVIRONMENTAL PLANNING

This project has been determined to qualify for:

☐ **Category I** – No further *Federal* permit processing is necessary.

☐ **Category I** – May be eligible as Category I, but backup information must be presented to DEP regarding why specific conditions have not been met (see notes section below)

☐ **Category II** – This project must be presented at the Corps/DOT monthly Project Manager's Meeting for review by all regulatory agencies. The Corps application Form ENG 4345 and CT PGP addendum must be prepared.

☐ **Category III** – Individual Corps Permit is required.

If the project design changes, affecting water resource impacts or water crossing elements, the project must be resubmitted for review by Environmental Planning

Special concerns / Notes: No 404 permit required

Completed By: K Lesay Extension: X2933 Date: 5/19/11

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

memorandum

COM-09A REV. 2/91 Printer on Recycled or Reclaimed Paper

subject: **ENVIRONMENTAL REVIEW FORM**

Project No : 310-xxx

Bridge Number :

Town/City : Branford

Date : Jan 31, 2011

to: Mr. Theodore H. Nezames
Transportation Principal Engineer
Bureau of Engineering and Construction

from: Mark W. Alexander
Transportation Assistant Planning Director
Bureau of Policy and Planning

Mark Alexander

Digitally signed by Mark Alexander
DN: cn=Mark Alexander, o, ou, email=Mark.W.Alexander@ct.gov, c=US
Date: 2011.01.31 14:26:49 -05'00'

The Office of Environmental Planning has reviewed the subject activity and notes the following environmental concerns and makes certain recommendations:

1. Socio-Economic

☐ Investigate displacement of families, businesses.

☐ Investigate potential impacts to minorities, local institutions, emergency services, and low-income neighborhoods.

☒ No apparent conflict with or impact to socio-economic resources.

☐ Project area is in a census tract containing certain ethnic populations with over 5% Limited English Proficiency.

☐ A conceptual stage relocation survey may be required. Please contact the Rights of Way Administrator.

Other :

2. Parks/Wildlife Refuges/Scenic Roads/Bikeways

☐ Investigate whether publicly owned parks, recreation areas and/or wildlife and waterfowl refuges are to be affected. Investigate Possible Section 4(f) and/or Section 6(f) Processing.

☐ This road has been/is in the process of being designated as a Scenic road under P.A. 87-280. Contact the Scenic Roads Committee Chairman, for further information.

☐ There may be a conflict and/or impact to a State Bikeway. Contact the Office of Intermodal Planning, Bikeway/ Pedestrian Coordinator.

☒ No apparent conflict/impact on publicly owned parks, recreation areas, refuges, scenic roads and/or bikeways.

Other :

Name: Kevin Fleming

Extension: 2924

3. Historical and Archaeological Resources

The Office of Environmental Planning (OEP) makes recommendations on possible project impacts to historical and archaeological resources based on the source of funding and permits that the project requires. If Federal funding is involved then the **National Historical Preservation Act Section 106 Review** process is initiated with consultation among the lead Federal Agency, the State Historic Preservation Office (SHPO), and CTDOT OEP. Projects that are fully State funded or a combination of State and local funds are reviewed by the **Connecticut Environmental Policy Act (CEPA)** process. Consultation is then among the lead State Agency (ConnDOT), the SHPO, and with the local municipality. For information about the State and Federal regulations applicable for CEPA and Section 106 go to http://www.cultureandtourism.org/cct/site/default.asp then choose Programs and Services\History Division. Projects that impact historical and archaeological resources as determined under **Section 106** review may also require a **Section 4(f)** review. **Section 4(f)** is a U.S.DOT regulation applicable to Federally funded transportation projects that acquire/use/affect property, or easements on property, where a historic resource is located. (For information on Section 4(f) for Historic Properties go to http://www.environment.fhwa.dot.gov/projdev/4fpolicy.asp

The Office of Environmental Planning makes the following recommendations based on research and/or field review of the project Area of Potential Effect (APE) for potential impacts to historical and archaeological resources. The recommendations are **provisional** and **will be finalized by consultation** by OEP with SHPO and the relevant Local, State, and Federal agencies. After consultation the SHPO will send a "Letter of Effect" to the project initiating unit.
Please contact OEP at 594-2926 if a " Letter of Effect" from the SHPO for this project is not received by the project initiating unit within 30 days of receipt of the completed Environmental Review Form from OEP.

☒ The OEP recommends "**No Historic Properties Affected**" within the APE of this project under Section 106/ Section 4(f) and/or CEPA.

☐ Possible **CEPA** processing required **OR**

☐ **Possible Section 106** and **Section 4 (f)** processing required because of possible effect to **known** historic:

◯ Structures(s)	◯ Bridge(s)	◯ State Register Historic District(s)	◯ Local Historic District(s)
◯ Cemetery(ies)	◯ Tribal Land(s)	◯ National Historic Landmark(s)	◯ National Register Historic District(s)
◯ Town Green(s)	◯ Archaeological Site(s)	◯ State Archaeological Preserve(s)	

Avoidance is recommended. Please contact OEP (X2926) for coordination.

☐ The project APE has moderate to high archaeological sensitivity. Avoidance or further investigation is recommended by OEP. Please contact OEP (X2926) for coordination.

☐ The project APE has a bridge(s) **OR**

☐ The project APE has a structure(s) that could be eligible for the National Register of Historic Places. Avoidance or further investigation is recommended by OEP. Please contact OEP (X2926) for coordination.

☐ The project APE is adjacent to or includes a portion of Route 15, the Merritt Parkway. Please contact OEP (X2926) for coordination.

☐ A bridge on the project has been identified as listed in the Connecticut's Historic Bridge inventory. Rehabilitation must be carried out in accordance with the Connecticut Bridge Inventory Preservation Plan (1991). Please contact OEP (X2926) for coordination.

☐ The project will effect a resource that is in the ☐ Quinebaug-Shetucket Heritage Corridor or ☐ The Upper Housatonic Valley Heritage Area. Please contact OEP (x2926) for coordination

Comments: **The scope of this project has changed from its original submission for review November 8, 2006 as project 310-xxx. The proposed platform on the north side of the tracks has been reduced in length. The SHPO letter dated 6/20/2007 included in the Environmental Review Request and stating the determination of No Effect under Section 106 should still be applicable.**

Name: Robert Cless

Extension: 2952

Attachments :

☐ Map ☐ Photograph ☐ Other

4. Water Resources and Permits

☒ Inland Wetlands or Watercourses ○ (IN) ● (NEARBY) the project area; an Inland Wetland Permit ● (MAY) ○ (WILL) be required from the DEP/IWRD and the ACOE. Please contact the DOT Office of Environmental Planning. ● Area should be field checked for Inland Wetlands and/or delineated.

☒ Tidal Wetlands or Coastal, Tidal or Navigable Waters ○ (IN) ● (NEARBY) the project area; a Tidal Wetlands or Structures and Dredging Permit ● (MAY) ○ (WILL) be required from the DEP/OLISP. Please contact the DOT Office of Environmental Planning. ● Area should be field checked for Coastal Wetlands and/or delineated.

☒ The project is located ● (WITHIN) ○ (ADJACENT TO) the Coastal Area Management (CAM) boundaries and ○ (MAY) ● (WILL) require a Coastal Consistency Review Form. Please contact the DOT Office of Environmental Planning, for assistance. ○ If Coastal Permits are sought, a separate CAM is not required

☒ A flood hazard area is located ● (AT) ○ (NEARBY) the project; a Flood Management Certification ○ (MAY) ● (WILL) be required from the DEP/IWRD if the drainage area to the site is greater than one square mile. Please contact the DOT Office of Environmental Planning. ○ Project may qualify as a Flood Management General Certification. Please contact the DOT Hydraulics and Drainage Unit x3234.

Flood Insurance Rate Panel Number: **09009C0464H / ZONE AE**

☐ Stream Channel Encroachment Lines (SCEL) have been established by DEP in this project area; a SCEL permit ○ (MAY) ○ (WILL) be required from the DEP/IWRD. Please contact the DOT Hydraulics and Drainage Unit x3234. SCEL Map Number:

Other water resource concerns:

○ a. Surface Supply Watershed, Name of Watershed:
○ b. Potential Water Company Lands, Name of Water Company:
○ c. Wells: ○ Community ○ Non-community ○ Aquifer Protection, See Comments:
○ d. Sole Source Aquifer: ○ Pootatuck (Newtown - Monroe), ○ Pawcatuck (Stonington & N. Stonington)
○ e. Wild and Scenic River: ○ Farmington River (East Branch), ○ Eightmile River
○ f. Aquifer Protection Area: ○ Level A (Final) ○ Level B (Preliminary)

Additional Site Information:

● a. Drainage Basin Number(s) : **5000**

○ b. Impaired Body of Water :

● c. Approximate Area - **N: 41.275** **E: -72.816**

Method of Determination: ○ GPS ● USGS - Quadrangle Map (# & name) : **96 Branford**

☒ For projects requiring state water resource permits, the Erosion and Sedimentation Control Plan (E&S) and hydraulic computations will be submitted to the DEP as part of the permit application. For projects, which do not require water resource permits the E&S plan must be submitted to the District Environmental Inspector.

☒ The DEP and/or ACOE permit applications will be prepared by ● Initiating Unit ○ Environmental Planning

☐ The Office of Environmental Planning has reviewed the information submitted for this project. It has been our experience that under normal circumstance projects of this magnitude would not negatively impact water resources. If you have any concerns, please contact the Office of Environmental Planning.

Comments :

5. Natural Resources

☐ Prime farmlands may be present. ◯ If area is within a DOT ROW, farmland status does not apply.

Threatened or Endangered Species:

☐ It has been determined that there are no threatened or endangered species in the project area. (This determination has **NOT** been sent to the DEP, Natural Resources Division.)

Map Reference Date

☒ There is an indication that there may be threatened or endangered species present in the area. (This determination has been sent to the DEP, Natural Resources Division, a copy of the letter is attached.)
Project is located ◉ (IN) ◯ (NEARBY) (UPSTREAM/DOWNSTREAM WITHIN A ½ MILE)
◉ See Attached Mapping

☐ The Office of Environmental Planning has reviewed the information submitted for this project. It has been our experience that under normal circumstance projects of this magnitude would not negatively impact natural resources. If you have any concerns, please contact the Office of Environmental Planning

Bridge Surface Preparation Containment Recommendations

This determination is a preliminary recommendation, using available mapping and aerial photos. The project engineer must determine if adjustment in the containment level and environmental controls are required or if further investigation is required.

☐ Level 1/Class 1 Containment, Area of Concern: **Level 1** - This is an enhanced containment system to be utilized in situations which warrant exceptional protection for environmental and social resources. Level 1 protection will be utilized for structures over, or in the immediate vicinity of, public water supply reservoirs (or their tributaries), schools, outdoor recreational areas, playgrounds, or other areas of concern.

☐ Level 2/Class 3 Containment, Area of Concern: **Level 2** - This is an enhanced containment system to be utilized in situations that warrant exceptional protection for environmental and social resources. Level 2 protection will be utilized for structures over, or in the immediate vicinity of wetlands (both tidal and inland), watercourses, and waterbodies (other than public supplies), critical habitats, populated areas, hospitals, and public buildings. Level 2 protection shall be used unless Level 1 protection is warranted.

6. Department Stormwater Policy

Named Watercourse Signage

Please see the Department Policy regarding the installation of signage for named watercourses which transverse the Department's roadways.

Does the following project require a sign for a watercourse? ◯ Yes ◉ No If yes, see below.

Bridge #	Town	Name of Waterbody	Scour Critical
			◯ Yes ◯ No If yes, see below
			◯ Yes ◯ No If yes, see below

If the noted bridge is scour critical, an elevation board is required. Please contact Bridge Safety

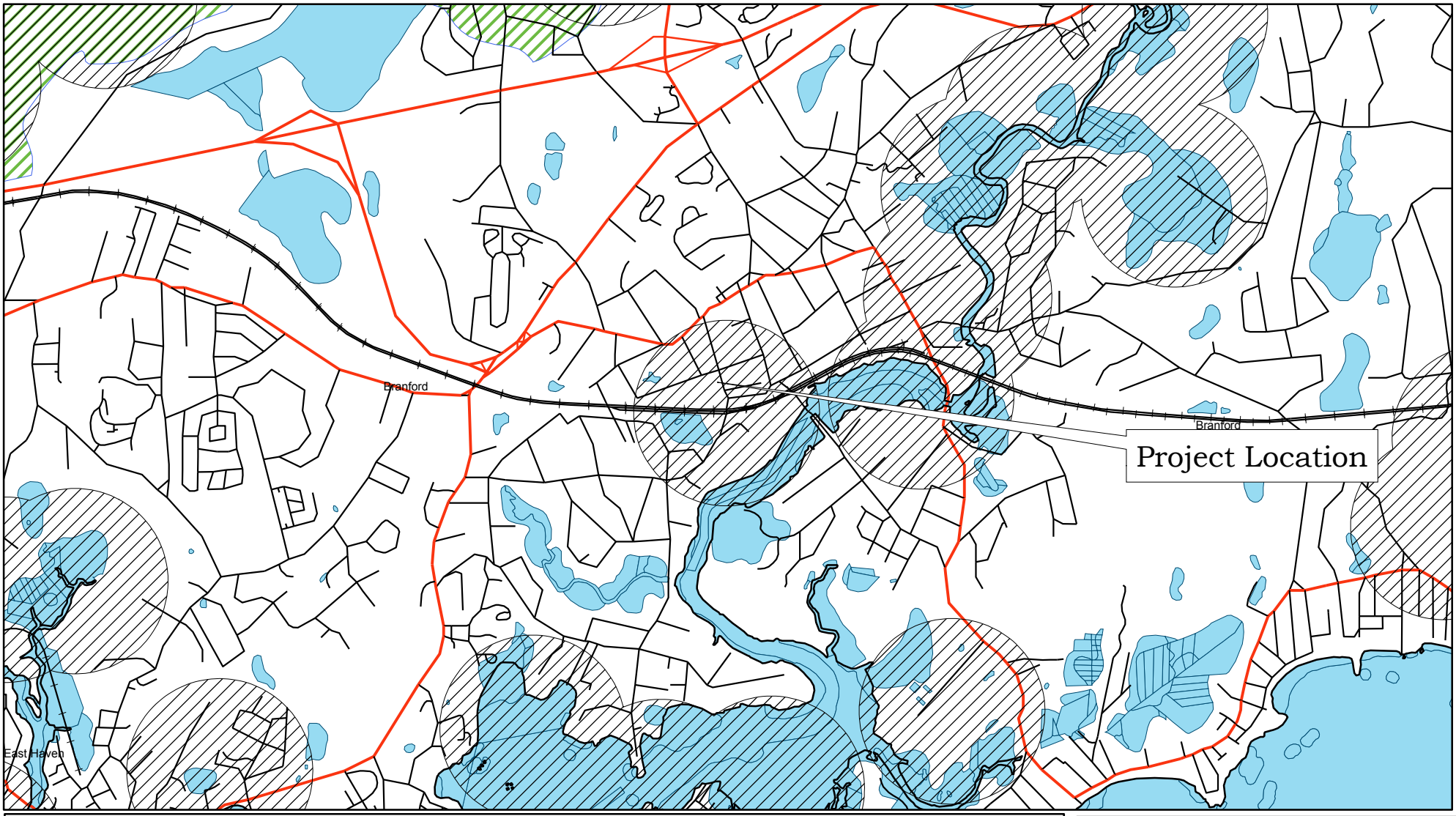
Stormwater Permit

☐ Does the project disturb > than 1 acre of land? ◯ Yes ◯ No ◉ Unknown If yes, Stormwater Permit needed.

Throughout the duration of a project design, the Project Engineer is responsible to request an update of Sections 4, 5 and 6 of this Environmental Review Form every three years.

Name: Christopher Samorajczyk

Extension: 2938



Map data maintained by the Connecticut Departments of Environmental Protection and Public Health. Map printed by the Connecticut Department of Transportation. NDDB layer revised June 2008

Environmental Resources: Scale 1:24,000

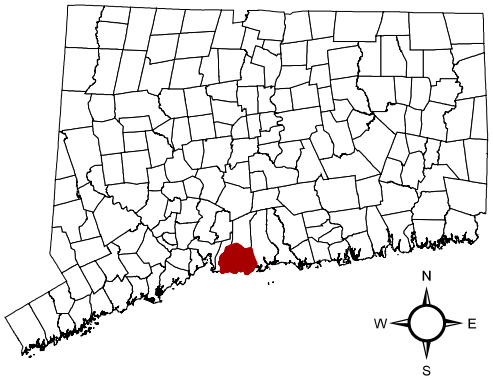
Project No. 310-56
Town of Branford

LEGEND

NATURAL_DIVERSITY_DATABASE

TOWNS

0.5 0 0.5 1 Miles



7. Air Quality

☐ An Indirect Source Review is not required.

☐ An Indirect Source Review is required. The Office of Environmental Planning will prepare the application.

☐ This project is included in the State/Regional Transportation Improvement Program which the FHWA has determined to be in conformance.

☒ Air Quality conformity determination is **not** required. This type of project has been determined to be exempt. If the project is Federally funded, please include the following paragraph in the Categorical Exclusion request letter to the FHWA:

"*This project is located within the boundaries of the portion of the state which has been classified as* attainment maintenance *for carbon monoxide (CO),*
as non-attainment *for PM 2.5 and non-attainment for Ozone*
and attainment maintenance *for PM 10. This project type has been determined to be exempt from the requirement that a conformity determination be made in accordance with the Final Rule on conformity*".

☐ Air Quality Conformity Determination is required. Contact the Office of Environmental Planning for Information (594-2944)

☐ Carbon Monoxide analysis may be required for this project. An intersection level of service (LOS) analysis is required to determine conformity. If the LOS for the build condition is D, E, or F, a carbon monoxide air quality assessment is required and will be prepared by the Office of Environmental Planning. Transmit the following information by memorandum to this Office:

1. Appropriate traffic (peak hour).
2. Proposed signalization showing:
    a. sequencing and timing
    b. lane arrangement (40ft. or Metric equivalent Scale)

Other:

☐ Please insert the following paragraph in the Categorical Exclusion request letter to FHWA:

"This project is located within the boundaries of the portion of the state which has been classified as non-attainment for PM 2.5 and attainment maintenance for PM 10 and a project level conformity determination is required. However, this project is not of the type listed in 40 CFR 93.123 (b)(1) as an air quality concern. Therefore, Clean Air Act and 40 CFR 93.116 requirements are met without an explicit PM 2.5/PM 10 hotspot analysis."

☐ The project is located in an area that has been classified as non-attainment for PM 2.5 and/or attainment maintenance for PM 10, and a project level qualitative hotspot analysis is required to determine conformity. Please contact the Office of Environmental Planning

ENVIRONMENTAL REVIEW FORM

Project No: 310-xxx

Town/City: Branford

☒ This project is exempt from an analysis or discussion of Mobile Source Air Toxics (MSAT) effects for one or both of the following reasons, in accordance with FHWA Interim Guidance Memorandum dated February 3, 2006 (http://www.fhwa.dot.gov/environment/airtoxic/020306guidmem.htm):

○ Project is categorically excluded under 23 CFR 771.117(c); and/or

◉ Project is exempt under the Clean Air Act pursuant to 40 CFR 93.126

☐ This project has no meaningful potential Mobile Source Air Toxics (MSAT) effects. The following language must be included in the project record in order to satisfy FHWA's MSAT documentation requirements in accordance with FHWA Interim Guidance Memorandum dated September 30, 2009 (http://www.fhwa.dot.gov/environment/airtoxic/020306guidmem.htm):

"The purpose of this project is to (*insert major deficiency that the project is meant to address*)

By constructing (*insert major elements of the project*).

This project will not result in any meaningful changes in traffic volumes, vehicle mix, location of the existing facility, or any other factor that would cause an increase in emissions impacts relative to the no-build alternative. As such, FHWA has determined that this project will generate minimal air quality impacts for Clean Air Act criteria pollutants and has not been linked with any special MSAT concerns. Consequently, this effort is exempt from analysis for MSATs.

Moreover, EPA regulations for vehicle engines and fuels will cause overall MSATs to decline significantly over the next 20 years. Even after accounting for a 64 percent increase in VMT, FHWA predicts MSATs will decline in the range of 57 percent to 87 percent, from 2000 to 2020, based on regulations now in effect, even with a projected 64 percent increase in VMT. This will both reduce the background level of MSATs as well as the possibility of even minor MSAT emissions from this project."

☐ This project has potential MSAT effects and a MSAT qualitative or quantitative analysis is required. Please contact Environmental Planning for information (594-2944).

Name: James Kocaba

Extension: 2082

8. Noise

☐ No noise analysis required.

☐ A noise analysis is required.

Provide the following for a detailed highway traffic noise analysis:

Plans to include 5 foot contours
Spot elevations
Buildings out to five hundred feet
Connecticut grid markers (northing and easting)
Roadway Profiles
Cross Sections to include ground elevations out to buildings as shown on plans

Provide the following for a detailed transit noise analysis:

Fixed Guideway :

source / type
average number of locomotives per train
average number of cars per train
average throttle setting of diesel-powered locomotives and DMU's
train speed in miles per hour
average hourly volume of train traffic, in trains per hour
average hourly volume of train traffic, in trains per hour (7am to 10 pm)
average hourly volume of train traffic, in trains per hour (10 pm to 7 am)

existing and proposed number of vehicles (hourly)
existing and proposed speeds for vehicles
average hourly volume of vehicle traffic, in vehicles per hour
average hourly volume of vehicle traffic, in vehicles per hour (7am to 10 pm)
average hourly volume of vehicle traffic, in vehicles per hour (10 pm to 7 am)

Contact the Office of Environmental Planning for further information at 594-2945.

☒ Other ***As proposed, the new station on new location would trigger a noise analysis for the project. This office will make a determination when preliminary design plans are available. After reviewing the 90 % design plans, it has been found that the project will not have a significant impact to the neighboring residences. March 3, 2011, Desmond Dickey, Transportation Planner II.***

Name: Desmond P. Dickey

Extension: 2945

9. Recommendations

☐ a. Federal/State or Federal/Local Funds. The Office of Environmental Planning recommends that this activity be classified a **CATEGORICAL EXCLUSION**. This recommendation does not preclude the need for a Coastal Area Management Consistency Statement, environmental permits, Section 4(f) Statements, Section 106 processing or other environmental coordination. IF THE PROJECT IS FEDERAL HIGHWAY ADMINISTRATION FUNDED AND/OR FEDERAL TRANSIT ADMINISTRATION, A CATEGORICAL EXCLUSION DETERMINATION TO THAT EFFECT MUST BE SUBMITTED BY YOUR OFFICE TO THE FHWA/FTA FOR APPROVAL OF THE EXCLUSION WITH THIS FORM ATTACHED. No significant environmental impacts are foreseen resulting from the activity(s). No further analysis is required under CEPA.

☐ b. Federal/State or Federal/Local Funds. The Office of Environmental Planning recommends a **FEDERAL ENVIRONMENTAL ASSESSMENT/STATE ENVIRONMENTAL IMPACT EVALUATION** be prepared Contact this Office for scheduling.

☐ c. Federal/State or Federal/Local Funds. The Office of Environmental Planning recommends a **FEDERAL ENVIRONMENTAL IMPACT STATEMENT/STATE ENVIRONMENTAL IMPACT EVALUATION** be prepared. Contact this Office for scheduling.

10. Recommendations

☒ a. State Funds. The Office of Environmental Planning feels this activity does not require an Environmental Impact Evaluation as no significant environmental impacts are foreseen resulting from the activity(s). No further analysis is required under CEPA. This recommendation does not preclude the need for environmental permits or other environmental coordination

☐ b. State Funds. The Office of Environmental Planning recommends that the Environmental Concerns noted, plus any others that may arise, be investigated through the preparation of an **ENVIRONMENTAL IMPACT EVALUATION**. Contact this Office for scheduling.

11. Recommendations

☐ Further analysis is needed to establish in which category this activity falls. The Office of Environmental Planning recommends that further information based upon your investigation of Environmental Concerns No. 1-7 be developed, and that your office subsequently contact the Office of Environmental Planning so that a determination can be made.

12. Recommendations

☐ This project does not meet the definition of a major metropolitan transportation investment, as defined in 23 CFR Part 450.104, and does not require a Major Investment Study.

13. Comments: A CT EIE was previously prepared and approved by OPM on 4-20-09 for this project.

Print Form

Reset Form

Name: Keith T. Hall

Extension: 2926

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

memorandum

subject: **ENVIRONMENTAL REVIEW REQUEST FORM**

Project No.: 310-56
Town/City: Branford
Bridge No.: N/A
Federal Project No. n/a

date: ***Jan 21, 2011***

to: Mr. Mark W. Alexander
Transportation Assistant Planning Director
Bureau of Policy and Planning

from: Theodore H. Nezames
Transportation Principal Engineer
Bureau of Engineering and Construction

Theodore H Nezames
2011.01.20 17:13:52 -05'00'

Please review the information below to determine what, if any, environmental, socioeconomic, or cultural documentation and mitigation will be required for this project.

1. The following items are attached:

- (●) **Detailed** Project Description (project number, location, scope) [required]
- (●) Site Location Map [required]
- ( ) Purpose and Need Statement [preferred]
- ( ) Aerial Photograph with the project limits delineated [preferred]
- ( ) Photographs showing project features and context
- ( ) Concept/Sketch Plans Location on server: _____
- (●) Preliminary Design Plans (with proposed project and slope limits, existing and proposed right-of-way (ROW) lines and edges of pavement, existing and proposed drainage features, delineated (or potential) wetlands, State Plane North American Datum - 1983 coordinates of project limits and major features) [as available]
  Location on server: <\\SH3DGS18\CTDOT_Projects\Z_V8_CTDOT_NON_PROJECTS\Facilities\SLE\Branford 90%>

2. The Department of Transportation Project Contact/Ext/Room:

Keith A. Hall, ext 3301 or Bruce Olmstead, ext 3186 both of Facilities Design Unit

3. This Environmental Review Request is as follows:

- ( ) **Original**
- (●) **Resubmittal** *The originating office will advise the Office of Environmental Planning and resubmit the Environmental Review Request if a change in the project scope and/or conditions (e.g., project or slope limits, taking lines, other) causes any of the responses, herein, to change or if three years has passed.*

Original Submittal Date: Nov 8, 2006

Previous/Temporary Project No.(if any): 310-xxx

(●) From the time the original ER recommendation was issued, changes made in the project scope and/or conditions (e.g., project or slope limits, taking lines, other) are as follows:
The platform length in previous ER was stated as 365 feet. The project as constructed and permitted by DEP had only a 200 foot long platform on the south side of the tracks. This expansion project will add the pedestrian bridge as before but will only include a 200 foot long north platform.

(●) Supplemental data, as requested by the Office of Environmental Planning in the original ER Recommendation dated Nov 8, 2006 : is as follows:

A CT EIE was prepared for this project as recommended. OPM signed off on CEPA approval 4-20-09. See file attachment

4. Project Facts:

The proposed project is at the following stage :

○ concept ○ less than 30% PD ◉ 30% PD or greater

○ other: _____

Yes	No	Unknown	
○	◉	○	Project is located in multiple towns.
○	◉	○	May cause public controversy relative to political, social, economic, environmental, and/or cultural factors or resources to the extent the project scope and/or conditions may require modification

Yes	No	Unknown	**Cultural Resources**
○	◉	○	Abuts or is within the immediate environs of a town green
○	◉	○	Is within the ROW of, abuts, or is within the immediate environs or viewshed of the Merritt Parkway
○	◉	○	Abuts or is within the immediate environs of a park/recreation area
○	◉	○	Abuts or is within the immediate environs of a cemetery
◉	○	○	Requires a change in grade of earth or a paved surface
◉	○	○	Requires excavation, boring, or augering
○	◉	○	Requires removal of footings, drainage structures, utilities, other underground features
○	◉	○	Requires removal of tree stumps or stone walls
○	◉	○	Requires removal/relocation of a structure

Yes	No	Unknown	**Air and Noise**
○	◉	○	Requires rock ledge removal and/or slope flattening adjacent to residential areas.
○	◉	○	Requires interchange and/or ramp reconfiguration to include but not limited to location or number of lanes.
○	◉	○	Requires lengthening of exit and/or entrance ramp to include but not limited to speed change lanes.
○	◉	○	Requires significant removal of mature vegetation adjacent to residential areas.

Wetlands

○	●	○	Does the project involve a culvert or bridge?
○	○	○	If yes, is the tributary watershed to that structure ≥ 1 square mile? (640 acres)
●	○	○	Will the project involve full depth reconstruction / replacement of drainage systems?
●	○	○	Has there been any previous coordination with NDDB? If so, attach copy of correspondence.
○	●	○	Has there been any coordination with DEP Fisheries? If so, attach copy of correspondence.
○	●	○	Will the project involve stream bank stabilization or alteration ≥ 200 feet in length?

5. Funding: ☑ All State Funds ○ Federal/State Funds ○ Federal/Local Funds

○ Other : _____

6. Final Design Plan Date: Mar 9, 2011 Advertising Date May 18, 2011

7. Project included in Transportation Improvement Program (TIP):

○ Yes ● No ○ Pending: _____

8. Coordination with the Connecticut State Historic Preservation Officer has been initiated:

● Yes ○ No, because: _____

9. Railroad ROW to be acquired: Property will be leased from AMTRAK for platform and ped bridge air rights

● Yes (detailed in Project Description, Preliminary Design (PD) Plans, and below) ○ No

10. Highway ROW to be acquired:

○ Yes (see Project Description, PD Plans, and below)

○ Yes (actual type and number to be determined; estimates are shown below)

● No

○ Unknown at this time

	Total Takings	Partial Takings	Easement (slope or drainage)	Describe
No. of residential parcels			1	Right to drain acquired
(# of dwelling units)				
No. of business parcels				
(# of individual businesses				
Park and recreation land*				
Cemetery*				
Other			1	AMTRAK lease rights needed

Name* : _____

○ Public Agency : _____

○ Private Entity : _____

Additional ROW to be used on a temporary basis, e.g., construction, utility, or slope easement, maintenance and protection of traffic:

◉ No ○ Unknown ○ Yes, as follows

Project-related ROW acquired to date:

○ None ◉ As Follows :

Right to drain to abutting N/F property of Laird and Daszuta et al

11. Coordination with the Office of Environmental Compliance has been initiated via customary notification:

◉ Yes ○ No ○ Other : Have completed Task 210 with DTC and are presently working on Phase 3 products

Parcels with current or past land uses associated with hazardous and/or toxic materials will be affected by the project:

○ No ○ Unknown ◉ Yes, as follows : Material from Project 310-47 project is stockpiled on north side property with DEP approval

12. Bridge:

Name / Number :

Owned By : ○ Department ○ Other

Crosses : Define :

Steel surface preparation will be required: ○ Yes ◉ No

○ See attached list of multiple bridge maintenance projects

13. Public Outreach has begun:

○ No, because :

◉ Yes, as follows:

The project has been presented and/or made available to the following :

	YES	NO	DATE
Town / City Officials	✓	○	Jan 21, 2011
General Public	✓	○	Aug 7, 2008
CTDEP	✓	○	Aug 19, 2008

Other Date :

cc: Scott A. Hill - Theodore H. Nezames
Mark D. Neri - Jayantha Mather - Yure Kuljis

Reset Form | Print Form | Send via E-mail

STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OFFICE OF LONG ISLAND SOUND PROGRAMS

TO: Edgar T. Hurle, Director of Environmental Planning
DOT Transportation, Policy and Planning

FROM: John Gaucher, Environmental Analyst II
DEP Office of Long Island Sound Programs

DATE: August 14, 2001

RE: **State Project No. 310-0019, Branford Railroad Station**
Shore Line East Railroad
Branford, CT

FROM THE DESK OF
BRADLEY J. SMITH

AUG 23 2001

	FYI	PLS DO	PLS SEE ME
HIGHWAYS			
FACILITIES			
BRIDGES			

Thank you for coordinating with this office in the review of the above-referenced project to construct a new railroad station and associated parking in Branford. As you know, pursuant to Section 22a-100 of the Connecticut General Statutes, any actions proposed by DOT within the coastal boundary which may significantly affect the environment must be fully consistent with the policies and standards of the Connecticut Coastal Management Act (CCMA).

We received a coastal management consistency worksheet and associated plans and materials from your office on March 26, 2001. We have also received more detailed plans and runoff calculations on July 2, 2001. We were concerned that the site disturbance, grading, and post development stormwater runoff would adversely impact the tidal wetlands on the site. As such, we requested that your staff consider an alternative parking layout to include angled parking in the northernmost parking isle to reduce the footprint of the parking area to provide a wider buffer between the parking lot and the tidal wetlands located to the west of the proposed station.

The analysis you provided shows that the buffer could be increased by 10' as a result of implementing angled parking. Conversely, the number of available parking spaces would be reduced by 8% or 16 spaces. However, the proposed limit of disturbance adjacent to the tidal wetlands in question can be reduced by approximately 10' if a retaining wall, as discussed with John Bernick of your staff, were placed along the tidal wetlands with proper sedimentation and erosion controls in place. The retaining wall would need to begin at the north edge of the handicapped spaces and extend along the pavement down to the beginning of the rolled gravel bank as shown on the attached plan. To reduce post-construction disturbance of the buffer and potential erosion of the bank, we agree that enhancing the area with appropriate vegetation will provide more effective protection of the wetlands over maintained grass on a steeper slope. However, please note that Rosa rugosa, which was proposed to be planted in the area in question,

is a non-native and potentially invasive species. Please utilize native species in this area in lieu of Rosa rugosa. We have included a list of invasive and potentially invasive species and a native tree and shrub availability list for your reference.

Another concern has been the potential impact to tidal wetlands from parking lot runoff. Even relatively clean runoff of fresh water into tidal wetlands can cause adverse impacts. Through the implementation of stormwater best management practices such as the rolled gravel bank, the grass-lined swale, the use of parking islands as areas of infiltration, and a thickly vegetated buffer between tidal wetlands and the parking lot, it appears that potential adverse impacts to tidal wetlands will be sufficiently mitigated.

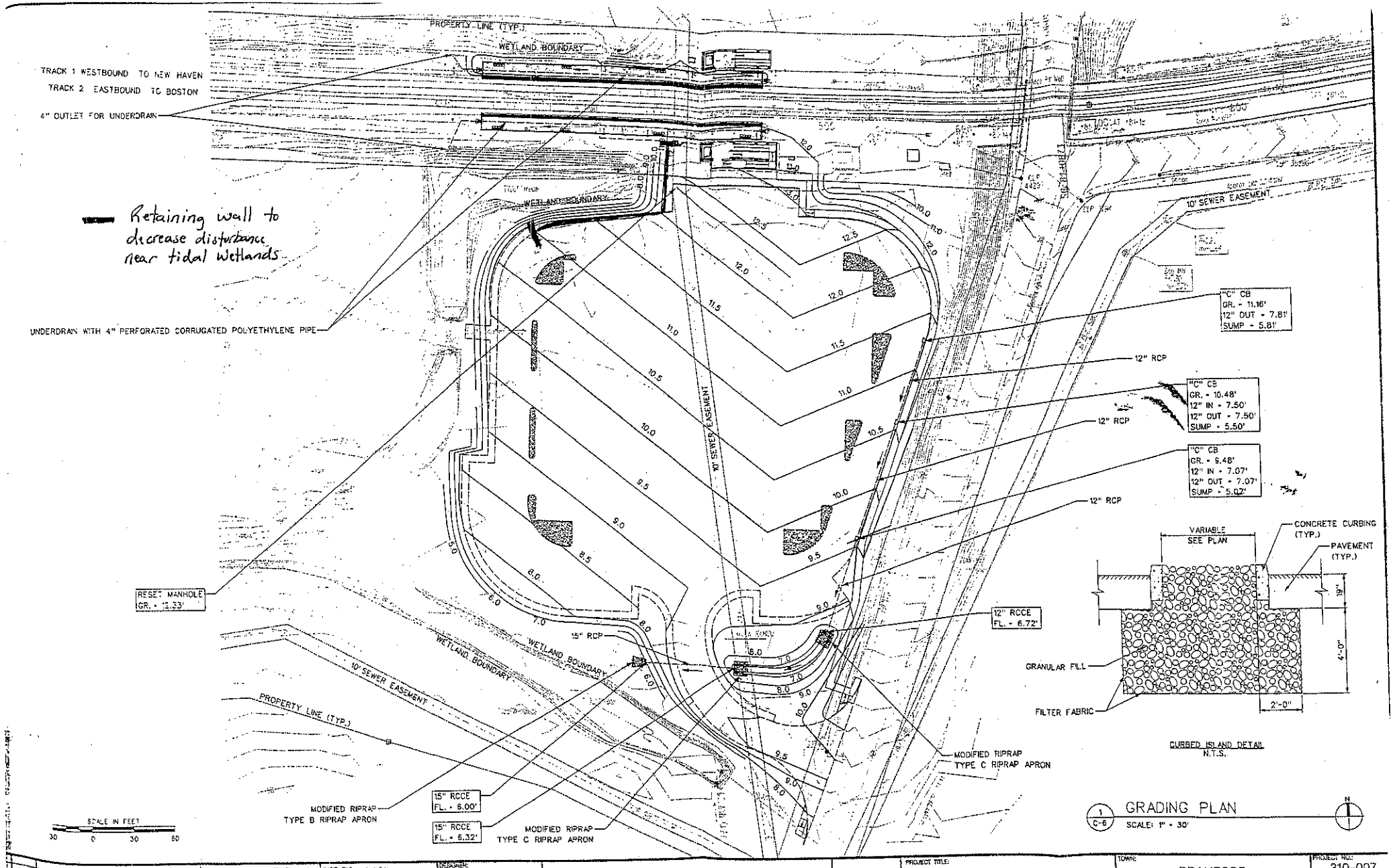
Based on our review of the information provided and a site inspection conducted on July 24, 2001, we have determined that the project, with the following modifications and conditions, is consistent with the policies and standards of the CCMA.

1) All parking lot islands, through the inclusion of curb breaks, are used for stormwater retention.
2) A retaining wall shall be placed at the top of the slope adjacent to the tidal wetlands on the northwest portion of the parcel as shown on the attached site plan.
3) Appropriate soil erosion and sedimentation controls shall be in place prior to site improvements and continuously maintained until vegetation has been established on disturbed areas.
4) The tidal wetland buffer between the above-noted retaining wall and the tidal wetland should be landscaped using native, non-invasive species.

At your convenience, please provide updated plans showing the retaining wall, elimination of site grading, and new landscaping.

If you have any questions regarding this memo or any conditions of this approval, please contact me at 860-424-3034.

cc: John Bernick, DOT Environmental Planning / with attachments


PROPERTY LINE (TYP.)
WETLAND BOUNDARY
TRACK 1 WESTBOUND TO NEW HAVEN
TRACK 2 EASTBOUND TO BOSTON
4" OUTLET FOR UNDERDRAIN
Retaining wall to decrease disturbance near tidal wetlands
UNDERDRAIN WITH 4" PERFORATED CORRUGATED POLYETHYLENE PIPE
10' SEWER EASEMENT
"C" CB
GR. = 11.16'
12" OUT = 7.81'
SUMP = 5.81'
12" RCP
"C" CB
GR. = 10.48'
12" IN = 7.50'
12" OUT = 7.50'
SUMP = 5.50'
12" RCP
"C" CB
GR. = 9.48'
12" IN = 7.07'
12" OUT = 7.07'
SUMP = 5.07'
12" RCP
RESET MANHOLE
GR. = 12.33'
12" RCCE
FL. = 6.72'
15" RCP
MODIFIED RIPRAP
TYPE C RIPRAP APRON
MODIFIED RIPRAP
TYPE B RIPRAP APRON
15" RCCE
FL. = 6.00'
15" RCCE
FL. = 6.32'
MODIFIED RIPRAP
TYPE C RIPRAP APRON
SCALE IN FEET
30 0 30 60
VARIABLE
SEE PLAN
CONCRETE CURBING (TYP.)
PAVEMENT (TYP.)
19"
4'-0"
2'-0"
GRANULAR FILL
FILTER FABRIC
CURBED ISLAND DETAIL
N.T.S.
1
C-6
GRADING PLAN
SCALE: 1" = 30'
N
THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK, SHOWN ON THESE SHEETS IS BASED
CADD FILE: tr_c-6.dgn
PLOTTED DATE: 27 March 2001
DESIGNER: D. L. WARREN
DRAFTER:
CONNECTICUT
PROJECT TITLE:
DEPARTMENT OF TRANSPORTATION
SHORE LINE EAST
TOWN:
BRANFORD
PROJECT NO.:
310-007
DRAWING NO.:
C-6

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

memorandum

COM-09A REV. 2/91 Printer on Recycled or Reclaimed Paper

subject: Environmental Review
Project No: 310-xxx
Bridge No:
Town: Branford

date: November 8, 2006

to
Scott A. Hill
Transportation Principal Engineer
Bureau of Engineering and Highway Operations

from for Edgar T. Hurle
Director of Environmental Planning
Bureau of Policy and Planning

ext.

The Office of Environmental Planning has reviewed the subject activity and notes the following environmental concerns and makes certain recommendations:

1. Socio-Economic

☒ Investigate displacement of families, businesses.

☐ Investigate potential impacts to minorities, local institutions, emergency services, and neighborhoods.

☐ No apparent conflict with or impact to socio-economic resources.

Other _____

2. Historical and Archaeological Resources

☐ Contact the State Historic Preservation Officer regarding potential archaeological and historic resource impacts.

☐ Possible Section 4(f) Statement and/or Section 106 processing required. Contact this Office at 594-2926.

☐ A bridge on the project has been identified as listed on or eligible for the National Register of Historic Places in the Connecticut's Historic Bridge inventory. Rehabilitation must be carried out in accordance with the Connecticut Bridge Inventory Preservation Plan (1991).

RSC 11/09/06

Other To be determined by the Office of Environmental Planning in coordination with the SHPO

3. Parks/Wildlife Refuges/Scenic Roads/Bikeways

☐ Investigate whether publicly owned parks, recreation areas and/or wildlife and waterfowl refuges are to be affected.

☐ This road has been/is in the process of being designated as a Scenic road under P.A. 87-280. Contact the Scenic Roads Committee Chairman, for further information.

☐ There may be a conflict and/or impact to a State Bikeway. Contact the Office of Intermodal Planning, Bikeway/Pedestrian Coordinator.

☒ No apparent conflict/impact on Parks, Scenic Roads and/or Bikeways.

Other _____

FROM THE DESK OF
SCOTT A. HILL

FEB 08 2007

	F.Y.I.	PLS. DO	PLS. SEE ME
K. HALL			
R. MESSINA			
T. NILZAMES			
J. WALESZCZYK			

Revised November 2002

ENVIRONMENTAL REVIEW FORM
Project No.: 310-xxx
Town: Branford

4. **Water Resources and Permits**

N.A. ☐ Inland Wetlands or Watercourses ☐ (IN) ☐ (NEARBY) the project area; an Inland Wetland Permit ☐ (MAY) ☐ (WILL) be required from the DEP/IWRD and the ACOE. Please contact the DOT Office of Environmental Planning. ☐ Area should be field checked for Inland Wetlands and/or delineated.

☒ Tidal Wetlands or Coastal, Tidal or Navigable Waters ☒ (IN) ☐ (NEARBY) the project area; a Tidal Wetlands or Structures and Dredging Permit ☒ (MAY) ☐ (WILL) be required from the DEP/OLISP. Please contact the DOT Office of Environmental Planning. ☒ Area should be field checked for Coastal Wetlands and/or delineated.
* Please Note: This area was delineated for previous work at the Station, however, additional delineation may be necessary as a result of the project expansion and/or to update the original flagging.

☒ The project is located ☒ (WITHIN) ☐ (ADJACENT TO) the Coastal Area Management (CAM) boundaries and ☐ (MAY) ☒ (WILL) require a Coastal Consistency Review Form. Please contact the DOT Office of Environmental Planning, for assistance. ☒ If Coastal Permits are sought, a separate CAM is not required.

☒ A flood hazard area is located ☒ (AT) ☐ (NEARBY) the project; a Flood Management Certification ☐ (MAY) ☒ (WILL) be required from the DEP/IWRD if the drainage area to the site is greater than one square mile. Please contact the DOT Office of Environmental Planning. ☐ Project qualifies as a Flood Management General Certification. Please contact the DOT Hydraulics and Drainage Unit x3234.
Flood Insurance Rate Panel Number: 0900730003D, dated 6/16/1992

N.A. ☐ Stream Channel Encroachment Lines (SCEL) have been established by DEP in this project area; a SCEL permit ☐ (MAY) ☐ (WILL) be required from the DEP/IWRD. Please contact the DOT Hydraulics and Drainage Unit x3234.
SCEL Map Number:

Other water resource concerns:

N.A.

☐ a. Surface Supply Watershed, Name of Watershed:
☐ b. Potential Water Company Lands, Name of Water Company:
☐ c. Wells: ☐ Community ☐ Non-community ☐ Aquifer Protection, Comments:
☐ d. Sole Source Aquifer: ☐ Pootatuck (Newtown – Monroe), ☐ Pawcatuck (Stonington & N. Stonington)
☐ e. Wild and Scenic River: ☐Farmington River (East Branch), ☐ Eightmile River
☐ f. Aquifer Protection Area: ☐ Level A (Final) ☐ Level B (Preliminary)

Additional Site Information:

☒ a. Drainage Basin Number(s): 5000
☐ b. Impaired waterbody.
☒ c. Approximate Area – Latitude 41.27 Longitude -72.82
Method of Determination: ☐ GPS ☒ USGS – Quadrangle Map (# & name): 96, Branford Quad

☒ For projects requiring state water resource permits, the Erosion and Sedimentation Control Plan (E&S) and hydraulic computations will be submitted to the DEP as part of the permit application. For projects, which do not require water resource permits the E&S plan must be submitted to the District Environmental Inspector.

☒ The DEP and/or ACOE permit applications will be prepared by ☒ Initiating Unit ☐ Environmental Planning

☐ The Office of Environmental Planning has reviewed the information submitted for this project. It has been our experience that under normal circumstance projects of this magnitude would not negatively impact water resources. If you have any concerns, please contact the Office of Environmental Planning.

Comments:

ENVIRONMENTAL REVIEW FORM
Project No.: 310-xxx
Town: Branford

5. Natural Resources

N.A. ☐ Prime farmlands may be present. ☐ If area is within a DOT ROW, farmland status does not apply.

Threatened or Endangered Species:

☐ It has been determined that there are no threatened or endangered species in the project area. (This determination has **NOT** been sent to the DEP, Natural Resources Division.)

☒ There is an indication that there may be threatened or endangered species present in the area. (This determination has been sent to the DEP, Natural Resources Division, a copy of the letter is attached.) Project is located ☒ (IN) ☐ (NEARBY) ☐ (UPSTREAM/DOWNSTREAM WITHIN A ½ MILE)

☐ The Office of Environmental Planning has reviewed the information submitted for this project. It has been our experience that under normal circumstance projects of this magnitude would not negatively impact natural resources. If you have any concerns, please contact the Office of Environmental Planning.

Bridge Surface Preparation Containment Recommendations

This determination is a preliminary recommendation, using available mapping and aerial photos. The project engineer must determine if adjustment in the containment level and environmental controls are required or if further investigation is required.

N.A.

☐ Level 1/Class 1 Containment, Area of Concern: **Level 1** – This is an enhanced containment system to be utilized in situations which warrant exceptional protection for environmental and social resources. Level 1 protection will be utilized for structures over, or in the immediate vicinity of, public water supply reservoirs (or their tributaries), schools, outdoor recreational areas, playgrounds, or other areas of concern.

☐ Level 2/Class 3 Containment, Area of Concern: **Level 2** – This is an enhanced containment system to be utilized in situations that warrant exceptional protection for environmental and social resources. Level 2 protection will be utilized for structures over, or in the immediate vicinity of wetlands (both tidal and inland), watercourses, and waterbodies (other than public supplies), critical habitats, populated areas, hospitals, and public buildings. Level 2 protection shall be used unless Level 1 protection is warranted.

6. Department Stormwater Policy – Named Watercourse Signage

It is Department Policy to install signs for named watercourses for bridges/culverts crossing under the state roadway system. Please see Department Policy for additional information or contact the Office of Environmental Planning.

Does the following project meet the criteria? ☐ Yes ☒ No. If yes, see below.

A sign must be provided for the following watercourse(s) located at bridge(s)/culvert(s):

Bridge #	Town	Name of Waterbody	Scour Critical
			☐ Yes ☐ No. If yes, see below
			☐ Yes ☐ No. If yes, see below
			☐ Yes ☐ No. If yes, see below
			☐ Yes ☐ No. If yes, see below
			☐ Yes ☐ No. If yes, see below

The noted bridge is scour critical. An elevation board is required. Please contact Bridge Safety.

INTERDEPARTMENTAL MESSAGE

STATE OF CONNECTICUT

To	NAME, TITLE Dawn M. Mckay Environmental Analyst	DATE January 23, 2007
	AGENCY, ADDRESS Department of Environmental Protection and Geographic Information Center 79 Elm Street, Hartford, Connecticut 06106	
From	NAME, TITLE Mark W. Alexander Transportation Supervising Planner	TELEPHONE 594-2931
	AGENCY, ADDRESS Department of Transportation, Office of Environmental Planning, PO Box 317546, 2800 Berlin Turnpike, Newington, Connecticut 06131-7546	

Subject: State and Federal Listed Species and Natural Communities Map

State/Federal Project No.: 310 - XXX

Location: Branford

Tittle/Description: Supplemental Rail Parking at Branford Shoreline East Railroad Station

Map Reference Date: December 2006

Upon review of the pertinent Department of Environmental Protection's Natural Diversity Database (NDDB) maps, it was determined by the Department of Transportation's Office of Environmental Planning office that one or more state or federally endangered, threatened, or species of special concern may be present at the above noted project site.

Please provide a final determined of the presence of endangered and/or threatened species at the subject project location. If you have any questions concerning the project specifications, please contact John E. Bernick at (860)-594-(3304).

The final determination may be addressed to the project engineer at the following location:

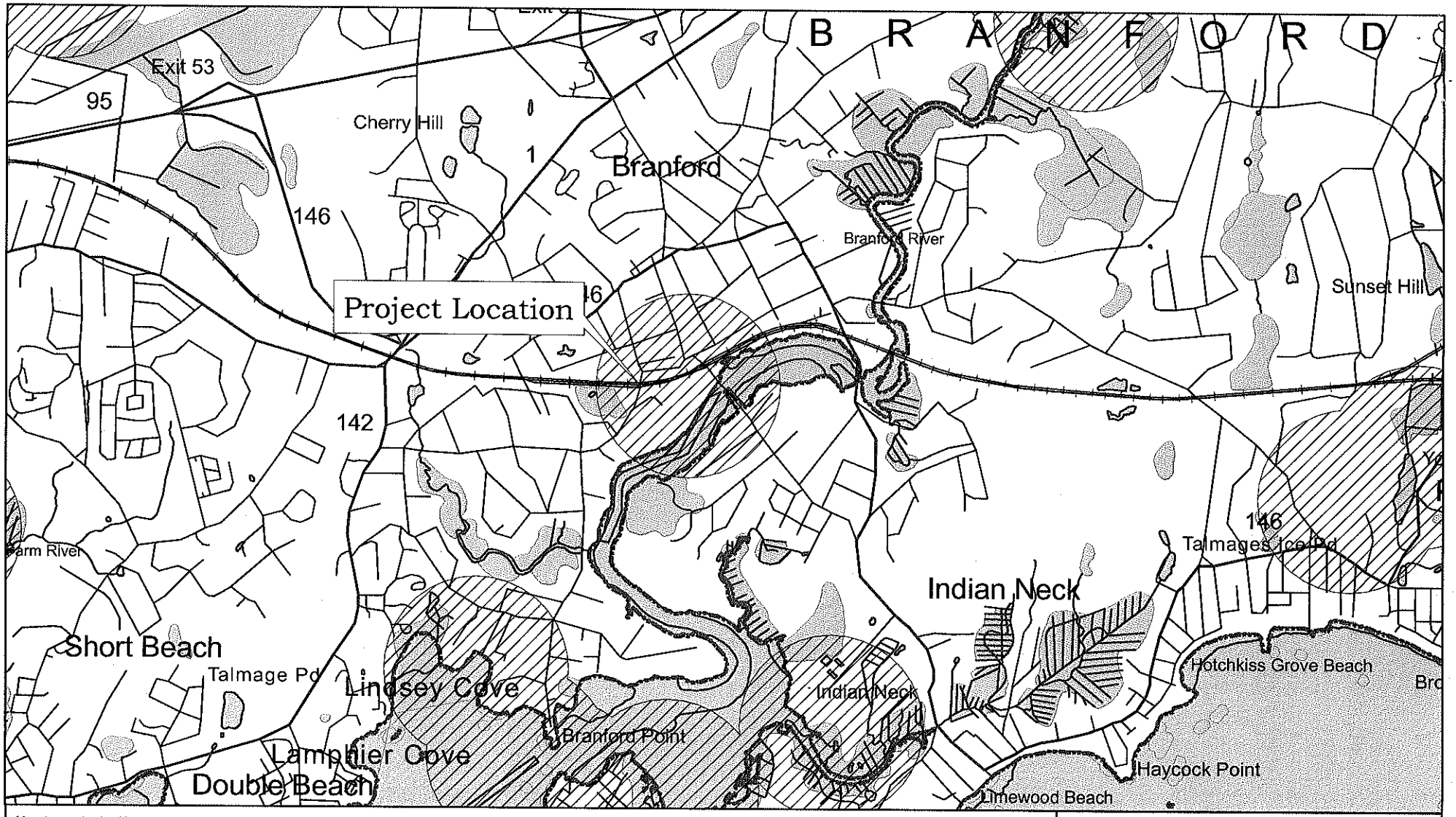
State of Connecticut, Department of Transportation
PO Box 317546, 2800 Berlin Turnpike
Newington, Connecticut 06131-7546
Attention: Scott A. Hill

Please provide a copy to my attention as well. If you have any further questions, please contact me at (860)-594-2931.

Cc: Edgar Hurle – Mark Alexander

Scott A. Hill John. E. Bernick

Revised October 2005



Map data maintained by the Connecticut Departments of Environmental Protection and Public Health. Map printed by the Connecticut Department of Transportation. NDDB layer revised December 2006

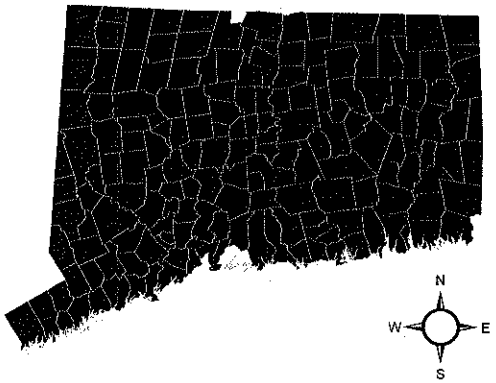
Environmental Resources: Scale 1:24,000

Project No. 310-xxx
Supplemental Rail Parking at
Branford Shoreline East Railroad Station
Town of Branford

LEGEND

Natural Diversity Database Area

0.5 0 0.5 1 Miles



Thomas H. Doyle

13 November, 2006

X-2944

7. Air Quality

☒ An Indirect Source Review is not required.

☐ An Indirect Source Review is required. The Office of Environmental Planning will prepare the application.

☐ This project is included in the State/Regional Transportation Improvement Program which the FHWA has determined to be in conformance.

☐ Air Quality conformity determination is **not** required. This type of project has been determined to be exempt. If the project is Federally funded, please include the following paragraph in the Categorical Exclusion request letter to the FHWA:

"*This project is located within the boundaries of the portion of the state which has been classified as _____ for carbon monoxide (CO), as _____ for PM 2.5 and _____ for PM 10. This project type has been determined to be exempt from the requirement that a conformity determination be made in accordance with the Final Rule on conformity*".

☒ Air quality Conformity Determination is required. Contact the Office of Environmental Planning for information (594-2944).

☒ Carbon Monoxide analysis may be required for this project. An intersection level of service (LOS) analysis is required to determine conformity. If the LOS for the build condition is D, E, or F, a carbon monoxide air quality assessment is required and will be prepared by the Office of Environmental Planning. Transmit the following information by memorandum to this Office:

1. Appropriate traffic (peak hour).
2. Proposed signalization showing:
   a. sequencing and timing
   b. lane arrangement (40ft. or Metric equivalent Scale)

☐ Please insert the following paragraph in the Categorical Exclusion request letter to FHWA:

"This project is located within the boundaries of the portion of the state which has been classified as non-attainment for PM 2.5 and attainment maintenance for PM 10 and a project level conformity determination is required. However, this project is not of the type listed in 40 CFR 93.123 (b)(1) as an air quality concern. Therefore, Clean Air Act and 40 CFR 93.116 requirements are met without an explicit PM 2.5/PM 10 hotspot analysis."

☐ The project is located in an area that has been classified as non-attainment for PM 2.5 and/or attainment maintenance for PM 10, and a project level qualitative hotspot analysis is required to determine conformity. Please contact the Office of Environmental Planning, for more information at 594-2944.

☐ Other _____

8. Noise

Desmond P. Dickey

11/13/2006 10:59 AM

☒ No noise analysis required.

☐ A noise analysis may be required. Contact the Office of Environmental Planning for information at 594-2945.

☐ Other _____

9. Recommendations

☐ a. Federal/State or Federal/Local Funds. The Office of Environmental Planning recommends that this activity be classified a **CATEGORICAL EXCLUSION**. This recommendation does not preclude the need for a Coastal Area Management Consistency Statement, environmental permits, Section 4(f) Statements, Section 106 processing or other environmental coordination. IF THE PROJECT IS FEDERAL HIGHWAY ADMINISTRATION FUNDED, A CATEGORICAL EXCLUSION DETERMINATION TO THAT EFFECT MUST BE SUBMITTED BY YOUR OFFICE TO THE FHWA APPROVAL OF THE EXCLUSION WITH THIS FORM ATTACHED. No significant environmental impacts are foreseen resulting from the activity(s). No further analysis is required under CEPA.

☐ b. Federal/State or Federal/Local Funds. The Office of Environmental Planning recommends a **FEDERAL ENVIRONMENTAL ASSESSMENT/STATE FINDING OF NO SIGNIFICANT IMPACT** be prepared. Contact this Office for scheduling.

☐ c. Federal/State or Federal/Local Funds. The Office of Environmental Planning recommends a **FEDERAL ENVIRONMENTAL IMPACT STATEMENT/STATE ENVIRONMENTAL IMPACT EVALUATION** be prepared. Contact this Office for scheduling.

10. Recommendations

☐ a. State Funds. The Office of Environmental Planning feels this activity does not require a State Finding of No Significant Impact or Environmental Impact Evaluation as no significant environmental impacts are foreseen resulting from the activity(s). No further analysis is required under CEPA. This recommendation does not preclude the need for environmental permits or other environmental coordination.

☒ b. State Funds. The Office of Environmental Planning recommends that an environmental assessment process be initiated during which the Environmental Concerns noted, plus any others that may arise, be investigated. The environmental assessment process must culminate in a **STATE FONSI OR ENVIRONMENTAL IMPACT EVALUATION**. Contact this Office for scheduling.

11. Recommendations

☐ Further analysis is needed to establish in which category this activity falls. The Office of Environmental Planning recommends that further information based upon your investigation of Environmental Concerns No. 1-7 be developed, and that your office subsequently contact the Office of Environmental Planning so that a determination can be made.

12. Recommendations

☐ This project does not meet the definition of a major metropolitan transportation investment, as defined in 23 CFR Part 450.104, and does not require a Major Investment Study.

13. Comments:

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

memorandum

subject: Project No. 310-xxx
Environmental Review Request
Branford Railroad Station
Shore Line East Railroad

date: October 30, 2006

to: Ms. Cynthia S. Holden
Assistant Dir. of Intermodal and
Environmental Planning
Bureau of Policy and Planning

from: Scott A. Hill
Trans. Principal Engineer
Bureau of Engineering and
Highway Operations

Please review the subject activity to determine what, if any, environmental documentation will be required for the referenced project. The activity involves:
✓ All State Funds ___X___ Federal/State Funds ____ Federal/Local Funds

I am submitting the following required information for your review:

1. Contact Person ___John E. Bernick___ Phone ___594-3304___

2. Detailed project description: This project will add surface parking for 250 vehicles on a lot adjacent to the current station. Also, at the existing south platform will be extended to 365 feet and a 365 foot long north side platform with a pedestrian bridge will be added. A property acquisition on the north side of the tracks will allow pick up and drop off along with approximately 20 parking spaces. The original Branford Station parking lot, now abandoned, will be brought back in to service and connected with the current station via stairways and crosswalks.

3. Project site location map (TRU or USGS base map required, PD plans, Design reports, etc. if applicable)

4. Advertising Date ___March 2008___

5. State Historic Preservation Office (SHPO) coordination has been initiated: No___ Yes_X_
If no, please forward a project description and location map to SHPO. Note the funding type (State/Federal) in the memo to SHPO.

6. Rights of Way will be acquired: _____ No___X___ Yes
Railroad Right of Way will be affected: ___No___X___ Yes
If yes to either, please submit a copy of the project description and location map to the Environmental Compliance Division, Bureau of Engineering and Highway Operations.

7. Surface preparation of structural steel on a bridge: X No___ Yes

8. Project is included in the State/Regional Transportation Improvement Program (TIP): X No ____Yes___Pending

KTH

9. Other Information: This request updates our previous request dated February 14, 2006 to include the additional scope associated with the improvements on the north side of the tracks and the inclusion of the original station parking lot.

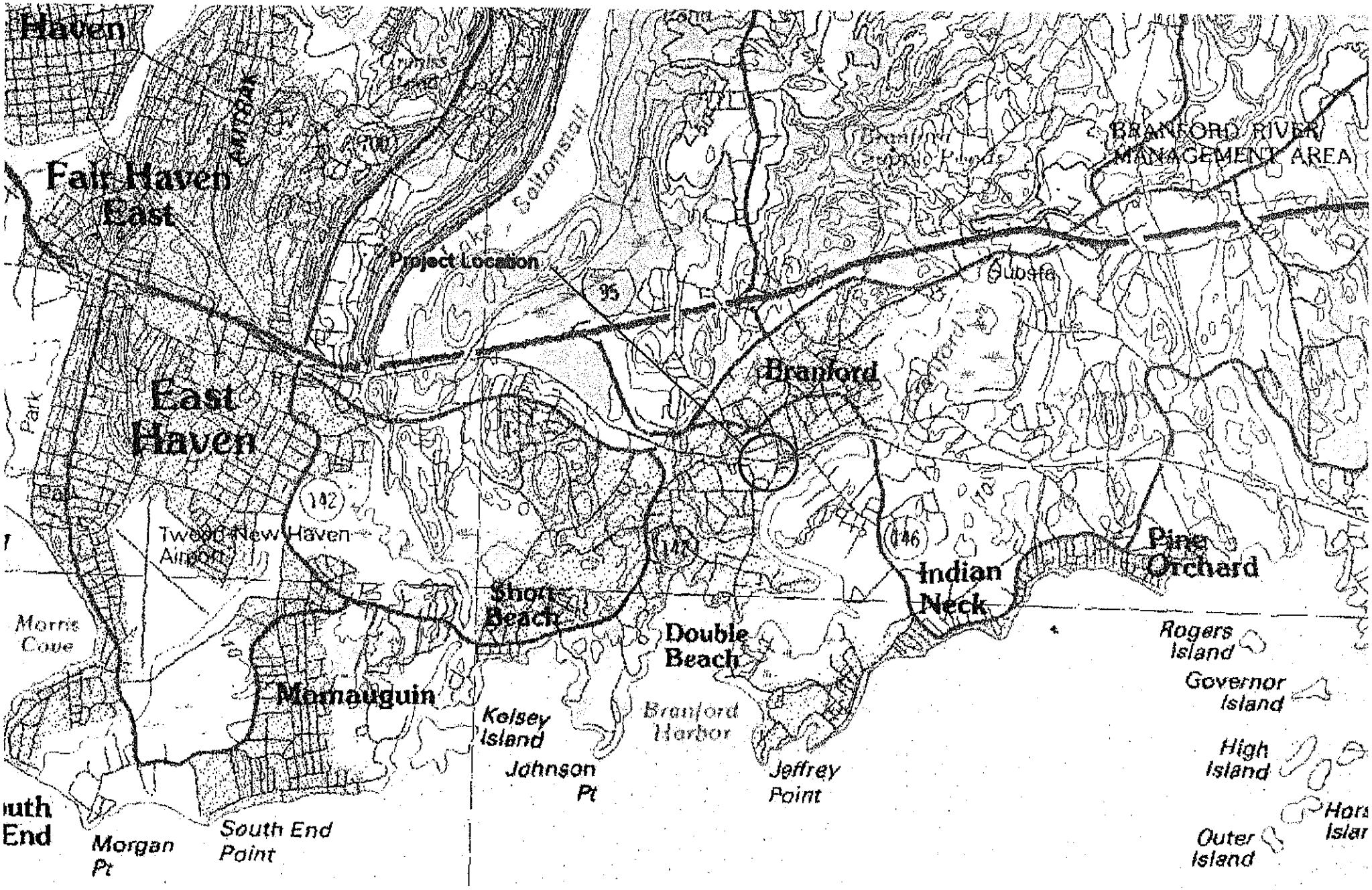
10. Has a Public Involvement Program been initiated? __X No___ Yes

11. Is this a resubmittal of a previous Environmental Review? __ No X Yes
If yes, please attach a description or mapping indicating the proposed changes.

Attachments

John E. Bernick\jeb\crj
cc: Mark D. Neri - Jayantha Mather
Manager of State Design - Scott A. Hill
f:\facility\310-xxx\Env Rev Branford.doc

North Side Platform
Pick-up & Drop-off


Haven
Fair Haven East
East Haven
Project Location
95
Branford
BRANFORD RIVER MANAGEMENT AREA
Tweed New Haven Airport
142
146
Short Beach
Double Beach
Indian Neck
Pine Orchard
Morris Cove
Momauguin
Kelsey Island
Branford Harbor
Johnson Pt
Jeffrey Point
Rogers Island
Governor Island
High Island
Outer Island
South End
Morgan Pt
South End Point

I. DECISION

The State of Connecticut Department of Transportation (ConnDOT) intends to implement the Proposed Action, which involves infrastructure improvements at the Branford Shoreline East (SLE) Railroad Station. The improvements will include:

- A new north-side high level rail platform located opposite the existing south-side high level rail platform
- A new pedestrian bridge over the active rail line that will connect the north-side and south-side platforms. The new pedestrian bridge will include elevators to satisfy the requirements of the Americans with Disabilities Act (ADA).
- A new 316-space surface parking lot located on an undeveloped parcel to the west of the existing 201-space surface parking lot. The new surface parking lot will be fully illuminated and include direct pedestrian connections (walkways and ramps) to the existing south-side high level rail platform. Access to the new parking lot will be obtained from the existing station entrance at the Maple Street/Indian Neck Avenue signalized intersection.
- A new kiss-and-ride drop off area located to the north of the existing rail corridor with direct pedestrian connections (walkways and ramps) to the station via the new north-side high level rail platform. The kiss-and-ride drop off area will be constructed subsequent to the north-side high level rail platform as the property will first be used as a staging area for platform construction.
- Re-use of the former rail station parking lot located north of the rail corridor along Meadow Street. The parking lot will be re-paved and re-striped to provide approximately 52 spaces that will function as overflow parking for the new station. New pedestrian connections from the overflow parking lot to the station will include walkways, stairwells, and a crosswalk at Kirkham Street.

This decision is based on the *Environmental Impact Evaluation* (EIE) (Fitzgerald & Halliday, Inc., December, 2008) that was prepared for the Proposed Action and the mitigation commitments it contains including those clarified or further detailed in the responses made to public or agency comments. Those comments were received during the August 7, 2008 public hearing and the public review and comment period held between July 8, 2008 and August 21, 2008. A copy of the EIE *Executive Summary* (July, 2008) is included as Appendix A of this Record of Decision. The responses to comments received are contained in Appendix E.

ConnDOT is in the process of making strategic infrastructure and service improvements to the Shore Line East (SLE) commuter rail service so that it will be fully capable of meeting future commuter rail passenger needs. The purpose of the Proposed Action relates directly to ConnDOT's ongoing commitment to expand commuter rail services in

keeping with Governor M. Jodi Rell's Transportation Initiative, which was passed by the Connecticut Legislature in 2005. The Proposed Action will provide infrastructure improvements to the existing Branford SLE Railroad Station, which opened in August 2005.

The need for the Proposed Action is two-fold:

1) There is an increasing customer service need as demonstrated by steadily increasing SLE ridership numbers. Connecticut's residents are utilizing the state rail service for in-state travel as well as for travel to and from New York City. This has been precipitated by:

   - Increased development pressures in coastal and southeastern Connecticut
   - Increased congestion on coastal roadway corridors including I-95 and U.S. Route 1
   - Rapidly fluctuating gas prices
   - An increasingly mobile workforce; and
   - Improved commuter rail infrastructure.

   The result is that existing parking facilities at SLE railroad stations can no longer meet the demand. ConnDOT's goal is to provide between 400 and 500 parking spaces at each SLE commuter rail station in order to accommodate future patrons. At the Branford Railroad Station, the 201-space parking lot that was constructed in 2005 is already at capacity, indicating an immediate need to provide additional parking at the station.

2) For commuters taking SLE, Governor Rell has announced improved service to and from New Haven and for reverse commuting to Old Saybrook in the near future. Improved service east of New Haven is an important component in reducing traffic congestion and improving mobility in southeastern Connecticut. To efficiently and effectively provide this enhanced service, there is the need to construct north-side high level rail platforms at each of the existing SLE stations, thereby making each station a full service dual-platform station. The need is driven by existing lease agreements between ConnDOT and Amtrak. Under current lease agreements, ConnDOT is obligated to construct high-level rail platforms on both sides of the rail corridor at each SLE station if it wants to provide commuter service outside the current rush hour periods. Thus, in order to meet Amtrak lease requirements and to provide bi-directional service, a new north-side high level rail platform at the Branford SLE Station and at other SLE stations is necessary if future expansion of SLE service is to succeed.

Two alternatives were assessed in this EIE; a Build Alternative and the No-Action Alternative. Because existing lease agreements between Amtrak and ConnDOT stipulate that future expansion of SLE service beyond the current peak periods cannot occur

without constructing dual high-level rail platforms at each SLE station, and because the parking lot at the existing Branford SLE Station is at capacity, the Build Alternative is the only alternative that will successfully meet the stated purpose and need for the Proposed Action.

In addition, given the existing rail station configuration, rail line constraints, and lease agreements between Amtrak and ConnDOT, the use of an alternative site is not prudent or feasible to meet the project purpose and need. Because rail is a fixed system, land available for the Proposed Action must be located immediately adjacent to the rail corridor and existing station in order to gain maximum benefit from the project and its intended use. As described above, the north-side high level rail platform must be located opposite the existing south-side platform in order for optimal functionality, and parking expansion options are limited to only those parcels within a short and safe walking distance of the station.

Project construction cost is anticipated to range from $20 to $25 million, with start of construction in January 2010. This cost represents a midpoint of construction (2010) dollars. The facility is scheduled to be open and operational by spring of 2011.

II. STATEMENT OF ENVIRONMENTAL IMPACT

The Proposed Action is essential for increasing the efficiency of operations at the SLE Railroad Station in Branford and is an important part of meeting future transportation demands in southeastern Connecticut. Potential adverse effects from the Proposed Action include:

- Minor visual impacts to adjacent land uses located north of the railroad tracks along Elm Street and Kirkham Street
- Loss of 5.38 acres of vacant undeveloped land that is currently under private ownership and which is designated as a coastal flood hazard area (100-year coastal floodplain). Some fill will be placed in the 100-year coastal floodplain that will result locally in a minor loss of flood storage capacity.
- Acquisition of a 0.65-acre private residential parcel that is partially within the coastal flood hazard area
- Approximately 0.02 acres (720 SF) will be impacted below the high tide line during the replacement of an existing undersized and partially clogged 12-inch RCP culvert with a new open bottom span or arch culvert. The new open bottom span or arch culvert will improve tidal exchange in adjacent tidal wetlands to the north
- Introduction of 2.88 acres (125,450 SF) of new paved surface which has the potential to affect water quality
- Construction-period impacts relative to noise, air quality, energy usage, and stormwater among others, and

- Potential for exposure of construction workers to subsurface contamination that exists on the 5.38 acre parcel that will be developed as a new 316-space surface parking lot.

These impacts will be mitigated through landscaping, proper management of materials and resources during and after construction, and by adhering to all applicable state, and federal regulations related to coastal resource protection, floodplain management, erosion and sedimentation control, and stormwater runoff/water quality treatment/management. Additionally, construction of the 316-space surface parking lot will be an important aspect of the Remedial Action Plan (RAP) that will be required for the project site. The lot will effectively cap and therefore isolate and limit the potential for exposure to and/or leaching of subsurface hazardous materials and contamination that has been identified on the 5.38 acre vacant parcel. A Health and Safety Plan will be developed and implemented in accordance with Occupational Safety and Health Administration (OSHA) guidelines to ensure that construction workers are protected from potential contamination and other hazards.

Coordination with resource agencies, including the Connecticut Department of Environmental Protection (CTDEP) and U.S. Army Corps of Engineers (ACOE), among others, will continue throughout the duration of the project to ensure that all regulatory requirements are met. Through its impact avoidance and mitigation measures, the Proposed Action will not incur any significant environmental, cultural, or social impacts.

III. SUMMARY OF CONSULTATION WITH AGENCIES AND OTHER PERSONS

Per Connecticut Environmental Policy Act (CEPA) requirements, a scoping notice for the Proposed Action was placed in Connecticut's Environmental Monitor on July 17, 2007. A Public Scoping Meeting was not conducted for this project as such a meeting was not requested by 25 or more individuals or by an association that represents 25 or more members during the 30 day scoping comment period. Only three resource agencies, the CTDEP, the Connecticut Commission on Culture and Tourism – Historic Preservation and Museum Division, and the Connecticut Department of Public Health (CTDPH) provided scoping comments during the 30 day comment period.

During data collection efforts involved in the documentation of existing environmental conditions, several federal and state resource agencies were contacted for information as were local officials in the Town of Branford. A copy of the CEPA public scoping notice as well as responses received during the formal public scoping period (July 17, 2007 through August 17, 2007) are included in Appendix B. Important agency and local correspondence is also included in Appendix B.

The Draft EIE was made available for public review and comment from July 8, 2008 to August 21, 2008. Notice of Draft EIE availability and public hearing was placed in Connecticut's *Environmental Monitor* on July 8, 2008. Additionally, notice of Draft EIE availability and public hearing was advertised in the New Haven Register on July 8, July 22, and August 5, 2008. Notices and Affidavits are included in Appendix C. The Draft EIE was made available for public review at the following locations:

- Connecticut Department of Transportation Offices in Newington, Connecticut
- Branford Town Clerk's Office
- James Blackstone Memorial Library in Branford, Connecticut
- South Central Regional Council of Governments Office in North Haven, Connecticut

A public hearing was advertised and held at the James Blackstone Memorial Library in Branford at 7:00 PM on August 7, 2008. A transcript of the public hearing is included in Appendix D. Written comments received during the public comment period (July 8, 2008 through August 21, 2008) are included in Appendix E. Responses to these comments, as well as comments made during the public hearing are provided in Appendix F.

STATE OF CONNECTICUT

OFFICE OF POLICY AND MANAGEMENT

OFFICE OF THE SECRETARY

TO: Edgar T. Hurle, Transportation Planning Director
DOT – Bureau of Policy and Planning

FROM: Robert L. Genuario, Secretary
Office of Policy and Management

DATE: April 20, 2009

SUBJECT: Environmental Impact Evaluation for enhancement of the Branford Shoreline East Railroad Station

---

Based on a review of the subject environmental impact evaluation and related documentation conducted pursuant to C.G.S. 22a-1e, I am herewith advising you of my finding that this evaluation satisfies the requirements of the Connecticut Environmental Policy Act.

cc: John Bacewicz, OPM
Keith Hall, DOT

RECEIVED

APR 22 2009

ENVIRONMENTAL PLANNING DIVISION

Phone: (860) 418-6500 Fax: (860) 418-6487
450 Capitol Avenue-MS# 55SEC Hartford, Connecticut 06106-1379

Connecticut Commission on Culture & Tourism

Historic Preservation & Museum Division

59 South Prospect Street
Hartford, Connecticut
06106

(v) 860.566.3005
(f) 860.566.5078

FROM THE DESK OF
CYNTHIA S. HOLDEN

JUN 2 6 2007

	F.Y.I.	PLS. DO	PLS. SEE ME
KEITH T. HALL			
MARK W. ALEXANDER			
PAUL N. CORRENTE			
STEPHEN V. DELPAPA			

June 20, 2007

Ms. Cynthia S. Holden
Environmental Planning
ConnDOT
2800 Berlin Turnpike
Newington, CT

Subject: Branford Shore Island East Railroad Station Improvements
Meadow Street and Kirkham Street
Branford, CT
ConnDOT #310-xxx

Dear Ms. Holden:

The State Historic Preservation Office has reviewed the above-named project. This office expects that the proposed undertaking will have no effect on historic, architectural, or archaeological resources listed on or eligible for the National Register of Historic Places.

This office appreciates the opportunity to have reviewed and commented upon the proposed undertaking.

This comment is provided in accordance with the National Historic Preservation Act and the Connecticut Environmental Policy Act.

For further information, please contact Dr. David A. Poirier, Staff Archaeologist.

Sincerely,

Karen Senich
Deputy State Historic Preservation Officer

An Affirmative Action
Equal Opportunity Employer

STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION

February 27, 2007

Scott Hill
CT DOT-Office of Environmental Planning
P.O. Box 317546
2800 Berlin Turnpike
Newington, CT 06131

Re: Supplemental Rail Parking at Branford
Shoreline East Railroad Station

Dear Mr. Hill:

I have reviewed Natural Diversity Data Base maps and files regarding the area delineated on the map you provided and listed above. According to our information, there are no known extant populations of Federal or State Endangered, Threatened or Special Concern Species at the site in question.

Natural Diversity Data Base information includes all information regarding critical biologic resources available to us at the time of the request. This information is a compilation of data collected over the years by the Environmental and Geographic Information Center's Geological and Natural History Survey and cooperating units of DEP, private conservation groups and the scientific community. This information is not necessarily the result of comprehensive or site-specific field investigations. Consultations with the Data Base should not be substituted for on-site surveys required for environmental assessments. Current research projects and new contributors continue to identify additional populations of species and locations of habitats of concern, as well as, enhance existing data. Such new information is incorporated into the Data Base as it becomes available.

Please contact me if you have further questions regarding this information (424-3585). Thank you for consulting the Natural Diversity Data Base. Also be advised that this is a preliminary review and not a final determination. A more detailed review may be conducted as part of any subsequent environmental permit applications submitted to DEP for the proposed site.

Sincerely,

Nancy Murray
Biologist/Senior Environmental Analyst
NDDB Program Coordinator

NM/blm

FROM THE DESK OF
SCOTT A. HILL

MAR 08 2007

	F.Y.I.	PLS. DO	PLS. SEE ME
J. ANDREWS			
K. HALL			
R. MESSINA			
T. NEZAMES			
J. WALESZCZYK			

6405 #

#3079

CALVIN A.G. LAIRD ETAL

CONNECTICUT COORDINATE GRID

NOT TO SCALE

NOT TO SCALE

CREST GRAPHICS
FIXED LINE MYLAR

N/F NATIONAL RAILROAD PASSENGER CORPORATION

N/F RICHARD LANDSCHOFF ET AL

N/F RIS & DOUGLAS

N/F CORINNE FISHER

Limits Of Work Area

Subject to a 20' Easement for Control Cable Line in Favor of The Town Of Branford

Sec 30'

Base Line

587°34'22.7"E

470+00

471+00

472+00

PC 42+36.98 (MEA. BY EQUIP.)
N 857715.2
E 584429.57

SCALE IN FEET
1"=40'

References

1. General Location Survey Provided By Conn. D.O.T., Dist. 3 Digital File: Harris2.sap

2. Conn. D.O.T. Publication Valuation Map "54-60/F"

3. V. 176, P. 288 (Easement)

4. Map Entitled "Map of South Karlham Street Subdivision, Kirkham and Elm Streets, Branford, Conn. Property Of the Methodist Inc. Pittings Co. Scale 1"=1'/Date: September 30, 1907 (Map 1029 B.L.R.)

5. V. 276, P. 145 (Warr.)

Notes:
1. This survey has been prepared in accordance with the Regulations Of Connecticut State Agencies, Sections 20-300b-1 through 20-300b-20, the Minimum Standards For Surveys And Maps In The State Of Connecticut as adopted by the Connecticut Association of Land Surveyors, on September 26, 1996.
2. The "R.O.W." or "R.O.W." Point of Way Survey was prepared to define the limits of property in question for the project referenced herein.
3. The Town and Town, which has expressed interest in referenced property in Town, are not shown on this survey.
4. The referenced deed(s) herein are the result of the general search done for the project, or are deed(s) referenced herein. 5. The property and street lines depicted have been compiled from various sources and are not to be construed as necessarily being obtained as the result of a field survey, nor do they represent a property/boundary opinion.

DATE	REVISION	REQ. BY

Drawn By AG Date 03-15-01
Checked By RCC/SMC Date 03-20-01
File 30.001/300002001.pm

TO BE WORN ONLY WHEN SEALED AND SIGNATURE MAY SUBSTANTIALLY CONFORM AS NOTED HEREON.

PLS #18524

FOR WHICH THIS SURVEY WAS MADE

TOWN NO. 14

PROJECT NO. 72-09

Robert J. Barra, P.L.S.

SERIAL NO. 3

TITLE Manager - Survey Operations

SHEET 1 OF 1

DATE 8/29/01

RIGHT OF WAY SURVEY

TOWN OF BRANFORD

MAP SHOWING EASEMENT ACQUIRED FROM

CALVIN A. G. LAIRD ETAL

BY

THE STATE OF CONNECTICUT

DEPARTMENT OF TRANSPORTATION

BRANFORD RAIL STATION

CHARLES R. SCHOFIELD, P.E. TRANSPORTATION CHIEF ENGINEER
BUREAU OF ENGINEERING AND HIGHWAY OPERATIONS

March 2001

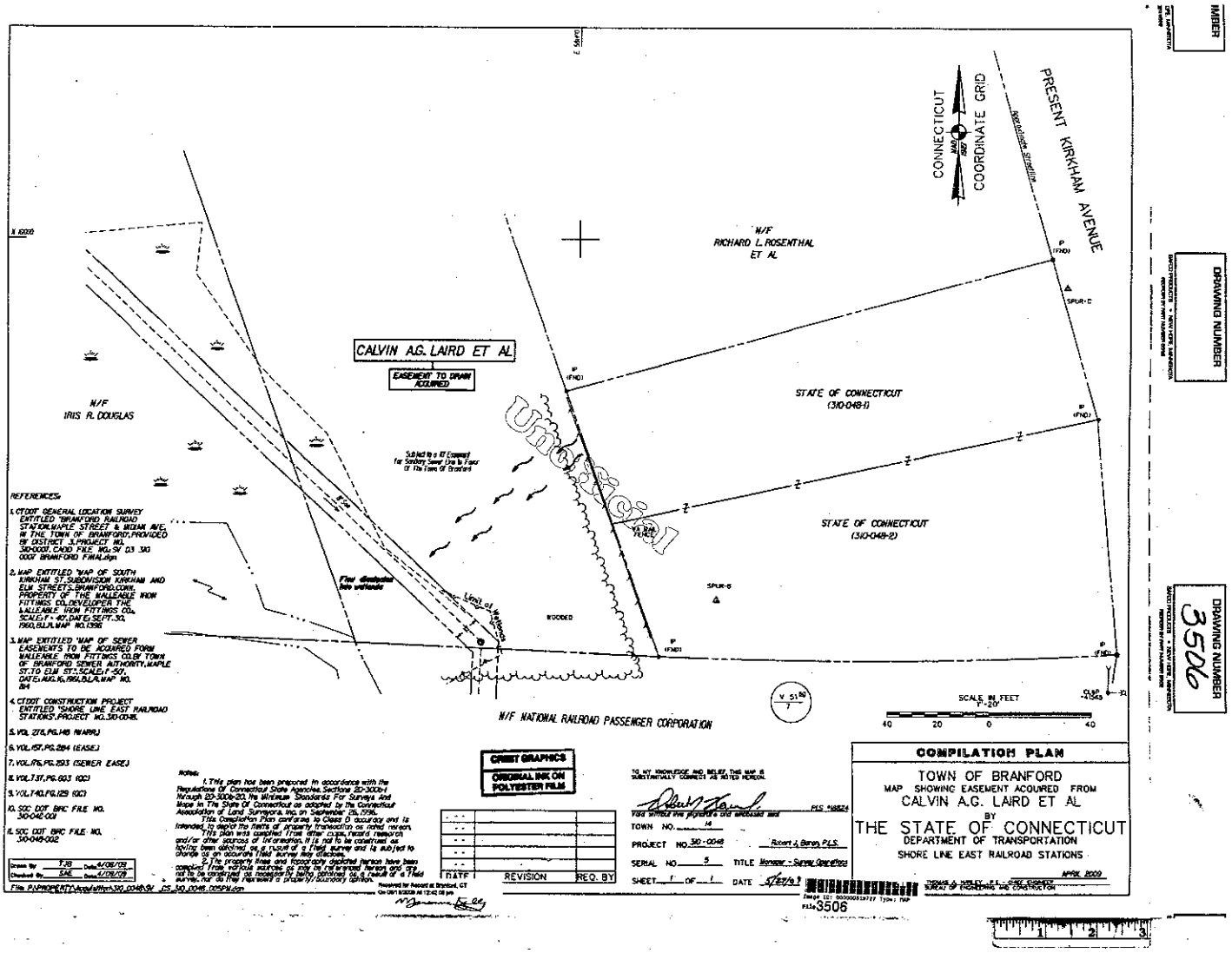
DRAWING NUMBER

DRAWING NUMBER 3079

Received for record October 5, 2001 at 12:32 p.m. and recorded by Melinda A. Yeates, Asst. Branford Town Clerk

#3079 [redacted]

File#:3079


CONNECTICUT COORDINATE GRID
PRESENT KIRKHAM AVENUE
N/F RICHARD L. ROSENTHAL ET AL
CALVIN A.G. LAIRD ET AL
EASEMENT TO DRAIN ACQUIRED
N/F IRIS R. DOUGLAS
STATE OF CONNECTICUT (310-049-1)
STATE OF CONNECTICUT (310-049-2)
Unnamed
WOODED
N/F NATIONAL RAILROAD PASSENGER CORPORATION
SCALE IN FEET 1"=20'
REFERENCES:
1. CTDOT GENERAL LOCATION SURVEY ENTITLED "BRANFORD RAILROAD STATION, MAPLE STREET & INDIAN AVE. IN THE TOWN OF BRANFORD, PROVIDED BY DISTRICT 3, PROJECT NO. 300-000T, CADD FILE NO.: SV 03 303 000T BRANFORD FINAL.dgn
2. MAP ENTITLED "MAP OF SOUTH KIRKHAM ST. SUBDIVISION KIRKHAM AND ELM STREETS, BRANFORD, CONN. PROPERTY OF THE MALLEABLE IRON FITTINGS CO., DEVELOPER THE MALLEABLE IRON FITTINGS CO., SCALE: 1" = 40', DATE: SEPT. 30, 1960, BLA. MAP NO. 1598
3. MAP ENTITLED "MAP OF SEWER EASEMENTS TO BE ACQUIRED FORM MALLEABLE IRON FITTINGS CO. BY TOWN OF BRANFORD SEWER AUTHORITY, MAPLE ST. TO ELM ST.", SCALE: 1" = 50', DATE: AUG. 16, 1960, BLA. MAP NO. 164
4. CTDOT CONSTRUCTION PROJECT ENTITLED "SHORE LINE EAST RAILROAD STATIONS", PROJECT NO. 300-004B.
5. VOL. 276, PG. 148 (WARR.)
6. VOL. 157, PG. 284 (EASE.)
7. VOL. 176, PG. 293 (SEWER EASE.)
8. VOL. 131, PG. 603 (QC)
9. VOL. 140, PG. 129 (QC)
10. SOC DOT BRC FILE NO. 30-042-003
11. SOC DOT BRC FILE NO. 30-049-002
Drawn By: YJB Date: 4/08/09
Checked By: SAE Date: 4/08/09
CREST GRAPHICS
ORIGINAL INK ON POLYESTER FILM
DATE
REVISION
REQ. BY
TO MY KNOWLEDGE AND BELIEF, THIS MAP IS SUBSTANTIALLY CORRECT AS NOTED HEREON.
Not valid unless properly signed and embossed seal
PLS #18824
TOWN NO. 14
PROJECT NO. 30-004B
Robert J. Barron, P.L.S.
SERIAL NO. 5
TITLE Manager - Survey Operations
SHEET 1 OF 1
DATE 5/21/09
Received for Record at Branford, CT
On 06/18/2009 At 12:42:08 pm
Image ID: 00000019717 Type: TMP
File 3506
COMPILATION PLAN
TOWN OF BRANFORD
MAP SHOWING EASEMENT ACQUIRED FROM
CALVIN A.G. LAIRD ET AL
BY
THE STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION
SHORE LINE EAST RAILROAD STATIONS
APRIL 2009
BUREAU OF ENGINEERING AND CONSTRUCTION
DRAWING NUMBER
3506

File#:3506

General Permit Registration Form for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities

Please complete this form in accordance with the general permit (DEP-PED-GP-015) in order to ensure the proper handling of your registration. Print or type unless otherwise noted. You must submit the *Permit Application Transmittal Form* (DEP-APP-001) and the registration fee along with this form.

DEP USE ONLY

Application No. _____

Permit No. _____

Facility I.D. _____

Part I: Registration Type

Enter a check mark in the appropriate box identifying the registration type.

This registration is for (check one):	Please identify any existing permit number in the space provided:
☒ A *new* general permit registration ☐ A *modification* of an existing general permit	Existing permit number: ***GSN***

Part II: Fee Information

☒ ***Registration only***	A registration fee of $625.00 is to be submitted with *each* registration that you are submitting at least 30 days before the initiation of construction activities.
☐ ***Registration and Plan Review***	All construction projects that result in the disturbance of ten or more acres require the submittal of a Stormwater Pollution Control Plan and a $625.00 plan review fee. The plan and the fee must be submitted 30 days prior to initiation of the construction activity. $625.00 registration fee + $625.00 review fee = $1,250.00 total fee

For municipalities, a 50% discount applies. The registration will not be processed without the fee. The fee shall be non-refundable and shall be paid by certified check or money order payable to the Department of Environmental Protection.

Part III: Registrant Information

1. Fill in the name of the registrant(s) as indicated on the *Permit Application Transmittal Form* (DEP-APP-001):

   Registrant: **Connecticut Department of Transportation**

   Phone: **860-823-3204** ext. Fax:

   ☐ Check here if there are co-registrants. If so, label and attach additional sheet(s) with the required information as supplied above.

Part III: Registrant Information (cont.)

2. List primary contact for departmental correspondence and inquiries, if different than the registrant.

   Name: **Connecticut Department of Transportation**

   Mailing Address: **District II Administratioin Office, 171 Salem Turnpike**

   City/Town: **Norwich** State: **CT** Zip Code: **06360**

   Business Phone: **860-823-3204** ext. Fax:

   Site Phone: Emergency Phone:

   Contact Person: **Carl E. Nelson** Title: **District Engineer**

   Association (e.g. developer, general or site contractor, etc.): **Office of Construction**

3. List owner of the property on which the activity will take place, if different from registrant:

   Name:

   Mailing Address:

   City/Town: State: Zip Code:

   Business Phone: ext. Fax:

   Contact Person: Title:

4. List developer, if different from registrant or primary contact:

   Name:

   Mailing Address:

   City/Town: State: Zip Code:

   Business Phone: ext. Fax:

   Contact Person: Title:

5. Name and address of general contractor:

   Name:

   Mailing Address:

   City/Town: State: Zip Code:

   Business Phone: ext. Fax:

   Site Phone: Off-hours Phone:

   Contact Person: Title:

6. List any engineer(s) or other consultant(s) employed or retained to assist in preparing the registration and Stormwater Pollution Plan.

   ☐ Check here if additional sheets are necessary, and label and attach them to this sheet.

   Name: **Michael Baker Engineering, Inc.**

   Mailing Address: **500 Enterprise Drive, Suite 2B**

   City/Town: **Rocky Hill** State: **CT** Zip Code: **06067**

   Business Phone: **860-563-3044** ext. Fax: **860-529-6627**

   Contact Person: **David B. Tudryn, AIA** Title: **Project Manager**

   Service Provided: **Planning, Engineering and Architectural Design Services**

Part IV: Site Information

1. Site or Project Name (if any): **Branford Railroad Station (North)**

   Street Address or Description of Location: **Kirkham Street**

   City/Town: **Branford** State: **CT** Zip Code: **06405**

2. Brief description of construction activity: **Railroad Station, access driveway with accompanying site improvements.**

3. Start Date: **10/3/2011** Anticipated Completion Date: **3/15/2013**

4. Estimated total number of acres to be disturbed: **1.06**

Part V: Stormwater Discharge Information

1. Where does stormwater discharge to:

   ☐ Municipal Separate Storm System? ☐ Yes ☒ No (Name):

   ☒ Surface water body or wetlands? ☒ Yes ☐ No (Name): **Tidal Wetlands**

2. Is the discharge located less than 500 feet from a tidal wetland, which is not a fresh-tidal wetland?

   ☒ Yes ☐ No

3. Name of the watershed where the site is located OR nearest waterbody to which it discharges:

   Branford River

4. Is construction in accordance with the Guidelines established under Section 22a-329 of the Soil Erosion and Sedimentation Act? ☒ Yes ☐ No

5. Is construction in accordance with local soil erosion and sediment ordinances? ☒ Yes ☐ No

   Note: A copy of this registration and the Stormwater Pollution Control Plan must be available to the town wetlands enforcement officials, wetlands commission, or their equivalent.

6. Will the construction project disturb over ten acres? ☐ Yes ☒ No

   If yes, enclose a copy of the Stormwater Pollution Control Plan and plan review fee.

7. Has the construction project been reviewed for compliance with the following DEP programs?

   a. Coastal Management Act (Section 22a-92 of the Connecticut General Statutes) ☒ Yes ☐ No

   b. Endangered and Threatened Species (Section 26-306 of the Connecticut General Statutes) ☒ Yes ☐ No

   c. State and Federal Historic Preservation statutes? ☒ Yes ☐ No

Part VI: Supporting Documents

Check the box by the attachments being submitted as verification that *all* applicable attachments have been submitted with this registration form. 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 registrant's name as indicated on the *Permit Application Transmittal Form.*

☒	Attachment A:	An 8 1/2" x 11" copy of the relevant portion or a full-sized original of a USGS Quadrangle Map indicating the exact location of the facility or site. Indicate the quadrangle name on the map. (To obtain a copy of the relevant USGS Quadrangle Map, call your town hall or DEP Maps and Publications Sales at 860-424-3555.)
☐	Attachment B:	A copy of the Stormwater Pollution Control Plan and plan review fee of $500.00, if the construction project disturbs over 10 acres

Part VII: Environmental Professional Certification

The following certification must be signed by a professional engineer, licensed to practice in Connecticut.

"I certify that I have thoroughly and completely reviewed the Stormwater Pollution Control Plan for the site. I further certify, based on such review and in my professional judgment, that the Stormwater Pollution Control Plan has been prepared in accordance with the Connecticut Guidelines for Soil Erosion and Sediment Control, as amended, and the conditions for the General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities and the controls required for such Plan are appropriate for the site. I am aware that there are significant penalties for false statements in this certification, including the possibility of fine and imprisonment for knowingly making false statements."

E.R. Whitbread

Signature of Professional Engineer

4/14/2011

Date

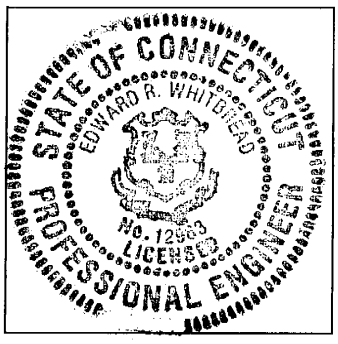
E.R. Whitbread

Name of Professional Engineer (print or type)

12963

P. E. Number (if applicable)

Affix P. E. Stamp Here



Part VIII: Registrant Certification

The registrant *and* the individual(s) responsible for actually preparing the registration must sign this part. A registration will be considered incomplete unless all required signatures are provided.

"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 those 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 registration is on complete and accurate forms as prescribed by the commissioner without alteration of the text. I understand that a false statement made in the submitted information may be punishable as a criminal offense, in accordance with section 22a-6 of the Connecticut General Statutes, pursuant to section 53a-157b of the Connecticut General Statutes, and in accordance with any other applicable statute.

I also certify under penalty of law that I have read and understand all conditions of the General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities, that all conditions for eligibility for authorization under the general permit are met, all terms and conditions of the general permit are being met for all discharges which have been initiated and are the subject of this registration, and that a system is in place to ensure that all terms and conditions of this general permit will continue to be met for all discharges authorized by this general permit at the site. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowingly making false statements."

Signature of Registrant	Date
Carl E. Nelson	**District Engineer**
Name of Registrant (print or type)	Title (if applicable)
	4/14/2011
Signature of Preparer (if different than above)	Date
David B. Tudryn, AIA	**Project Manager**
Name of Preparer (print or type)	Title (if applicable)

☐ Check here if additional signatures are necessary.
If so, please reproduce this sheet and attach signed copies to this sheet.

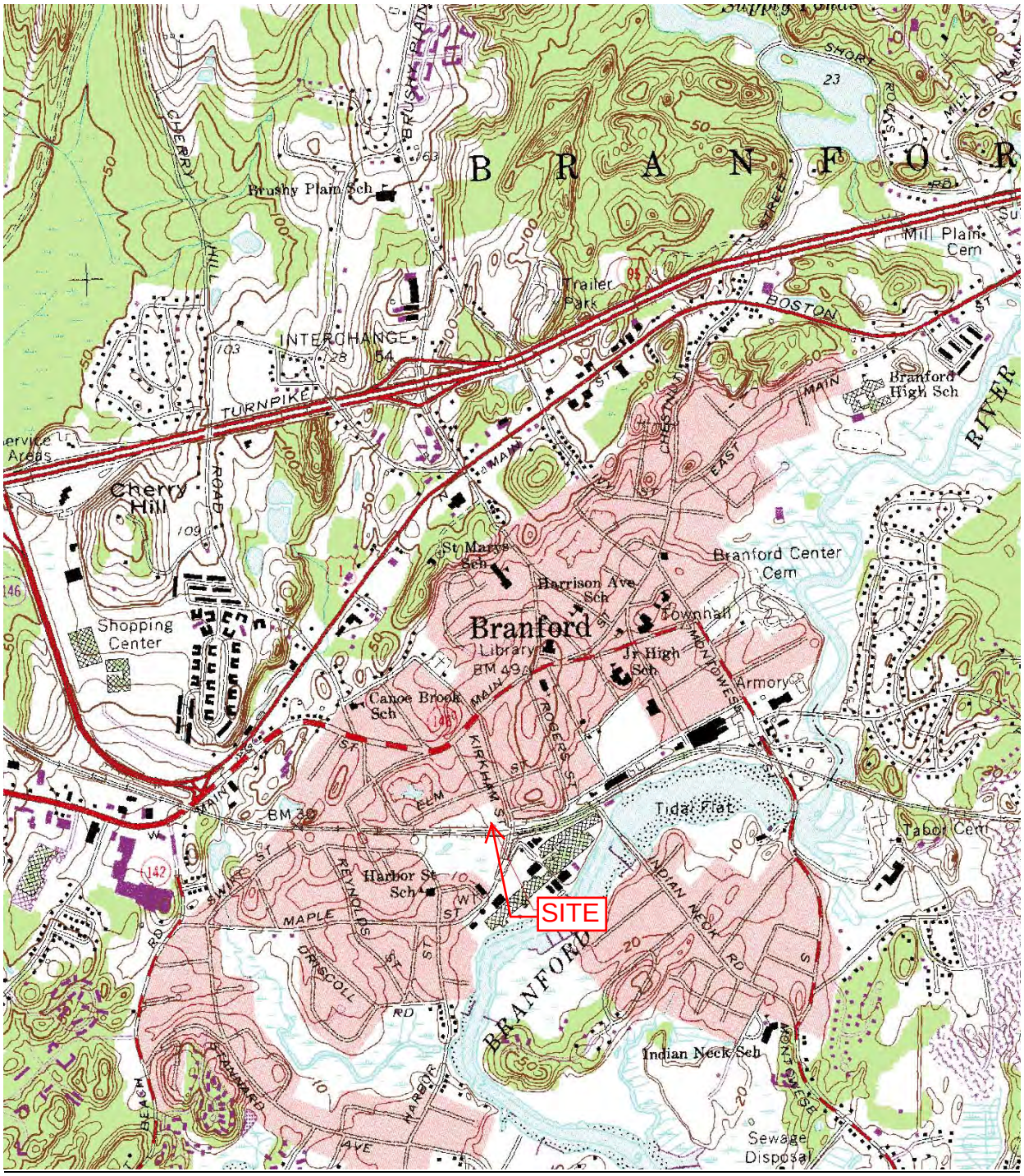
Note: Please submit the *Permit Application Transmittal Form*, the Registration Form, Fee(s), and all Supporting Documents to:

CENTRAL PERMIT PROCESSING UNIT
DEPARTMENT OF ENVIRONMENTAL PROTECTION
79 ELM STREET
HARTFORD, CT 06106-5127

Note: If discharging to municipal separate storm sewer, send a copy of this completed registration form to the owner or operator of that system.

If discharging to a public drinking water supply watershed or aquifer area, send a copy of this completed registration form to the appropriate water company.

ATTACHMENT A



Location Map

USGS 7.5 Minute Quadrangle Topographic Map

INTERDEPARTMENTAL MESSAGE **STATE OF CONNECTICUT**

To	NAME, TITLE Ms. Denise Ruzicka, Inland Water Resources Division	DATE May 23, 2011
	AGENCY, ADDRESS Department of Environmental Protection, 79 Elm Street, Hartford	
From	NAME, TITLE Mark W. Alexander, Transportation Assistant Planning Director	TELEPHONE (860) 594-2931
	AGENCY, ADDRESS Department of Transportation, 2800 Berlin Turnpike, Newington	

Subject State Project No. 310-0056
Branford Railroad Station
Shore Line East Railroad
Drainage Pipe Relocation

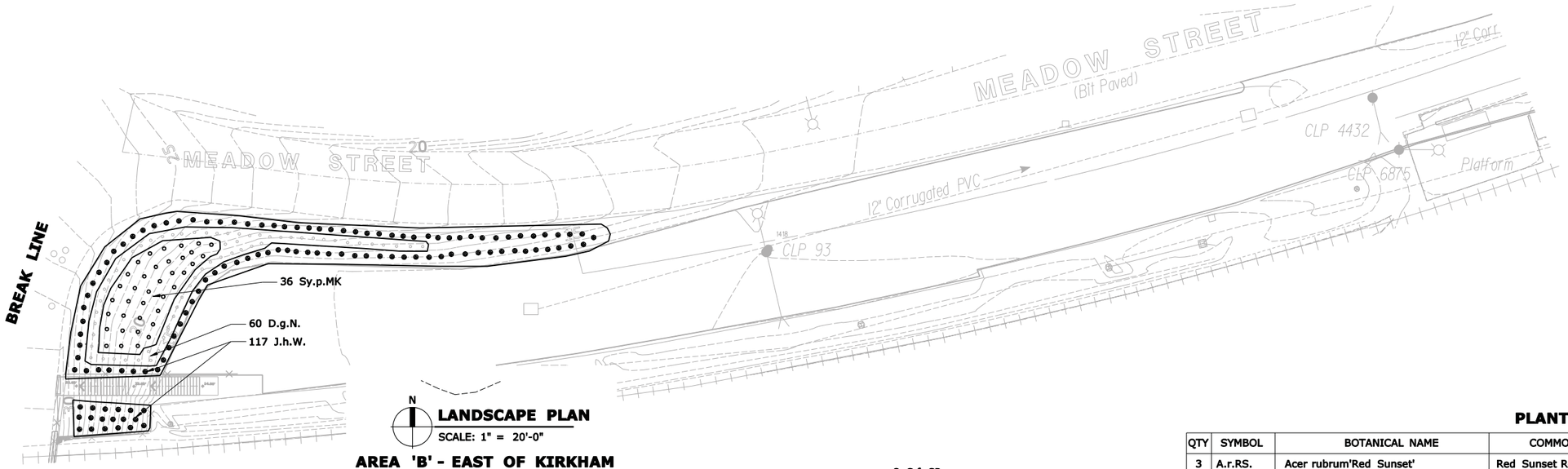
The Department of Transportation is submitting for your review and written approval a request for a technical plan revision for a minor adjustment to the Branford North Grading Plan and Drainage Plan, of the above mentioned project. This only affects the Kiss and Ride Area of the project. All south side parking lot expansion construction is to be completed by the end of the June.

The original approved design consisted of porous pavement and pea gravel infiltration trench over an infiltration bed. Drainage was provided at the bottom of the infiltration bed and discharge into an 18 inch pipe and out let to a wetland system at approximate Station 6+80 Rt. The proposed revision [Drawing No. C-107 see attached] is to pre-treat the storm water by passing through landscaped areas around the entrances to the two beehive catchbasins. Minor grading to accommodate additional snow storage relocated one internal beehive basin approximately 10 feet south to Station 8+15 O' RT. The basin on Kirkham Street will be moved to the driveway entrance approximately 25 feet to the west. Two additional basins will be added on the entrance driveway to limit the potential for icing. All basins will have 4 foot deep sumps (water quality) and discharge into a scour hole at the same location as the original design. The scour hole was sized to provide outlet protection, water quality and retain/infiltrate the approximate volume of the first inch of a storm event. The change is needed to address environmental soil issues, snow storage, and potential icing issues while maintaining storm water retention. This system will continue to provide primary storm water quality treatment in accordance with the SQM.

Any questions pertaining to this application may be directed to Mr. Paul Corrente, Transportation Supervising Planner of my staff at (860) 594-2932.

Attachments – Original Permit – Select Revised Plan Sheets
Bruce A. Olmstead/deb
cc: Robbin C. Cabelus - Mark W. Alexander
Kimberly C. Lesay
Scott A. Hill – Theodore H. Nezames – Bruce A. Olmstead
Jayantha Mather – Yure E. Kuljis

S:\Stdes\Facil\310-0056\permit\Submit_Tech_Res.doc

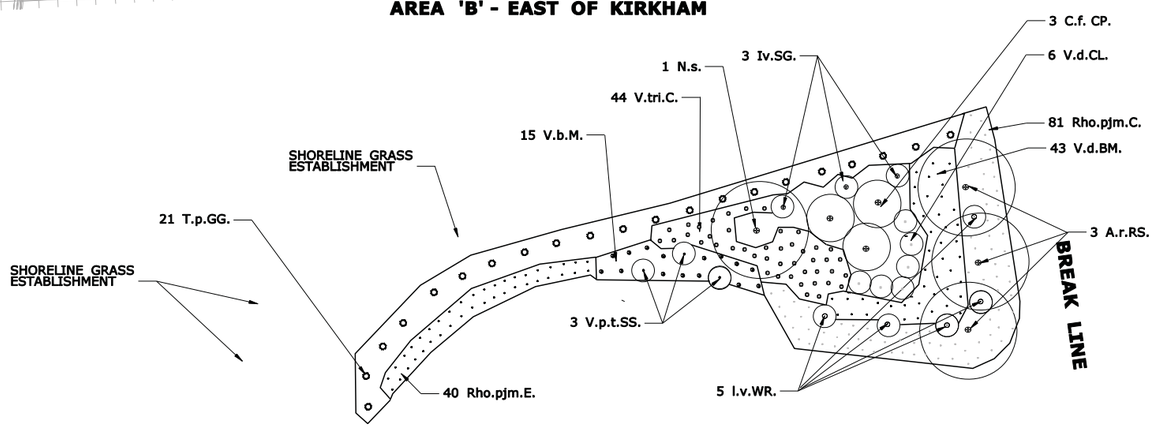


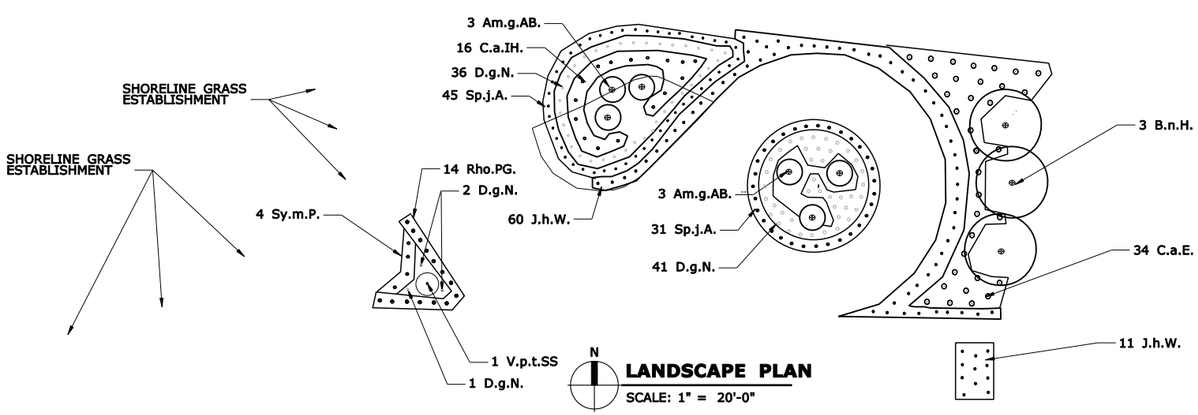
N

LANDSCAPE PLAN

SCALE: 1" = 20'-0"

AREA 'B' - EAST OF KIRKHAM





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LANDSCAPE PLAN

SCALE: 1" = 20'-0"

AREA 'A' - WEST OF KIRKHAM

PLANT LIST

QTY	SYMBOL	BOTANICAL NAME	COMMON NAME	SIZE/FORM	SPACING
3	A.r.RS.	Acer rubrum'Red Sunset'	Red Sunset Red Maple	3" - 31/2" Cal. B.B.	25' On Center
6	Am.g.AB.	Amelanchier x grandiflora 'Autumn Brilliance'	Autumn Brilliance Shadblow	8'-10' Ht. B.B., Clump	As Shown
3	B.n.H.	Betula nigra 'Heritage'	Heritage River Birch	10'-12' Ht. B.B., Clump	17' On Center
34	C.a.E.	Cornus alba 'Elegentissima'	Red Variegated Twig Dogwood	6 Gal. cont.	6' On Center
16	C.a.IH.	Cornus alba 'Ivory Halo''	Ivory Halo Twig Dogwood	24"-36" Ht. B.B.	5' On Center
3	C.f.CP.	Cornus florida 'Cherokee Princess'	Flowering Dogwood	3"-3½" Cal. B.B.	15' On Center
140	D.g.N.	Deutzia gracilis'Nikko'	Spreading Deutzia	2 Gal. cont.	4' On Center
3	I.v.SG.	Ilex verticillata 'Southern Gentleman'	Winterberry, male	3'-4' Ht. B.B.	As Shown
5	I.v.WR.	Ilex verticillata 'Winter Red'	Winterberry, female	5'- 6' Ht. B.B.	6' On Center or As Shown
188	J.h.W.	Juniperus horizontalis 'Wiltoni'	Blue Rug Juniper	1 Gal. cont.	4' On Center
1	N.s.	Nyssa sylvatica	Black Tupelo	4"-4½" Cal. B.B.	As Shown
81	Rho.pjm.C	Rhododendron P.J.M. 'Compacta'	PJM Rhododendron	3 Gal. cont.	4' On Center
40	Rho.pjm.E.	Rhododendron P.J.M. 'Elite'	PJM Rhododendron	3 Gal. cont.	4' On Center
14	Rho.PG.	Rhododendron 'Purple Gem'	Purple Gem Rhododendron	3 Gal. cont.	4' On Center
76	Sp.j.A.	Spirea japonica 'Alpina'	Japanese Spirea Alpina	2 Gal. cont.	3' On Center
4	Sy.m.P.	Syringa meyerli 'Paliban'	Dwarf Korean Lilac	6 Gal. cont.	5' On Center
37	Sy.p.MK.	Syringa patula 'Ms.Kim'	Ms. Kim Lilac	6 Gal. cont.	5' On Center
21	T.p.GG.	Thuja plicata 'Green Giant'	Western Red Cedar	7'-8' Ht. B.B.	9' On Center
43	V.d.BM.	Viburnum dentatum'Blue Muffin'	Arrowwood	3 Gal. cont.	5' On Center
6	V.d.CL.	Viburnum dentatum 'Chicago Lustre'	Arrowwood	3'-4' Ht. B.B.	As Shown
15	V.b.M.	Viburnumx burkwoodii 'Mohawk'	Burkwood Viburnum Hybrid	4'-5' Ht. B.B.	7' On Center or As Shown
4	V.p.t.SS.	Viburnum plicatum tomentosum 'Watanabei'	Summer Snowflake	5'-6' Ht. B.B.	As Shown
44	V.tri.C.	Viburnum trilobum 'Compactum'	American Cranberry Bush	6 Gal. cont.	4' On Center

FURNISHING AND PLACING OF TOPSOIL: 2085 S.Y. (AT 6" DEEP)
WOOD CHIP MULCH: 2085 S.Y. (AT 4" DEEP)
SHORELINE GRASS ESTABLISHMENT: 97 S.Y.

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

Filename: FD_MSH_GRD_0014_0056_C-700.dgn

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.

Date Plotted: April 13, 2011

DESIGNER/DRAFTER: A. SAMPSON
CHECKED BY: D. TUDRYN

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

ENGINEER: BAKER ENGINEERING
APPROVED BY: -
DATE: 04/13/2011

STATE OF CONNECTICUT — JAMES M. WHITTEMORE — No. 17,283 — LICENSED PROFESSIONAL ENGINEER

PROJECT TITLE: **SHORE LINE EAST RAILROAD STATIONS**

TOWN: **BRANFORD**

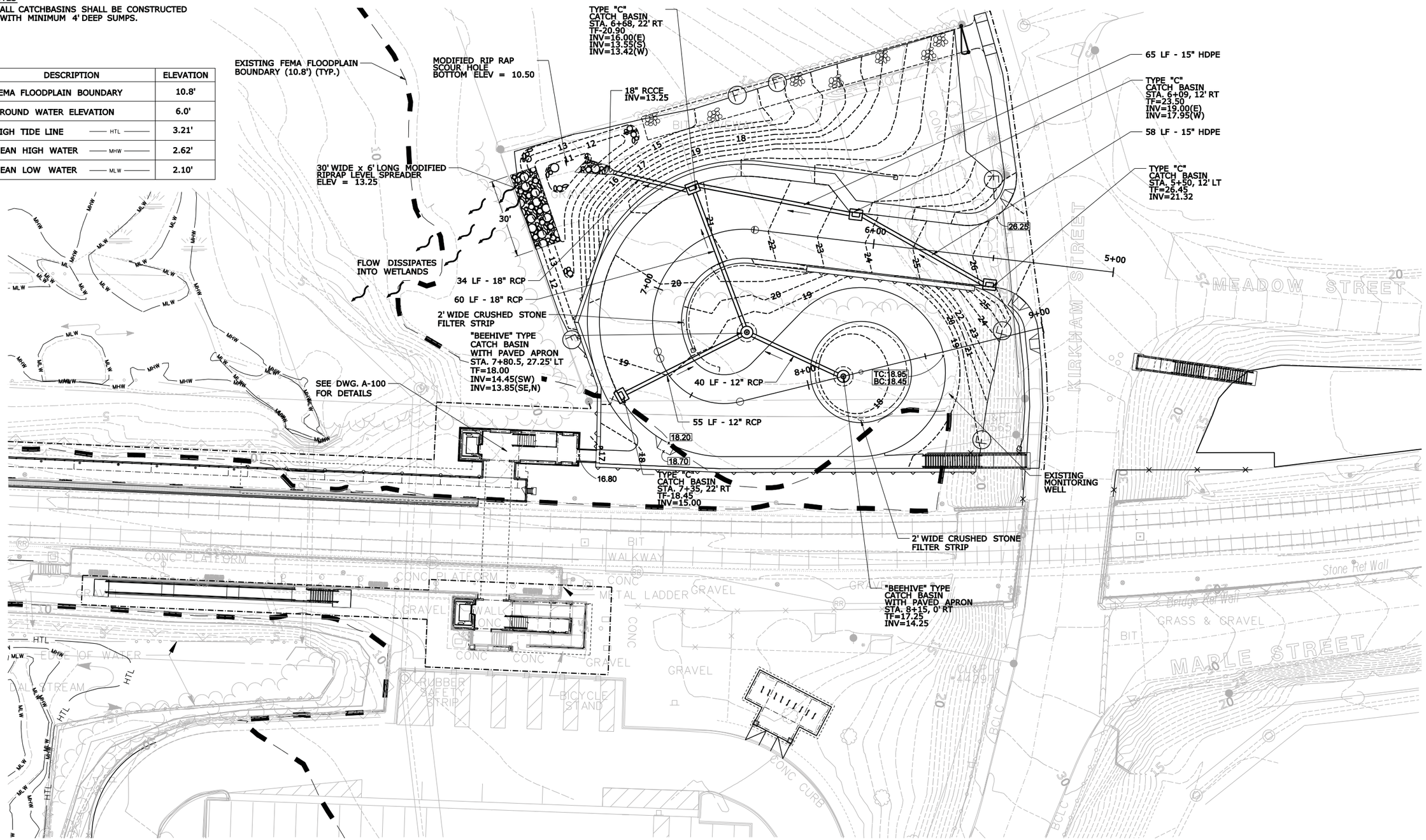
DRAWING TITLE: **BRANFORD NORTH LANDSCAPE PLAN**

PROJECT NO. 310-0056
DRAWING NO. C-700
SHEET NO. 01.03.025

NOTES

1. ALL CATCHBASINS SHALL BE CONSTRUCTED WITH MINIMUM 4' DEEP SUMPS.

DESCRIPTION	ELEVATION
FEMA FLOODPLAIN BOUNDARY	10.8'
GROUND WATER ELEVATION	6.0'
HIGH TIDE LINE —— HTL ——	3.21'
MEAN HIGH WATER —— MHW ——	2.62'
MEAN LOW WATER —— MLW ——	2.10'



N

GRADING PLAN

SCALE: 1" = 20'-0"

REV.	DATE	REVISION DESCRIPTION	SHEET NO.
-	-	-	-

Filename: FD_MSH_GRD_0014_0056_C-107.dgn

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Date Plotted: April 13, 2011

DESIGNER/DRAFTER: PB

CHECKED BY: ALM

SCALE IN FEET 0 20 40

SCALE 1"=20'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

ENGINEER: BAKER ENGINEERING

APPROVED BY: -

DATE: 04/13/2011

PROJECT TITLE:

SHORE LINE EAST RAILROAD STATIONS

TOWN: **BRANFORD**

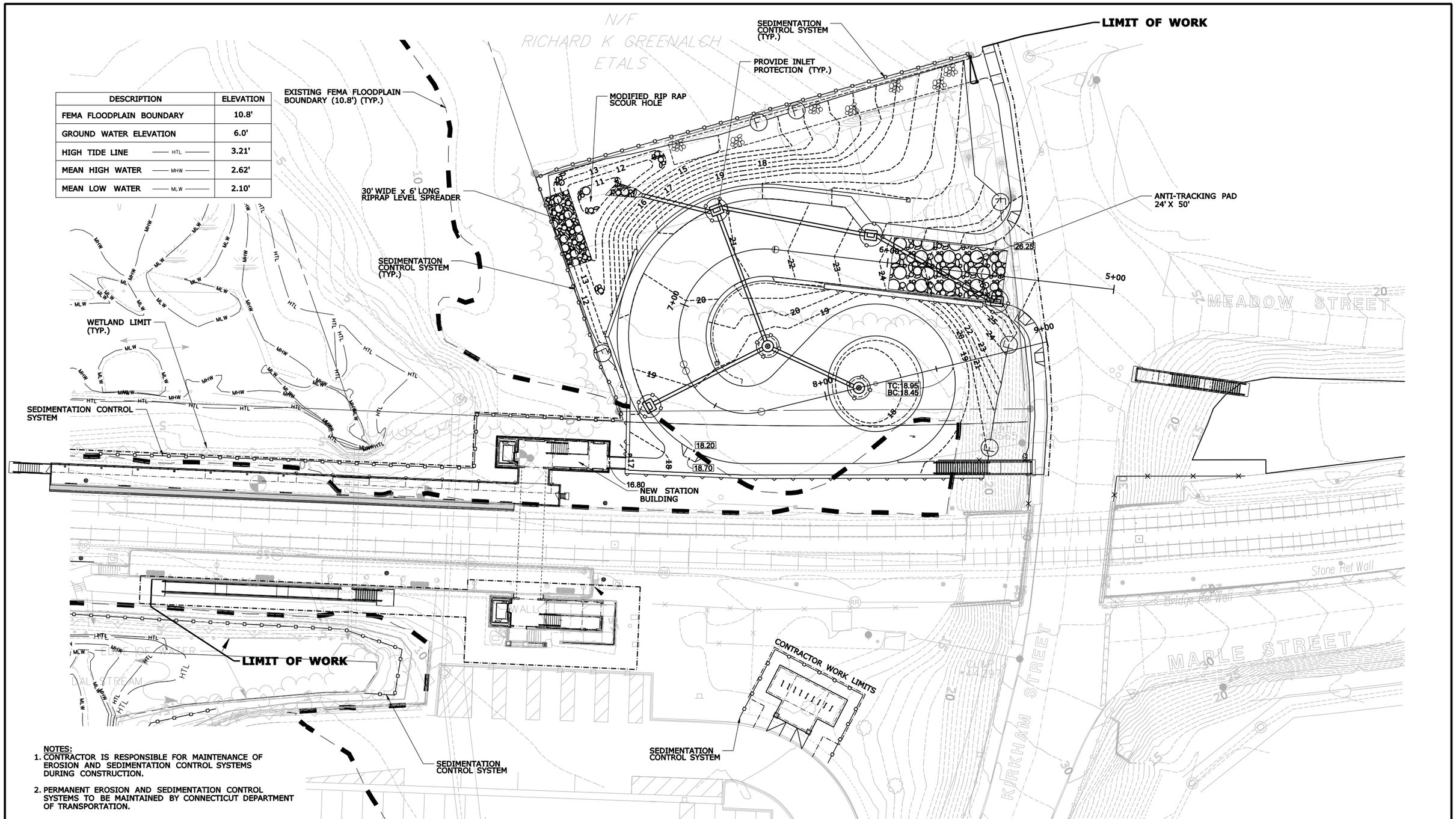
DRAWING TITLE: **BRANFORD NORTH GRADING PLAN**

PROJECT NO. 310-0056

DRAWING NO. C-107

SHEET NO. 01.03.013

DESCRIPTION	ELEVATION
FEMA FLOODPLAIN BOUNDARY	10.8'
GROUND WATER ELEVATION	6.0'
HIGH TIDE LINE — HTL —	3.21'
MEAN HIGH WATER — MHW —	2.62'
MEAN LOW WATER — MLW —	2.10'



NOTES:

1. CONTRACTOR IS RESPONSIBLE FOR MAINTENANCE OF EROSION AND SEDIMENTATION CONTROL SYSTEMS DURING CONSTRUCTION.
2. PERMANENT EROSION AND SEDIMENTATION CONTROL SYSTEMS TO BE MAINTAINED BY CONNECTICUT DEPARTMENT OF TRANSPORTATION.
3. IN CASE OF FLOODING OR HEAVY RAIN, ALL CONSTRUCTION EQUIPMENT AND MATERIALS ARE TO BE STORED ABOVE THE FEMA-DEFINED FLOODPLAIN BOUNDARY (ELEV. 10.8).
4. ALL CATCHBASINS SHALL BE CONSTRUCTED WITH MINIMUM 4' DEEP SUMPS.

N

SEDIMENTATION & EROSION CONTROL PLAN

SCALE: 1" = 20'-0"

REV.	DATE	REVISION DESCRIPTION	SHEET NO.
-	-	-	-

Filename: FD_MSH_SED_0014_0056_C-108.dgn

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.

Date Plotted: April 13, 2011

DESIGNER/DRAFTER: PB

CHECKED BY: ALM

SCALE IN FEET 0 20 40

SCALE 1"=20'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

ENGINEER: BAKER ENGINEERING

APPROVED BY: -

DATE: 04/13/2011

PROJECT TITLE:

SHORE LINE EAST RAILROAD STATIONS

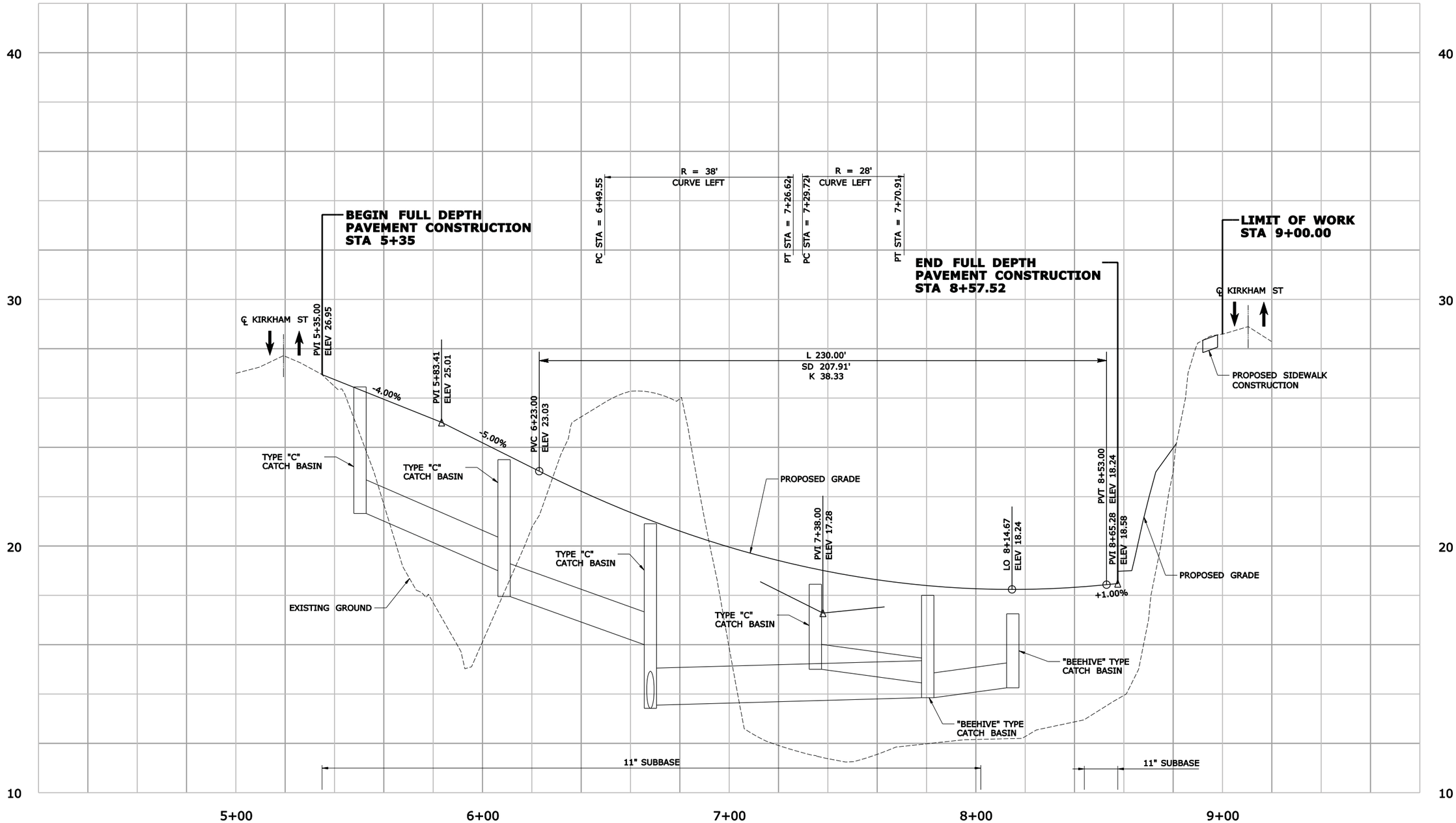
TOWN: BRANFORD

DRAWING TITLE: SEDIMENTATON & EROSION CONTROL PLAN

PROJECT NO. 310-0056

DRAWING NO. C-108

SHEET NO. 01.03.014



VERTICAL SCALE 1" = 2'
HORIZONTAL SCALE 1" = 20'

40 20 0 20 40

PROFILE VIEW

SCALE: 1" = 20'-0"

REV.	DATE	REVISION DESCRIPTION	SHEET NO.
-	-	-	-

Filename: FD_MSH_PRO_0014_0056_C-300.dgn

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.

Date Plotted: April 13, 2011

DESIGNER/DRAFTER: PB
CHECKED BY: ALM
SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

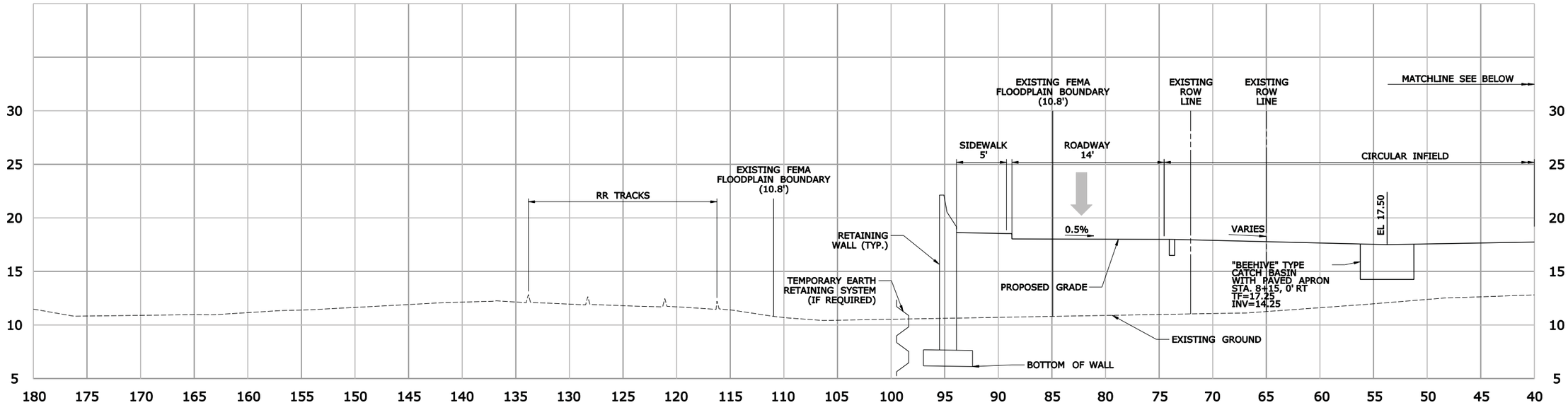
ENGINEER: BAKER ENGINEERING
APPROVED BY: -
DATE: 04/13/2011

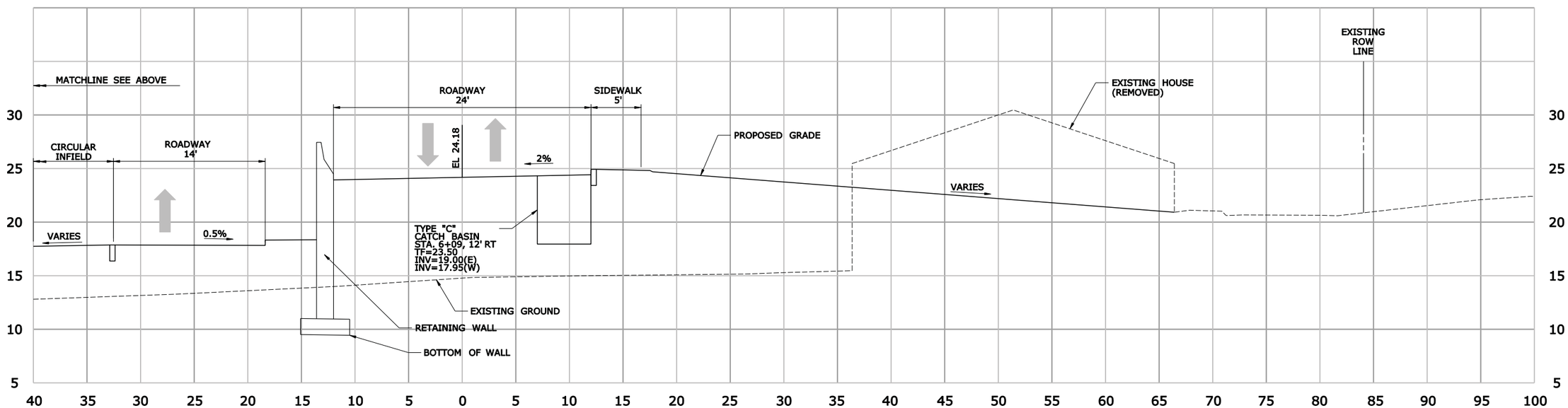
PROJECT TITLE:
SHORE LINE EAST RAILROAD STATIONS

TOWN: **BRANFORD**

DRAWING TITLE: **BRANFORD NORTH PROFILE**

PROJECT NO. 310-0056
DRAWING NO. C-300
SHEET NO. 01.03.015





SECTION AT STA 6+00 — A / C-103

SCALE: 1" = 5-0"

REV.	DATE	REVISION DESCRIPTION	SHEET NO.
-	-	-	-

Filename: FD..MSH..XSC..0014..0056..C-301.dgn

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Date Plotted: April 13, 2011

DESIGNER/DRAFTER: PB
CHECKED BY: ALM
SCALE IN FEET 0 5 10
SCALE 1"=5'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

ENGINEER: BAKER ENGINEERING
APPROVED BY:
DATE: 04/13/2011

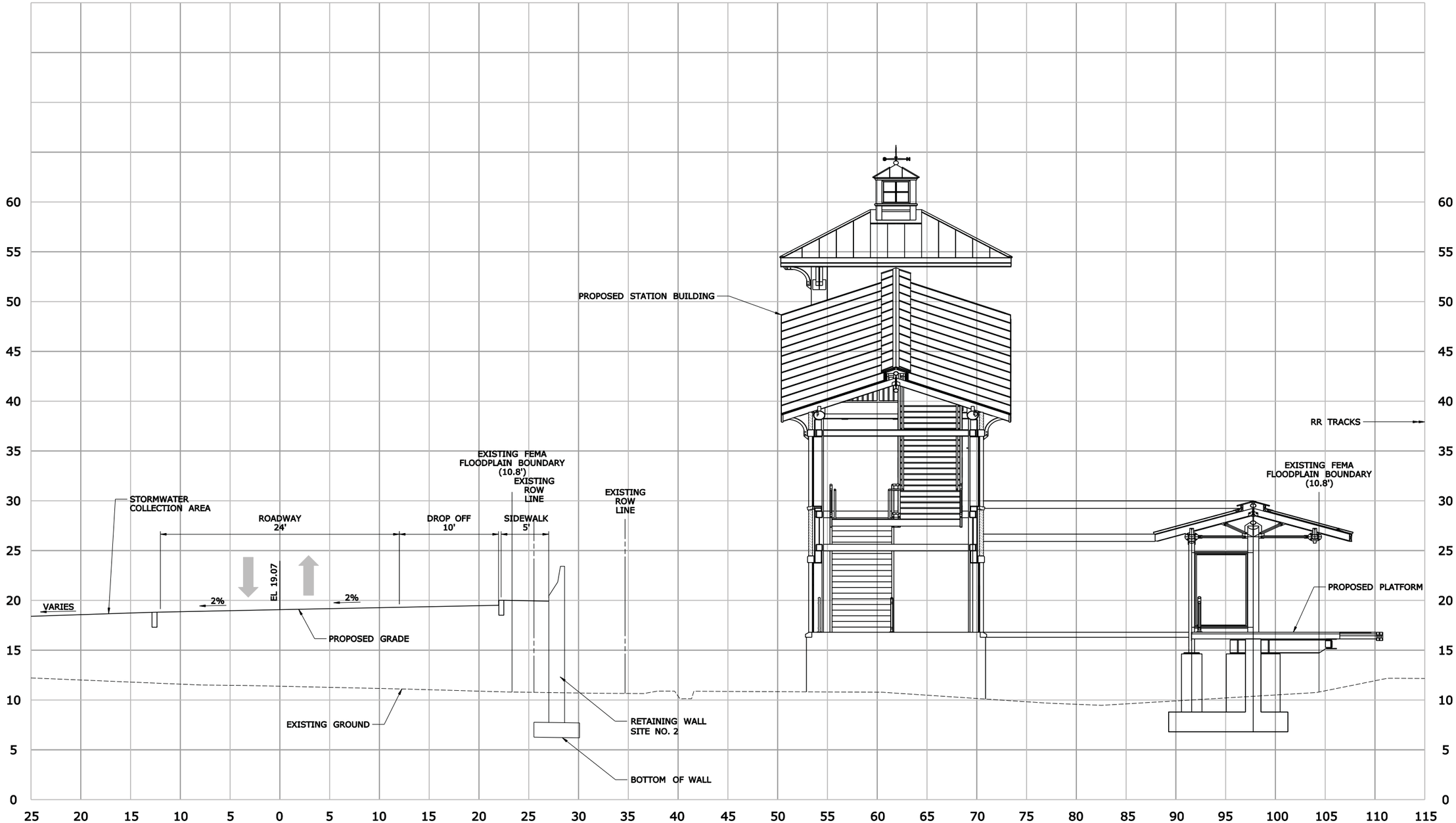
STATE OF CONNECTICUT LICENSED PROFESSIONAL ENGINEER

PROJECT TITLE: SHORE LINE EAST RAILROAD STATIONS

TOWN: BRANFORD

DRAWING TITLE: BRANFORD NORTH CROSS SECTIONS I

PROJECT NO. 310-0056
DRAWING NO. C-301
SHEET NO. 01.03.016



SECTION AT STA 7+35

SCALE: 1" = 5-0"

B / C-103

REV.	DATE	REVISION DESCRIPTION	SHEET NO.
-	-	-	-

Filename: FD_MSH_XSC_0014_0056_C-302.dgn

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Date Plotted: April 13, 2011

DESIGNER/DRAFTER: PB

CHECKED BY: ALM

SCALE IN FEET 0 5 10

SCALE 1"=5'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

ENGINEER: BAKER ENGINEERING

APPROVED BY:

DATE: 04/13/2011

PROJECT TITLE:

SHORE LINE EAST RAILROAD STATIONS

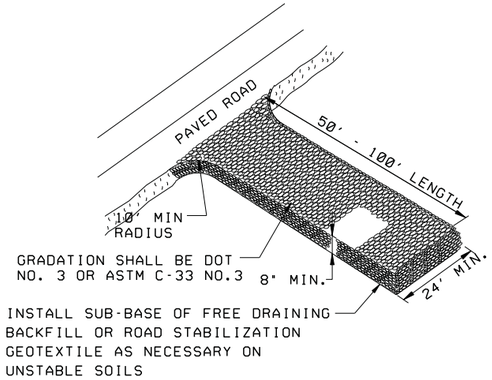
TOWN: **BRANFORD**

DRAWING TITLE: **BRANFORD NORTH CROSS SECTIONS II**

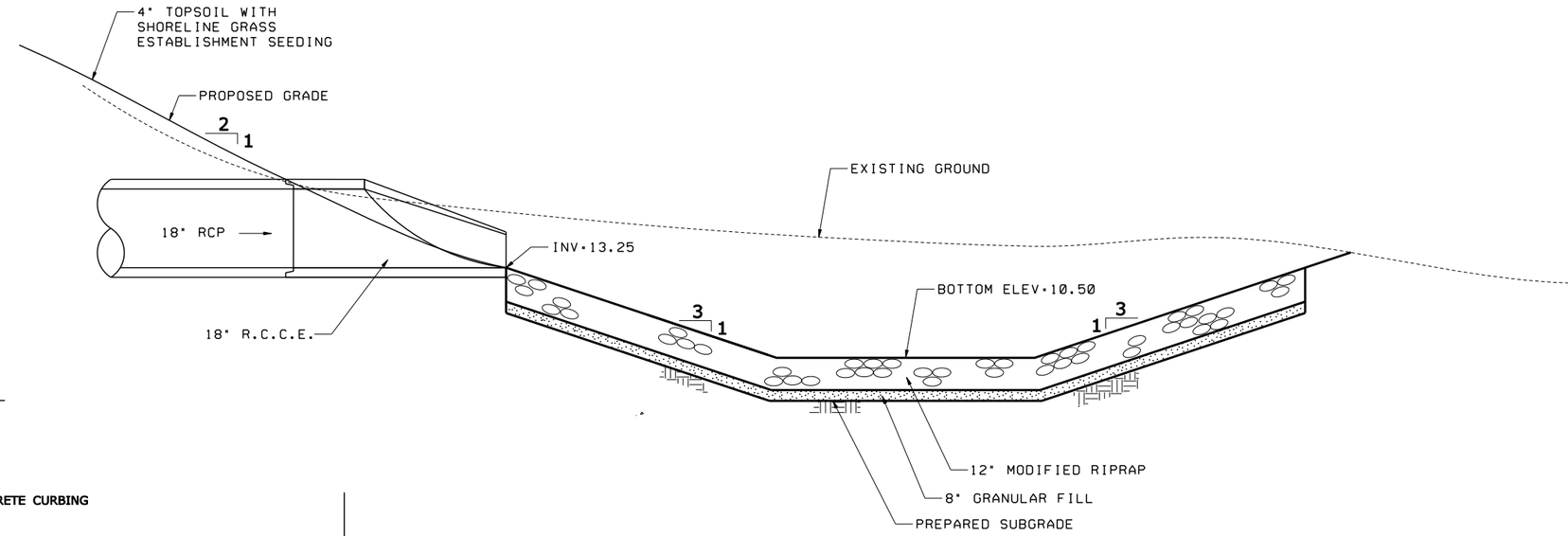
PROJECT NO. 310-0056

DRAWING NO. C-302

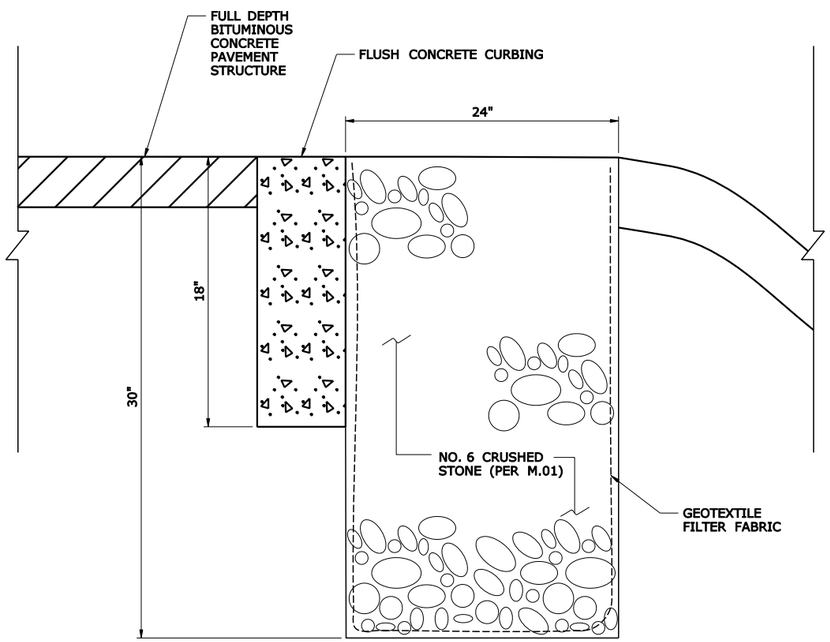
SHEET NO. 01.03.017



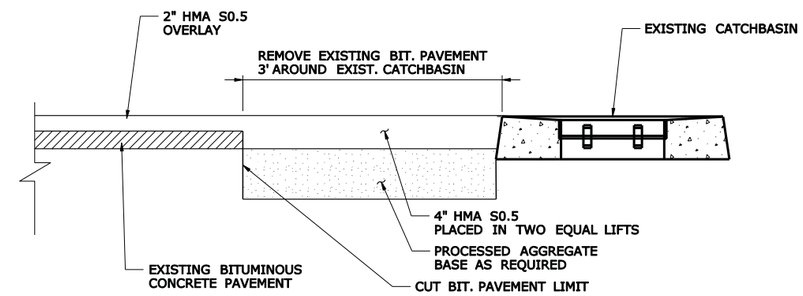
TYPICAL CONSTRUCTION ENTRANCE
PAY ITEM: ANTI-TRACKING PAD



MODIFIED RIPRAP SCOUR HOLE DETAIL

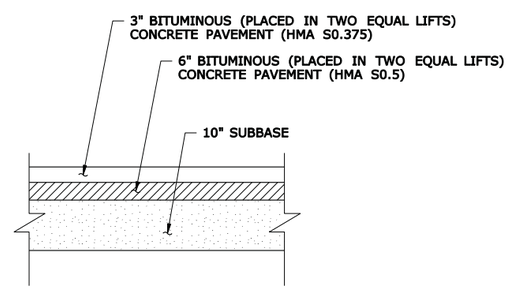


CRUSHED STONE FILTER STRIP DETAIL



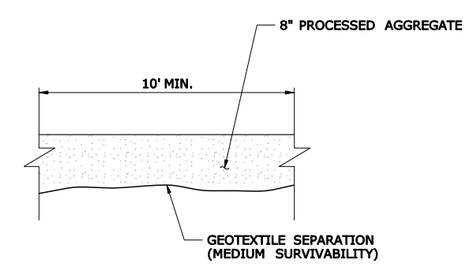
EASTERN PARKING LOT
PAVEMENT OVERLAY DETAIL

SCALE: N.T.S.



TYPICAL FULL DEPTH BITUMINOUS
CONCRETE PAVEMENT STRUCTURE
FOR STATION ENTRANCE DRIVE

SCALE: N.T.S.



MAINTENANCE ACCESS ROAD DETAIL

SCALE: N.T.S.

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

Filename: FDOTSH_DET_0014_0056_C-500.dgn

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Date Plotted: April 13, 2011

DESIGNER/DRAFTER: DAB/MG
CHECKED BY: RBC
SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

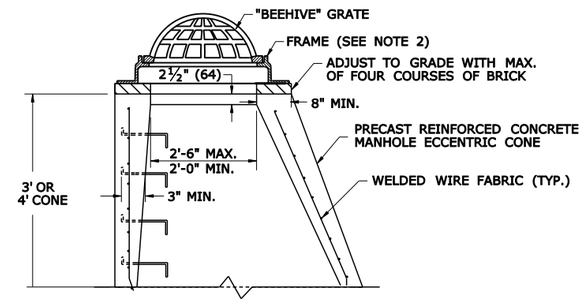
ENGINEER: BAKER ENGINEERING
APPROVED BY:
DATE: 04/13/2011

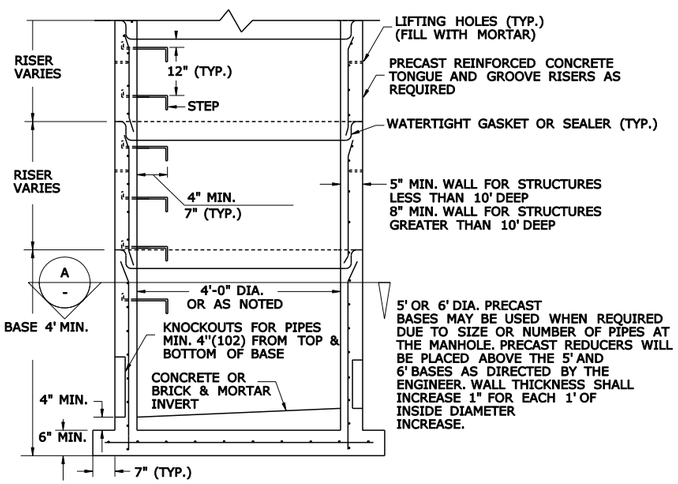
PROJECT TITLE:
SHORE LINE EAST
RAILROAD STATIONS

TOWN: BRANFORD

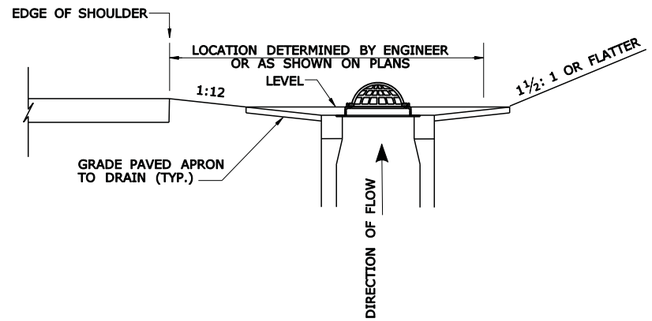
DRAWING TITLE: BRANFORD NORTH DETAILS

PROJECT NO. 310-0056
DRAWING NO. C-500
SHEET NO. 01.03.021

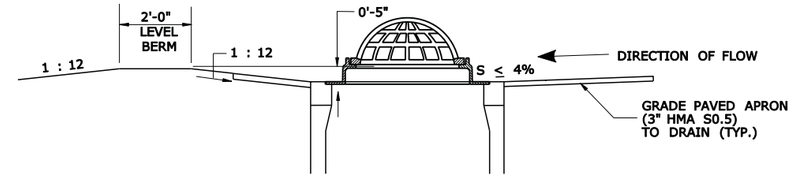




SPECIAL "BEEHIVE" CATCH BASIN

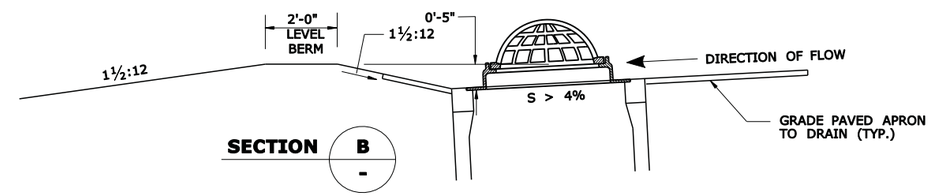


SECTION A



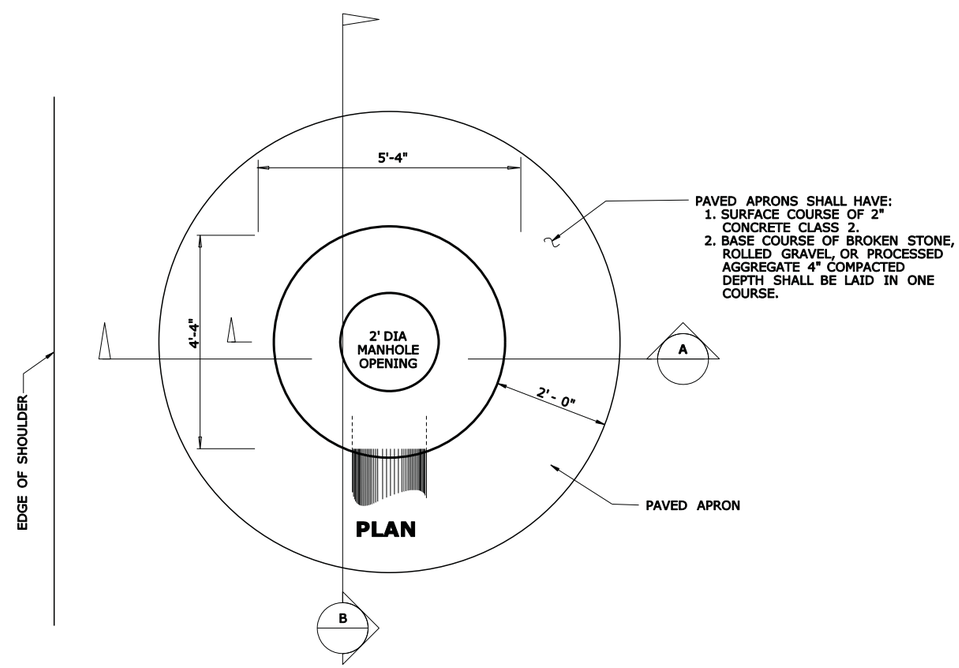
SECTION B

ON GRADES LESS THAN OR EQUAL TO 4%

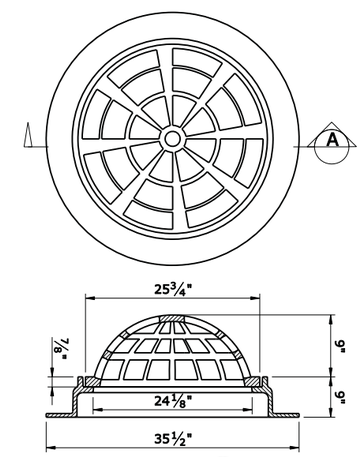


SECTION B

ON GRADES GREATER THAN 4%



PLAN



SECTION A

"BEEHIVE" INLET FRAME AND GRATE

NOTES:

1. SPECIAL CATCH BASIN SHALL BE DESIGNED BY A CONNECTICUT LICENSED ENGINEER FOR COOPER E-80 WHEN SUBJECT TO RAILROAD LOADING AND HS-20 WHEN SUBJECT TO VEHICULAR LOADING.
2. THE CONTRACTOR SHALL SUBMIT STAMPED SHOP DRAWINGS TO THE ENGINEER FOR APPROVAL.
3. SPECIAL CATCH BASIN SHALL RECEIVE DAMP PROOFING.
4. THE SPECIAL CATCH BASIN SHALL BE DESIGNED TO PREVENT FLOTATION. THE CONTRACTOR SHALL SUBMIT METHOD TO THE ENGINEER FOR APPROVAL.
5. COST OF THE FLAT SLAB TOP TO BE INCLUDED IN THE UNIT PRICE FOR "SPECIAL BEEHIVE CATCH BASIN".
6. BEEHIVE INLET FRAME AND GRATE SHALL CONFORM TO NEENAH FOUNDRY MODEL R-2560-E8 OR APPROVED EQUAL
7. COST OF FRAME AND GRATE SHALL BE INCLUDED UNDER THE ITEM "SPECIAL BEEHIVE TYPE CATCHBASIN"

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

Filename: FDOTMSH_DET_0014_0056_C-501.dgn

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Date Plotted: April 13, 2011

DESIGNER/DRAFTER: DAB/MG
CHECKED BY: RBC
SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

ENGINEER: BAKER ENGINEERING
APPROVED BY:
DATE: 04/13/2011

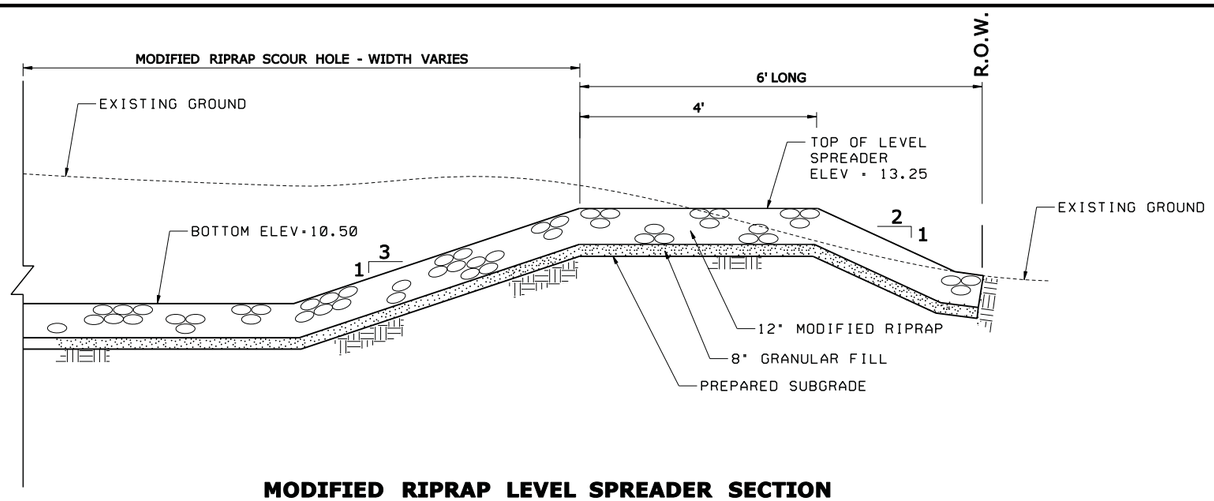
STATE OF CONNECTICUT — REGISTERED PROFESSIONAL ENGINEER — LICENSED

PROJECT TITLE: SHORE LINE EAST RAILROAD STATIONS

TOWN: BRANFORD

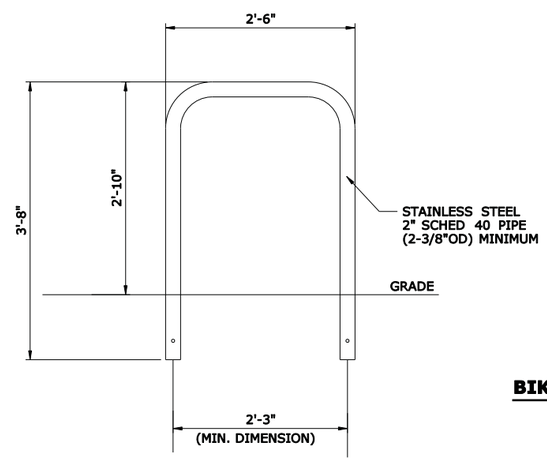
DRAWING TITLE: MISCELLANEOUS DETAILS

PROJECT NO. 310-0056
DRAWING NO. C-501
SHEET NO. 01.03.022



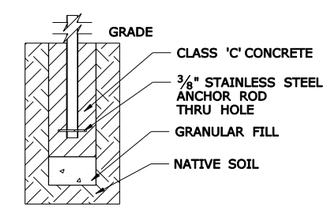
MODIFIED RIPRAP LEVEL SPREADER SECTION

SCALE: N.T.S



BIKE RACK ELEVATION VIEW

SCALE: N.T.S



BIKE RACK IN GROUND MOUNT

SCALE: N.T.S

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

Filename: FlightSH_DET.0014.0056.C-501.dgn

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Date Plotted: April 13, 2011

DESIGNER/DRAFTER: DAB/MG

CHECKED BY: RBC

SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

ENGINEER: BAKER ENGINEERING

APPROVED BY:

DATE: 04/13/2011

PROJECT TITLE: SHORE LINE EAST RAILROAD STATIONS

TOWN: BRANFORD

DRAWING TITLE: MISCELLANEOUS DETAILS

PROJECT NO. 310-0056

DRAWING NO. C-502

SHEET NO. 01.03.023

INTERDEPARTMENTAL MESSAGE **STATE OF CONNECTICUT**

To	NAME, TITLE Central Permit Processing Unit, 1st Floor	DATE 1-23-2009
	AGENCY, ADDRESS Department of Environmental Protection, 79 Elm Street, Hartford	
From	NAME, TITLE Edgar T. Hurle, Transportation Planning Director	TELEPHONE 594-2005
	AGENCY, ADDRESS Department of Transportation, 2800 Berlin Turnpike, Newington	

Subject: **Project No. 310-0047/0048**
Expansion of the Branford Railroad Station

Attached is the Flood Management Certification application for the subject project. Included in this application are 2 sets of plans, 1 original and 1 copy of the Flood Plain Management Permit application. This application documents the proposed regulated activity associated with the expansion of the Branford Railroad Station. A separate application for work associated with this project within a tidal wetland is being submitted to the Office of Long Island Sound. Should you have any questions regarding this matter, please contact Mr. John Bernick, Project Engineer, at (860) 594-3304.

Attachments

John E. Bernick/jeb/crj
bcc: Edgar T. Hurle - Cynthia S. Holden - Mark Alexander
Manager of State Design – Scott A. Hill – Keith A. Hall
Jayantha Mather – John D. Hanifin
Michael E. Masayda
S:\Stdes\Facil\310-0048\Permit\Submit FM.doc

Keith H.

FROM
JAMES

JAN 2 2009

HIGHWAY
FACILITY
PROJ DE
BRIDGE

STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Central Permit Processing Unit
79 Elm Street
Hartford, CT 06106-5127

DEP USE ONLY

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

Applicant: **Connecticut Department of Transportation**

2800 Berlin Turnpike, PO Box 317546

City/Town: **Newington** State: **CT** Zip Code: **06131**

Business Phone: **860-594-2005** ext.: Fax: **860-594-3028**

Contact Person: **Edgar T. Hurle** Phone: **860-594-2005** ext.

Applicant (check one): ☐ individual ☐ company ☐ federal gov't ☒ state agency ☐ municipality

If a Company, list company 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)*

State Project No. 310-0047 & 310-0048, Construction of infrastructure improvements to serve Branford, Ct Shoreline East Rail Station

Location (City/Town): **Branford**

Other Project Related Permits (*not* included with this form):

Permit Description	Issuing Authority	Submittal Date	Issuance Date	Denial Date	Permit #
TW / SD / 401	DEP OLISP	1/26/09			

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	$750.00			1 + 0
	Title V Operating Permits	none			1 + 0
	WATER DISCHARGES				
	To Groundwater	$1050.00			1 + 1
	To Sanitary Sewer (POTW)	$1050.00			1 + 1
	To Surface Water (NPDES)	$1050.00			1 + 2
	INLAND WATER RESOURCES-multiple permits 1 + 6 total copies				
	Dam Construction	none			1 + 2
N	Flood Management Certification	none	1		1 + 1
	Inland 401 Water Quality Certification	none			1 + 5
	Inland Wetlands and Watercourses	none			
	Stream Channel Encroachment Lines	★			
	Water Diversion	★			1 + 5
	OFFICE OF LONG ISLAND SOUND PROGRAMS				
	Certificate of Permission	$400.00			1 + 3
	Coastal 401 Water Quality Certification	none			1 + 3
	Structures and Dredging/Tidal Wetlands	$525.00			1 + 3
	WASTE MANAGEMENT				
	Aerial Pesticide Application	★			1 + 2
	Aquatic Pesticide Application	$100.00			1 + 0
	CGS Section 22a-454 Waste Facilities	★			1 + 1
	Hazardous Waste Treatment, Storage and Disposal Facilities	★			1 + 1
	Marine Terminal License	$125.00			1 + 0
	RCRA Closure Plan	$3750.00			1 + 0
	RCRA Post Closure	$3750.00			1 + 0
	Solid Waste Facilities	★			1 + 2
	Waste Transportation	★			1 + 0
		Subtotal ➡	1		
	GENERAL PERMITS and AUTHORIZATIONS Enter subtotals from Part IV, pages 3 & 4 of this form	Subtotals Page 3 ➡ Subtotals Page 4 ➡			
		TOTAL ➡	1		
	☐ Indicate whether municipal discount or state waiver applies.	Less Applicable Discount ➡		100%	
		AMOUNT REMITTED ➡		0	

Check # ➡ _____ Check or money order should be made payable to: "Department of 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	$5000.00			1 + 0
☐	Ionizing Radiation Registration	$200.00			1 + 0
☐	Emergency/Temporary Authorization	★★			★★
☐	Other, (please specify):				
	WATER DISCHARGES				
☐	Domestic Sewage	$500.00			1 + 0
☐	Food Processing Wastewater	$500.00			1 + 0
☐	Groundwater Remediation Wastewater to a Sanitary Sewer	$500.00			1 + 0
	Groundwater Remediation Wastewater to a Surface Water				1 + 0
☐	Registration Only	$500.00			
☐	Approval of Registration by DEP	$1000.00			
☐	Minor Non-Contact Cooling and Heat Pump Water	$500.00			1 + 1
☐	Minor Photographic Processing	$100.00			1 + 0
☐	Minor Printing & Publishing Wastewater	$500.00			1 + 0
☐	Minor Tumbling or Cleaning of Parts Wastewater	$1000.00			1 + 1
	Miscellaneous Discharges of Sewer Compatible Wastewater				1 + 1
☐	Flow < 5,000 gpd and fire sprinkler system testwater	$500.00			
☐	Flow > 5,000 gpd	$1000.00			
☐	Stormwater Associated with Commercial Activities	$500.00			1 + 0
☐	Stormwater Associated with Industrial Activities	$500.00			1 + 0
	Stormwater & Dewatering Wastewaters-Construction Activities				
☐	5 – 10 acres	$500.00			1 + 0
☐	> 10 acres	$1000.00			
☐	Stormwater from Small Municipal Separate Storm Sewer Systems (MS4)	$250.00			1 + 0
☐	Swimming Pool Wastewater - Public Pools and Contractors	$500.00			1 + 0
	Vehicle Maintenance Wastewater				
☐	Registration Only	$500.00			1 + 0
☐	Approval of Registration by DEP	$1000.00			
☐	Water Treatment Wastewater	$500.00			1 + 0
☐	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):				
	AQUIFER PROTECTION PROGRAM				
☐	Registration for Regulated Activities	$500.00			1 + 0
☐	Permit Application to Add a Regulated Activity	$1000.00			1 + 0
☐	Exemption Application from Registration	$1000.00			1 + 0
	Note: Carry subtotals over to Part III, page 2 of this form. Subtotal ➡				

★★ 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
	INLAND WATER RESOURCES				
☐	Dam Safety Repair and Alteration	$1000.00			1 + 2
☐	Diversion of Water for Consumptive Use: Reauthorization Categories	$1000.00			1 + 2
☐	Diversion of Water for Consumptive Use: Authorization Required	$2500.00			1 + 5
☐	Diversion of Water for Consumptive Use: Filing Only	$1500.00			1 + 4
☐	Habitat Conservation	$1000.00			1 + 2
☐	Lake, Pond and Basin Dredging	$1000.00			1 + 2
☐	Minor Grading	$1000.00			1 + 2
☐	Minor Structures	$1000.00			1 + 2
☐	Utilities and Drainage	$1000.00			1 + 2
☐	Emergency/Temporary Authorization	★★			★★
☐	Other, (please specify):				
	OFFICE OF LONG ISLAND SOUND PROGRAMS				
☐	4/40 Docks	$700.00			1 + 1
☐	Non-harbor Moorings	$100.00			1 + 0
☐	Osprey Platforms and Perch Poles	none			1 + 0
☐	Pump-out Facilities (no fee for Clean Vessel Act grant recipients)	$100.00			1 + 0
☐	Remedial Activities Required by Order	$700.00			1 + 0
☐	Residential Flood Hazard Mitigation	$100.00			1 + 0
☐	Swim Floats	$100.00			1 + 0
☐	Emergency/Temporary Authorization	★★			★★
☐	Other, (please specify):				
	WASTE MANAGEMENT				
☐	Addition of Grass Clippings at Registered Leaf Composting Facilities	$500.00			1 + 0
☐	Asbestos Disposal Authorization	$240.00			1 + 0
☐ ☐	Contaminated Soil and/or Staging Management (Staging/Transfer) Registration Only Approval of Registration by DEP	 $250.00 $1500.00			 1 + 0 1 + 0
☐	Disassembling Used Electronics	$1000.00			1 + 0
☐	Drop-site Recycling Facility	$200.00			1 + 0
☐	Leaf Composting Facility	none			1 + 1
☐	Limited Processing Recycling Facility	$500.00			1 + 0
☐	One Day Collection of Household Hazardous Waste and Hazardous Waste from Certain Generators	$500.00			1 + 0
☐	Recyclables Transfer Facility	$500.00			1 + 0
☐	Single Item Recycling Facility	$500.00			1 + 0
☐	Special Waste Authorization	$525.00			1 + 0
☐	Storage and Distribution of Two (2) Inch Nominal Tire Chip Aggregate	$500.00			1 + 0
☐	Storage and Processing of Asphalt Roofing Shingle Waste and/or Storage and Distribution of Ground Asphalt Aggregate	★			1 + 0
☐	Storage and Processing of Scrap Tires for Beneficial Use	$1000.00			1 + 0
☐	Emergency/Temporary Authorization	★★			★★
☐	Other, (please specify):				
	Note: Carry subtotals over to Part III, page 2 of this form. Subtotal ➡				

Permit Application for Programs Administered by the Inland Water Resources Division

DEP USE ONLY

Please complete this application form in accordance with the instructions (DEP-IWRD-INST-100) in order to ensure the proper handling of your application. Print or type unless otherwise noted. You must submit the *Permit Application Transmittal Form* (DEP-APP-001) and the initial fee along with this form.

Part I: Application Type

Check the appropriate box identifying the application type.

This application is for (check one):	Please identify any previous or existing permit/authorization/registration number in the space provided.
☒ A *new* application	Existing permit/authorization/registration number:
☐ A *renewal* of an existing permit	
☐ A *modification* of an existing permit	Expiration Date:

Part II: Permit Type and Fee Information

Please note: effective August 21, 2003, the application fees for the programs administered by the Inland Water Resources Division has increased as listed in the following table. The fee for municipalities is 50% of the listed rates.

Type of Permit (check *all* that apply):	Fee to submit with application:
☐ **Inland Wetlands & Watercourses** CGS Sec. 22a-36 et seq.	none
☐ **Dam Construction** *CGS Sec. 22a-403*	none
☐ **401 Water Quality Certificate** *33 U.S.C. 1341*	none
☒ **Flood Management Certification** *CGS Sec. 25-68(b) - (h)*	none
Stream Channel Encroachment *CGS Sec. 22a-342*	
☐ No change in grade and no construction of above-ground structures	$375.00
☐ A change in grade and no construction of above-ground structures	$750.00
☐ A change in grade and above-ground structures or buildings	$3,750.00
Water Diversion: Consumptive Use *CGS Sec. 22a-372(e)*	
☐ Withdrawal > 0.05 and < 0.5 mgd	$1,800.00
☐ Withdrawal ≥ 0.5 and < 2.0 mgd	$3,750.00
☐ Withdrawal ≥ 2.0 mgd	$6,000.00
Water Diversion: Nonconsumptive Use *CGS Sec. 22a-372(e)*	
☐ Watershed < 0.5 sq mi	$1,800.00
☐ Watershed ≥ 0.5 sq mi and < 2.0 sq mi	$3,750.00
☐ Watershed ≥ 2.0 sq mi	$6,000.00

Part III: Applicant Information

1. Fill in the name of the applicant(s) as indicated on the *Permit Application Transmittal Form* (DEP-APP-001):

   Applicant: **Connecticut Department of Transportation**

   Phone: **860-594-2005** ext. Fax: **860-594-3028**

   ☐ Check here if there are co-applicants. If so, label and attach additional sheet(s) with the required information to this sheet.

2. Applicant's interest in property at which the proposed activity is to be located:

   ☒ site owner ☐ option holder ☐ lessee

   ☐ easement holder ☐ operator ☐ other (specify):

3. List primary contact for departmental correspondence and inquiries, if different than the applicant.

   Name: **Connecticut Department of Transportation**

   Mailing Address: **2800 Berlin Turnpike P.O. Box 317546**

   City/Town: **Newington** State: **CT** Zip Code: **06131-7546**

   Business Phone: **860-594-2931** ext. Fax: **860-594-3028**

   Contact Person: **Mark W. Alexander** Title: **Supervising Planner**

4. List attorney or other representative, if applicable:

   Firm Name:

   Mailing Address:

   City/Town: State: Zip Code:

   Business Phone: ext. Fax:

   Attorney:

5. Facility or Property Owner, if different than the applicant:

   Name:

   Mailing Address:

   City/Town: State: Zip Code:

   Business Phone: ext. Fax:

   Contact Person: Title:

   Home address of owner (for Inland Wetlands applications only):

   Mailing Address:

   City/Town: State: Zip Code:

   Home Phone:

Part III: Applicant Information (continued)

6. List any engineer(s) or other consultant(s) employed or retained to assist in preparing the application or in designing or constructing the activity. ☒ Check here if additional sheets are necessary, and label and attach them to this sheet.

Name: Michael Baker Engineering, Inc.

Mailing Address: 500 Enterprise Drive

City/Town: **Rocky Hill** State: **CT** Zip Code: **06067**

Business Phone: **860-563-3044** ext. **2416** Fax: **860-529-6627**

Contact Person: **David B. Tudryn** Title: **Project Manager**

Service Provided: **Engineering Design/ Permit Application Preparation**

Part IV: Site Information

1. **Site Location:**

a. Name of facility, if applicable: **Branford RR Station Infrastructure Improvements**

Street Address or Description of Location: **South of I-95 Exit 54 at 35 Maple Street**

City/Town: **Branford** State: **CT** Zip Code: **06405**

Project No., if applicable: **310-0047, 310-0048**

b. Tax Assessor's Reference: Map Block Lot

(Assessor's reference is not required if requester is an agency of the State of Connecticut.)

c. Latitude and Longitude of the approximate "center of the site" in *degrees, minutes, and seconds*:

Latitude: **41 deg. 16' 27" N** Longitude: **72 deg. 49' 6" W**

Method of determination (check one):

☐ GPS ☒ USGS Map ☐ Other (please specify):

If a USGS Map was used, provide the quadrangle name: **Branford, Conn 41072-C7-TF-024**

d. Drainage Basin number(s) wherein the proposed activity will take place: **5000**

e. Flood Insurance Rate Map Panel Number: **090073 0003D**

Date of the map referenced: **6/16/1992**

f. If applying for a SCEL permit, identify the property wherein the proposed activity will take place by indicating the following:

SCEL Map number(s):

Property Identifier:

Date of the map referenced:

2. Is the activity which is the subject of this application located within the coastal boundary as delineated on DEP approved coastal boundary maps? ☒ Yes ☐ No

If yes, and this registration is for a new permit or for a modification of an existing permit, you must submit a *Coastal Consistency Review Form* (DEP-APP-004) with your application as Attachment P.

For forms or assistance, please call the Permit Assistance Office at 860-424-3003.

Connecticut Department of Transportation
State Project No. 310-0047, 310-0048 – Branford Railroad Station Improvements

Part III: Applicant Information

Question 6: List any engineers or other consultants employed or retained to assist in preparing the application or in designing or constructing the activity:

(continued)

Name: Fitzgerald & Halliday, Inc.
Mailing Address: 72 Cedar Street, Hartford, CT 06106
Business Phone: 860-247-7200
Fax: 860-247-7206
Contact Person: Marianne Latimer
Title: Principal Planner
Services Provided: Permit Application Coordination and Preparation

Part IV: Site Information (continued)

3. Is the project site located within an area identified as a habitat for endangered, threatened or special concern species as identified on the "State and Federal Listed Species and Natural Communities Map"?

   ☒ Yes ☐ No Date of Map: **12/2007**

   If yes, complete and submit a *Connecticut Natural Diversity Data Base* (CT NDDB) *Review Request Form* (DEP-APP-007) to the address specified on the form.

   When submitting this permit application, please include copies of any correspondence provided to or received from the NDDB, including copies of the completed CT NDDB Review Request Form, any field surveys, and any other information which may lead you to believe that endangered or threatened species may or may not be located in the area of your existing or proposed permitted activity, as Attachment K (Environmental Report) or in Attachment Q if no environmental report is required.

   Has a field survey been conducted to determine the presence of any endangered, threatened or special concern species? ☐ Yes ☒ No If yes, provide:

   Biologist's Name:

   Address:

   and submit a copy of the field survey with your application as an Attachment as specified above.

4. Is the site located within an aquifer protection area as defined in Section 22a-354a through 354bb of the General Statutes? ☐ Yes ☒ No

5. List any previous federal, state or local permits or certificates that have already been issued for the site or for the proposed activity:

Type or Nature of Permit	Permit No. Issuing Authority	Date Issued	Expiration Date	Permittee Name

Part V: Supporting Documents

Please check the attachments submitted as verification that *all* applicable attachments have been submitted with this application form. 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 applicant's name as indicated on the *Permit Application Transmittal Form.* The specific information required in each attachment is described in the *Instructions for Completing A Permit Application for Inland Water Resources Division Activities* (DEP-IWRD-INST-100).

☒	Attachment A:	Executive Summary
☒	Attachment B:	An 8 1/2" x 11" copy of a United States Geological Survey (USGS) Topographic Quadrangle Map (scale: 1:24,000) with the regulated activity or project site outlined or pinpointed, as appropriate.
☐	Attachment C:	*Documentation Form for: Inland Wetlands and Watercourses Permit, Stream Channel Encroachment Line Permit, and 401 Water Quality Certification* (DEP-IWRD-APP-101)
☐	Attachment D:	*Documentation Form for Water Diversion Permit* (DEP-IWRD-APP-102)
☐	Attachment E:	*Documentation Form for a Dam Construction Permit* (DEP-IWRD-APP-103)

Part V: Supporting Documents (continued)

- ☒ Attachment F: *Documentation Form for Flood Management Certification* (DEP-IWRD-APP-104) (State Agencies Only)
- ☒ Attachment G: Plan Sheets and Drawings
- ☒ Attachment H: Engineering Documentation
  - Part 1: *Engineering Report Checklist* (DEP-IWRD-APP-105A) and an Engineering Report
  - Part 2: *Hydrologic and Hydraulic Consistency Worksheet* (DEP-IWRD-APP-105B)
    - Section I: Floodplain Management
    - Section II: Stormwater Management
    - *For state agencies only:*
    - Section III: State Grants and Loans
    - Section IV: Disposal of State Land
- ☒ Attachment I: Flood Contingency Plan
- ☐ Attachment J: Soil Scientist Report (not required for Flood Management Certification)
- ☐ Attachment K: Environmental Report (not required for Flood Management Certification)
- ☐ Attachment L: Mitigation Report - wetlands and watercourses, fish and wildlife (not required for Flood Management Certification)
- ☐ Attachment M: Alternatives Assessment (not required for Flood Management Certification)
- ☐ Attachment N: *Applicant Compliance Information Form* (DEP-APP-002) (not required for Flood Management Certification or 401 Water Quality Certification Approvals)
- ☐ Attachment O: *Applicant Background Information Form* (DEP-APP-008) (not required for Flood Management Certification)
- ☐ Attachment P: *Coastal Consistency Review Form* (DEP-APP-004) (if applicable)
- ☒ Attachment Q: Other Information: any other information the applicant deems relevant or is required by DEP.

Number of Copies of Application:

Submit one original of all application forms, certifications, reports and supporting documents and the number of photocopies of all such materials as noted on the *Permit Application Transmittal Form*. When applying for more than one permit, you should submit the original and no more than six copies.

Part VI: Application Certification

The applicant *and* **all** individuals responsible for actually preparing the application or supporting documentation must sign this part. An application will be considered insufficient unless **all** required signatures are provided. You must include signatures of any person preparing any report or parts thereof filed in support of this application (i.e., professional engineers, surveyors, soil scientists, biologists, environmental and other consultants, etc.).

"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 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.

I certify that this application is on complete and accurate forms as prescribed by the commissioner without alteration of the text.

I certify that I will comply with all notice requirements as listed in Section 22a-6g of the General Statutes."

Signature of Applicant	Date 1/23/2009
Edgar T. Hurle Name of Applicant (print or type)	**Transportation Planning Director** Title (if applicable)
Signature of Preparer (if different than above)	Date 1/22/09
David B. Tudryn Name of Preparer (print or type)	**Project Manager** Title (if applicable)

☐ Check here if additional signatures are required.

If so, please reproduce this sheet and attach signed copies to this sheet.

Reminder: After submitting this application to DEP, except in the case of a Flood Management Certification, you must publish a notice of the application immediately and submit a certified copy of this published notice to DEP. See "Notice of Permit Application" section in the instructions (DEP-IWRD-INST-100).

List the name of the newspaper the Notice of Permit Application will be published in:

Note: Please submit the *Permit Application Transmittal Form*, Application Form, Fee, and all Supporting Documents to:

CENTRAL PERMIT PROCESSING UNIT
DEPARTMENT OF ENVIRONMENTAL PROTECTION
79 ELM STREET
HARTFORD, CT 06106-5127

ATTACHMENT A

EXECUTIVE SUMMARY

Shore Line East Expansion Program - Branford Railroad Station
Branford, Connecticut

1. Project Summary
2. Project Background
3. Site Design
4. Flood Plain Elevation Determinations
5. Work Within the Flood Plain
6. Culvert Design
7. Construction Sequencing
8. Environmental Material Handling
9. Other Environmental Concerns
10. Flood Emergency Measures

1. Project Summary

As shown in *Figure BR-1*, the subject project area in Branford, Connecticut is roughly bounded by Elm Street on the north, Harbor Street on the west, Curve Street on the south and Indian Neck Avenue on the east.

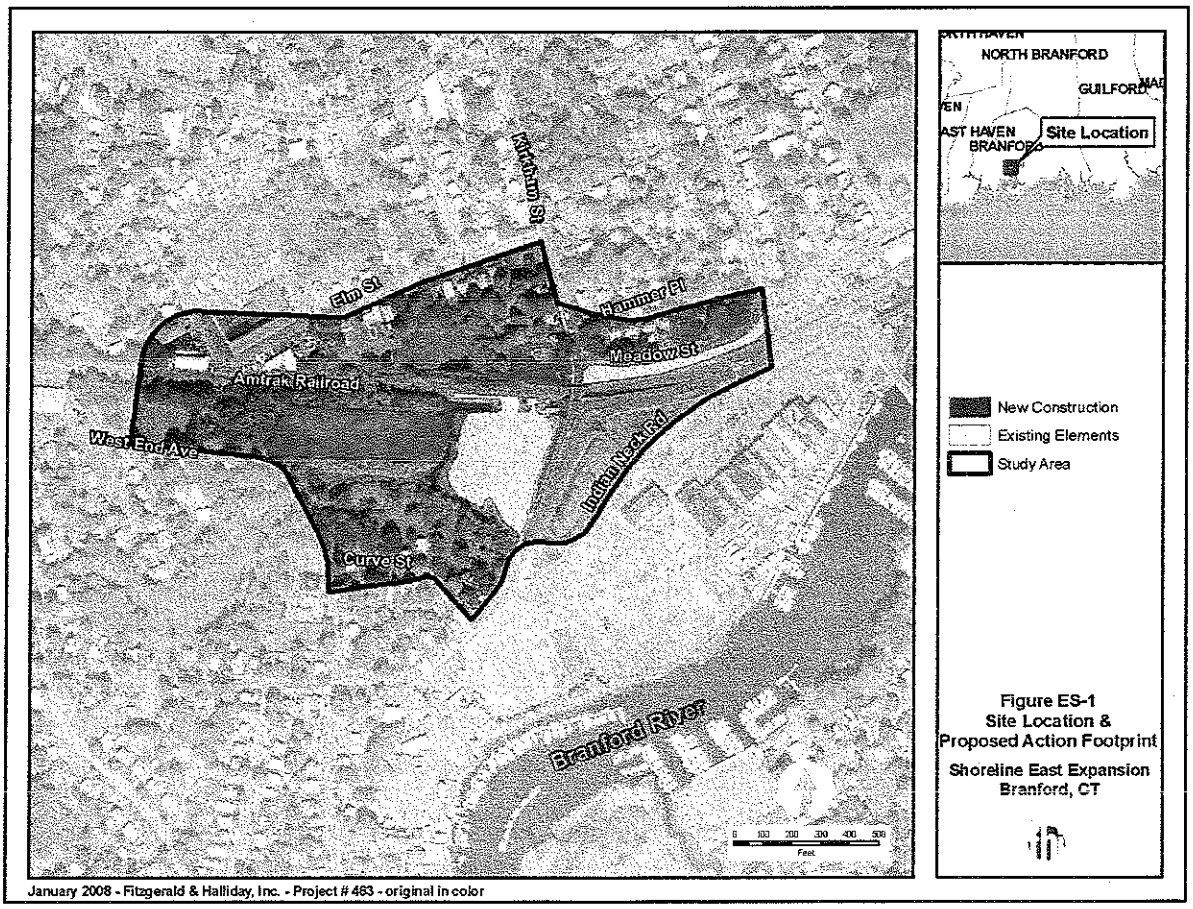


Figure BR-1: Project Area

ConnDOT is in the process of making infrastructure and service improvements to the Shore Line East (SLE) commuter rail service so that it will be fully capable of meeting future

commuter rail passenger needs. The proposed upgrades defined in this narrative include infrastructure improvements at the new Branford Railroad Station, which include:

- A new north-side high level rail platform located directly opposite the existing south-side high level rail platform.
- A new pedestrian bridge over the active rail line that will connect the north-side and south-side platforms. The new pedestrian bridge will include elevators to satisfy the requirements of the Americans with Disabilities Act (ADA).
- A new 316-space surface parking lot located on a vacant undeveloped parcel to the west of the existing 201-space surface parking lot. The new surface lot will provide pedestrian connections (walkways and ramps) to the existing south-side high level rail platform. Access to the new parking lot will be obtained from the existing station entrance at the Maple Street/Indian Neck Avenue signalized intersection.
- A new kiss-and-ride drop off area located to the north of the existing rail corridor with direct pedestrian connections (walkways and ramps) to the station via the new north-side high level rail platform.
- Re-use of the former rail station parking lot located north of the rail corridor along Meadow Street (access to the lot is presently blocked by guide rails). The existing paved lot will be refurbished and re-striped to provide approximately 52-spaces that will function as overflow parking. New pedestrian connections from the overflow parking lot to the new station will include walkways, stairs, and a crosswalk on Kirkham Street.

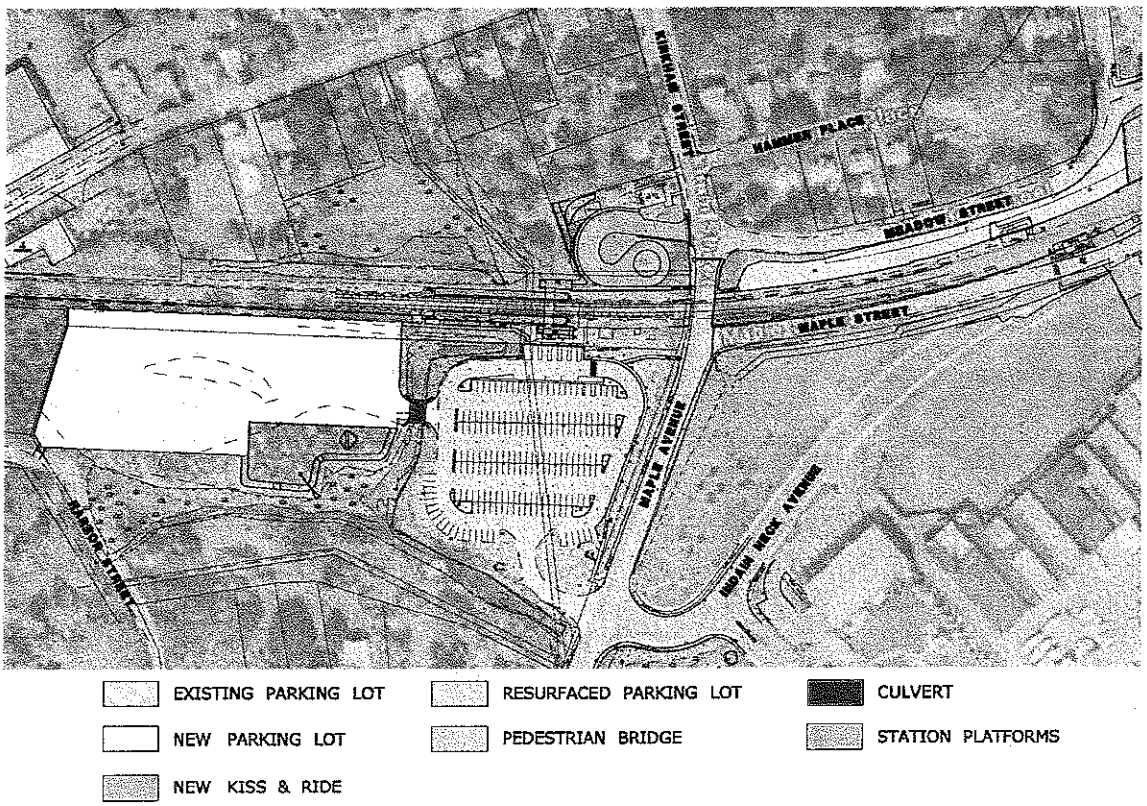


Figure BR-2: Proposed Improvements to Branford Station

2. Project Background

Shore Line East (SLE) trains are owned and operated by ConnDOT under contract with the Northeast Passenger Railroad Corporation (Amtrak) to provide daily rail operations. SLE commuter rail operations began in May of 1990 serving seven stations along a 33-mile segment of Amtrak's Northeast Corridor between New Haven and Old Saybrook. The service was extended by ConnDOT eastward to New London in 1996. Shore Line East operates in the peak direction only and in the morning connects at New Haven, Bridgeport and Stamford stations for Metro-North service to New York City's Grand Central Terminal. Since its inception, there has been a steady increase in SLE ridership. This trend is anticipated to persist into the future especially as improvements are made to the service, congestion on I-95 worsens, and gas prices continue to rise.

The August 2005 opening of the improved Branford SLE Station involved building the south-side high level rail platform in addition to a commuter shelter and 201-space surface parking lot. However, there is a need to provide high-level rail platforms on both sides of the rail corridor at each SLE station because the current lease agreement between ConnDOT and Amtrak that allows SLE trains to operate on one track only is not indefinite and is scheduled to expire within 10 years. The agreement specifies that high-level rail platforms are required on both sides of the tracks prior to adding future SLE service outside of the current rush hour period. A January 1, 2007 ConnDOT report to the Governor entitled, "Expanding Rail Service on Shore Line East" calls for bi-directional service on weekdays and between New Haven and New London in the future. In order to meet Amtrak lease requirements and to provide bi-directional service, a new north-side high-level rail platform at the Branford SLE Station and at other SLE stations is necessary. The dual platform configuration will benefit commuters in that: 1) a two-sided station will increase ridership and therefore reduce traffic congestion on coastal roadway corridors by allowing for two-way commuting on the SLE corridor, and 2) having two platforms allows more flexibility in how trains are scheduled and will allow additional trains to operate on the line in the future. The new platform and parking area will be financed with state funds.

Property History/Contamination
The site has historically been known as the former Branford Malleable Iron Fittings Company (MIF) site, which encompassed land on both sides of Maple Street. Early records indicate that much of this site was wetland fed hydraulically by an un-named tidal stream. The stream and wetland areas were, and continue to be, influenced by tidal action in the Branford River. A 1951 aerial photo indicates that this land remained primarily undisturbed at that time. Subsequent aerial photos in 1970 and 1985 show the addition of a culvert spanning the tidal stream. In the near future the Connecticut DOT will purchase the property from a private owner for construction of the additional parking area.

Top

3. Site Design

Project Phases
The project is divided into two distinct ConnDOT projects. Branford Parking Lot, (ConnDOT Project #310-0047) includes all the proposed expansion of parking areas south of the railroad tracks. Branford North (ConnDOT Project #310-0048) includes all proposed development north

of the railroad tracks and west of Kirkham Street, as well as the north platform and pedestrian overpass connecting the north and south platforms. A construction phase diagram is attached to the permit document for reference.

Design Approach – Branford Parking Lot
The existing Branford South region generally drains from west to east. The proposed region will retain similar patterns, draining from northwest to southeast. A wet pond, including forebay, is proposed at the southeast corner of the region. Approximately 50% of the Branford expansion parking runoff will be treated for water quality through use of a grass swale to the south of the parking lot. Upon treatment through the swale, this runoff is collected in two catch basins and piped through several more catch basins which along with an independent catch basin at the southeast corner of the proposed parking lot collect the balance of the site runoff which will then flow to the forebay of the wet retention pond. The forebay is sized to treat approximately 20% of the WQV, and the entire WQV is retained below the elevation of the lowest orifice on the pond control structure.

Design Approach – Branford North
The existing Branford North region generally drains from east to west. The proposed region is divided into two sub-regions, North Hill and Developed South. The design point for both sub-regions is the northwest corner of the Branford North site. The proposed North Hill region contains no impermeable area, and runoff travels through grass as it progresses to the design point. The Developed South sub-region includes the majority of the drainage area. The runoff is collected in catch basins throughout the site and through porous pavement at the terminus of the cul-de-sac. The runoff is transferred into a recharge bed below the porous pavement. Besides providing detention, the recharge bed treats runoff by permitting infiltration into the soil below the bed. The Branford North WQV is detained in the recharge bed for 24 hours through use of a low-flow orifice.

Runoff from the Proposed Station Facility
Discharge from the north platform canopy, stair tower roofs, and pedestrian bridge roof will be collected through roof leaders. The leaders will connect to a perforated underdrain that runs the length of the platform canopy and ties into the proposed drainage system on the north side.

Alternative Site Design
As recommended in the 2004 SQM Chapter 4.3 "Alternative Site Design", the planned site improvements include several measures associated with the design of vehicular traffic surfaces:

- *Reducing Street Widths*
  The proposed drive lanes in the new parking lot are set to ConnDOT minimum standards (12'-0" for single-direction traffic).

- *Reducing Parking Lot Size*
  The proposed parking lot spaces were made angled to achieve the required parking lot capacity while minimizing the impervious areas.

- *Using Permeable Paving Materials*
  The north-side kiss and ride areas utilize porous asphalt to the greatest extent possible to increase infiltration and reduce stormwater runoff.

Top

4. Flood Plain Elevation Determinations

Flood Plain
Based on the Flood Insurance Rate Map (FIRM) for the Town of Branford, Connecticut, New Haven County (Federal Emergency Management Administration [FEMA], June 16, 1992); the site resides in a 100-year floodplain. The floodplain is associated with high waters of the unnamed tidal creek that abuts the site, which is connected to, and therefore influenced by, the Branford River floodplain.

The FIRM indicates that the elevation of the 100-year floodplain in the area of the site is 10.8 feet. Because the site is in the Coastal Zone, the 100-year floodplain is recognized by the CTDEP Coastal Area Management Program as a coastal flood hazard zone. There is no designated floodway associated with the creek.

Top

5. Work Within the Flood Plain

Description of Work within the Flood Plain
Construction of the parking lot will require filling and grading of the undeveloped site so that its finished elevation gradually slopes from the northwest (proposed elevation 14.5 feet above mean sea level (NGVD) to the southeast [proposed elevation 12.5 feet NGVD]). The elevation of the southeastern portion of the new parking lot will then transition to the elevation of the existing 201-space parking lot across the culvert. The entire proposed parking lot is above the 10.8' (NGVD) floodplain elevation.

The proposed kiss-and-ride drop off area is located partially within the 100-year floodplain and will require the placement of fill within the floodplain in order to achieve the design elevation.

The effect of this fill on the level of the 100-year flood event is negligible due to the size of the floodplain, considering the coastal nature of the site, as shown below.

Region	Fill area in floodplain	Fill volume in floodplain	Fill volume up to 10.8'*
Branford South	50,000 sq. ft.	6100 cu. yd.	2400 cu. yd.
Branford North	13,000 sq. ft.	2700 cu. yd.	800 cu. yd.
TOTAL	**63,000 sq. ft.**	**8800 cu. yd.**	**3200 cu. yd.**

* - This column removes fill above the 100-yr flood elevation, showing the effective reduced capacity of the floodplain

Overall, the project will cause a small loss of flood storage capacity (volume) associated with the placement of fill to construct the new parking lot and kiss-and-ride drop off area. Due to the immense size of the floodplain, which connects with the Branford River coastal floodplain, this loss will be negligible and will not cause a change in flooding patterns or severity elsewhere.

Top

6. Culvert Design

The proposed open bottom arched culvert will be a pre-engineered structure. The span is 28'-0", which spans over the stream. Deep H-piles will be driven to support the structure and reduce the amount of excavation required. The width of the structure has been limited to support only two-directional vehicular traffic without provisions for pedestrian sidewalks. Cofferdams will be installed outside the stream to facilitate construction of the required deep piles and the cast-in-place pile cap/wing wall footings. The CT DEP 2002 Connecticut Guidelines for Soil Erosion and Sediment Control will be followed.

Top

7. Construction Sequencing

Overall Sequence of Construction;
Phase 1 (BRP), Branford West Parking Lot (*Parking lot expansion only)*

a. Construct temporary site access drive from Harbor Street and from the existing commuter lot. Both entrances will be utilized until the culvert has been completed.
b. Install anti-tracking pads at both access points as directed by the engineer.
c. Install temporary construction facilities, erosion and sedimentation controls. For material used for type 'e' and type 'f' erosion control matting, the contractor shall refer to the 'approved products list' issued by the ConnDOT Office of Research and Materials.
d. Install perimeter fencing to clearly define and secure the construction area.
e. Provide temporary power.
f. Mark trees and buffer areas for preservation.
g. Clear and grub site in preparation for parking area, platform construction and necessary work/staging area. Limits of site will be available to contractor for construction activities.
h. Establish waste stockpile area.
i. Install underground closed drainage facilities and grade parking lot per plans, finalizing grading in higher elevation regions first. Clean, excavated material from the platform footing excavation may be reused for parking lot grading if approved by the state environmental on-call engineer.
j. Install retention pond, forebay, outlet and riprap apron.
k. Construct grass swale along the south side of the parking lot. Stabilize soils with woven mulch and netting prior to turf establishment.
l. Bridge Construction
    1. Install turbidity control curtains upstream and downstream of proposed bridge.
    2. The area around the proposed pile cap and wing wall foundations will be excavated with a backhoe to an elevation of 7.0' NVGD.
    3. Construct temporary sediment basin for dewatering discharge.

4. Install temporary cofferdams outside the tidal stream high tide limits for construction of the deep piles and pile caps. Maintain a dry area by dewatering. All dewatering operations will run through a series of sedimentation control features in compliance with CT DEP's Stormwater Quality Manual prior to discharge.
5. Excavate area behind the cofferdams to -0.25' (bottom of pile cap).
6. Drive steel H-piles for support of bridge.
7. Form and pour the pile caps and wing wall foundations within the cofferdams. Backfill to an elevation equal to the top of pile cap (equal to the high tide line).
8. Excavate and remove the existing culvert. Dredge/grade the area to match the existing tidal stream banks adjacent to the work area. (Tidal stream is now free flowing with turbidity curtains still in place until end of construction.)
9. Install precast concrete arch sections on pile caps
10. Form and pour wing walls and backfill the surrounding area to subbase level
11. Terminate dewatering activity and remove sheet piling.
12. Install concrete parapets and bridge rail.
13. Provide roadway subbase across bridge.
14. Install native plant species along outside edge of wetlands where disturbance has occurred.
15. Remove turbidity control curtains. Maintain other sedimentation and erosion control devices until all station upgrade activities are complete.

m. Install electrical service.
n. Locate site lighting and install light pole bases, conduits and grounds.
o. Set parking lot curbing and sub-base.
p. Complete site grading and dismantle waste stockpile area.
q. Re-grade waste stockpile area.
r. Install concrete sidewalks
s. Install light poles and fixtures
t. Complete landscaping and turf establishment.
u. Complete sub-base and paving.
v. Complete line striping.
w. Complete punch-list items.
x. Remove the temporary construction facilities. Clean up the site and prepare for owner acceptance and public use.

Sequence of Construction;
Phase 2 (BR), Branford North Side Kiss and Ride (*includes rail platform and facility improvements – may be separate construction contract/schedule from Phase I)*

a. Demolish structures on property and perform preliminary grading to provide access to site.
b. Install anti-tracking pads as directed by the engineer.
c. Install temporary construction facilities, erosion and sedimentation controls. For material used for type 'e' and type 'f' erosion control matting, the contractor shall refer to the 'approved products list' issued by the ConnDOT Office of Research and Materials.
d. Install perimeter fencing to clearly define and secure the construction area.
e. Provide temporary power.
f. Mark trees and buffer areas for preservation.
g. Clear and grub site in preparation for driveway construction and necessary work/staging area. Limits of site will be available to contractor for construction activities.
h. Establish waste stockpile area.

i. Install underground closed drainage facilities and grade driveway per plans, finalizing grading in higher elevation regions first. Clean, excavated material from the platform footing excavation may be reused for parking lot grading if approved by the state environmental on-call engineer.
j. Install recharge bed, outlet and riprap apron.
k. Install erosion control matting at the bottom of the northern embankment. Stabilize soils with woven mulch and netting prior to turf establishment.
l. Install electrical service.
m. Locate site lighting and install light pole bases, conduits and grounds.
n. Set parking lot curbing and sub-base.
o. Complete site grading and dismantle waste stockpile area.
p. Re-grade waste stockpile area.
q. Install concrete sidewalks
r. Install light poles and fixtures
s. Complete landscaping and turf establishment.
t. Complete sub-base and paving, including porous pavement.
u. Complete line striping.
v. Complete punch-list items.
w. Remove the temporary construction facilities. Clean up the site and prepare for owner acceptance and public use.

Top

8. Environmental Material Handling

The lot will effectively cap and therefore isolate and limit the potential for exposure to and/or leaching of subsurface hazardous materials and contamination that has been identified on the 5.38 acre vacant parcel. A Health and Safety Plan will be developed and implemented in accordance with Occupational Safety and Health Administration (OSHA) guidelines to ensure that construction workers and adjacent natural resources are protected from potential contamination and other hazards.

Top

9. Other Environmental Concerns

Groundwater
Monitoring wells were installed on a portion of the Proposed Action site as part of a groundwater analysis program that was conducted in conjunction with a Task 210 Surficial Site Investigation by GEI Consultants, Inc. in February 2000. Groundwater in the area was found to be approximately five to six feet below the surface and tidally influenced. Analytic results were compared to the January 1996 Connecticut Remediation Standard Regulations (RSRs) Pollutant Mobility Criteria (PMC) and found to be within acceptable levels. Thus, groundwater is not contaminated at the site.

Threatened and Endangered Species

Coordination with the CTDEP Natural Diversity Data Base (NDDB) regarding threatened and endangered species was conducted during the EIE process. This yielded a reply from the NDDB dated October 25, 2007. Based on current NDDB information, no federal or state endangered, threatened or special concern species are known to occur on the Proposed Action site.

Top

10. Flood Emergency Measures

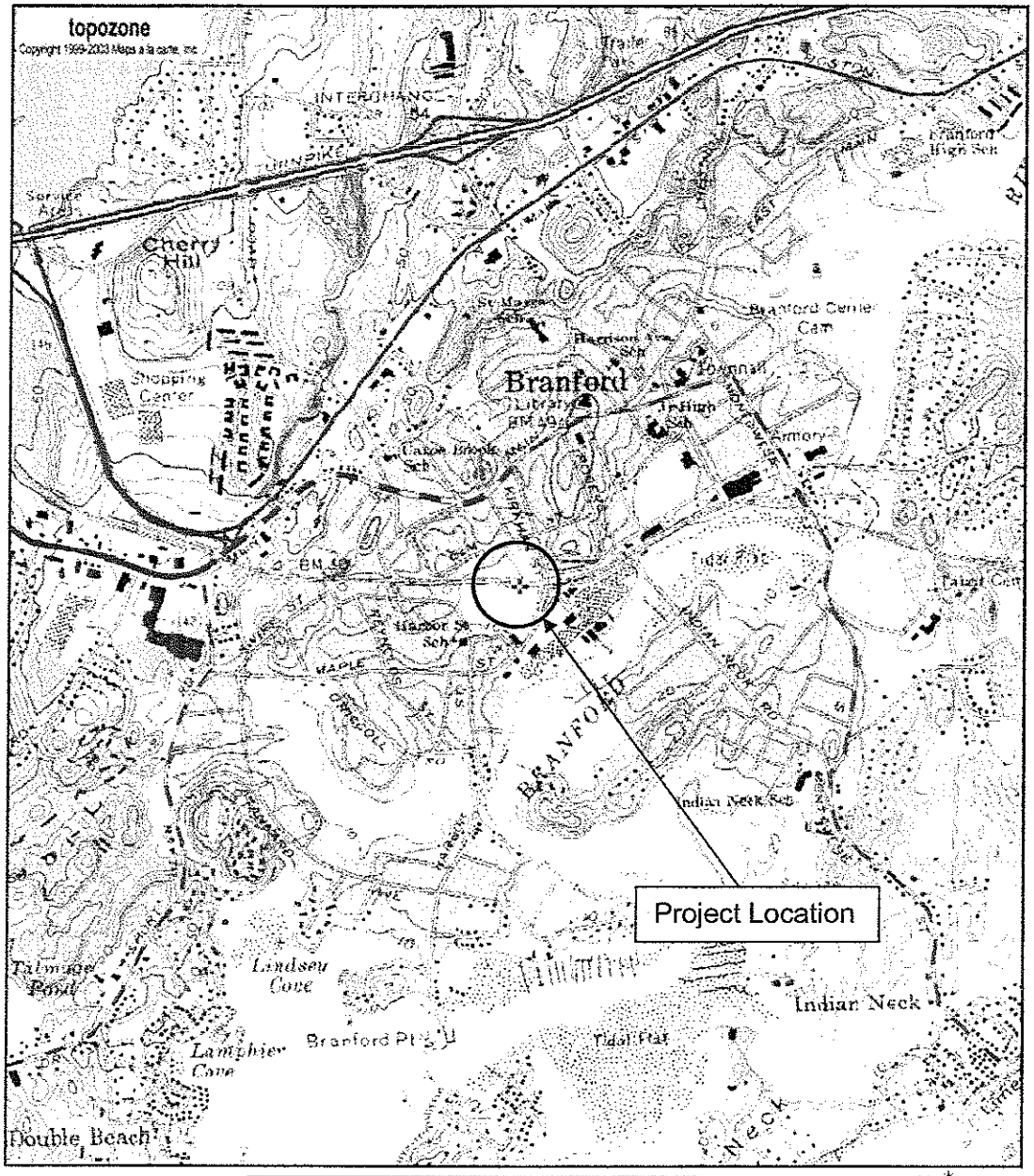
In the event of a flood, an emergency access gate and gravel drive will be employed at the southwest corner of the new parking lot to evacuate vehicles. Additionally, signs will be installed at the overflow parking similar to those at the existing Branford Station parking lot which warn commuters that the area is subject to flooding. The station platform Passenger Information Display (PIDS) is also capable of broadcasting emergency information both in audio and visual formats.

ATTACHMENT B

USGS MAP

Attachment B: USGS Topographic Quadrangle Map

Branford, Connecticut



0 0.3 0.6 0.9 1.2 1.5 km

0 0.2 0.4 0.6 0.8 1 mi

M G

M=-14.295
G=1.441

UTM 18 682773E 4571296N (NAD27)

Branford Counseling Center, USGS Branford (CT) Quadrangle

Projection is UTM Zone 18 NAD83 Datum

Branford, Conn.
41072-C7-TF-024

ATTACHMENT F

DOCUMENTATION FORM FOR FLOOD MANAGEMENT CERTIFICATION

Attachment F: Documentation Form for Flood Management Certification

1. Applicant Name: **Connecticut Department of Transportation**
   (as indicated on the *Permit Application Transmittal Form*)

2. Name of Subject Facility or Project/Project Number:
   Branford RR Station Infrastructure Improvements/Project No.310-0047 and 310-0048

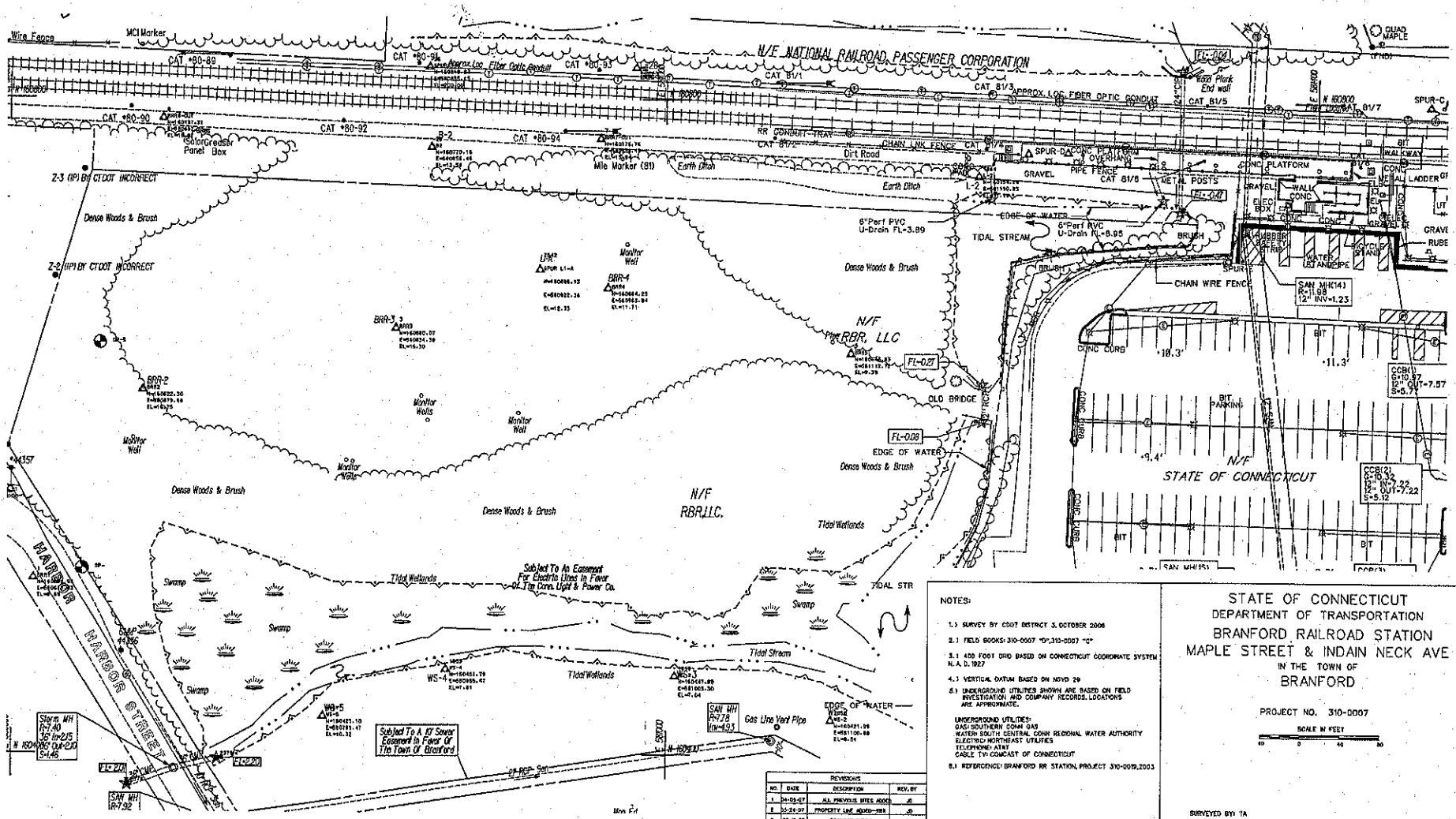
3. Name of floodplain and watercourse:
   Tidal Creek (Tidal backwater to Branford River and Long Island Sound)

4. This Certification is submitted for the Commissioner's approval pursuant to Section 25-68d of the General Statutes. I hereby certify that based on my reasonable investigation, including my inquiry of those individuals responsible for obtaining the information, the proposed activity described in this application is consistent with all applicable standards and criteria established in Sections 25-68d(b) of the General Statutes and Sections 25-68h-1 through 25-68h-3, inclusive, of the Regulations of Connecticut State Agencies.

Signature of the head of the certifying State agency or his/her designated agent	Date 1/23/2009
Edgar T. Hurle Name of the head of the certifying State agency or his/her designated agent (print or type)	**Transportation Planning Director** Title (if applicable)

ATTACHMENT G

PLAN SHEETS AND DRAWINGS



NOTES:

1.) SURVEY BY CDOT DISTRICT 3, OCTOBER 2006
2.) FIELD BOOKS: 310-0007 "D",310-0007 "C"
3.) 400 FOOT GRID BASED ON CONNECTICUT COORDINATE SYSTEM N.A.D. 1927
4.) VERTICAL DATUM BASED ON NGVD 29
5.) UNDERGROUND UTILITIES SHOWN ARE BASED ON FIELD INVESTIGATION AND COMPANY RECORDS. LOCATIONS ARE APPROXIMATE.

UNDERGROUND UTILITIES:
GAS: SOUTHERN CONN GAS
WATER: SOUTH CENTRAL CONN REGIONAL WATER AUTHORITY
ELECTRIC: NORTHEAST UTILITIES
TELEPHONE: AT&T
CABLE TV: COMCAST OF CONNECTICUT

6.) REFERENCE: BRANFORD RR STATION, PROJECT 310-0019,2003

REVISIONS			
NO.	DATE	DESCRIPTION	REV. BY
1	04-03-07	ALL PREVIOUS SHEET ADDED	JD
2	05-24-07	PROPERTY LINE ADDED-RBR	JD
3	07-18-07	DRAINAGE CHECK	FT
4	01-15-08	REVISED WETLANDS	JLE

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION
BRANFORD RAILROAD STATION
MAPLE STREET & INDAIN NECK AVE
IN THE TOWN OF
BRANFORD

PROJECT NO. 310-0007

SCALE IN FEET
10 0 10 20

SURVEYED BY: TA
PLOTTED BY: RHF
CHECKED BY: JD
FILE: SV 03 310 0007 BRANFORD FINAL.dgn

DECEMBER 2008

N
SURVEY PLAN
SCALE: 1" = 30'-0"

FINAL DESIGN REVIEW

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

Filename: FD_MSH_EXT_0014_0047_C-100.dgn

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.

Date Printed: January 06, 2009

DESIGN/DOCUMENTATION: DAB/MG
CHECKED BY: RBC
SCALE IN FEET 0 30 60
SCALE 1"=30'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

ENGINEER: BAKER ENGINEERING
APPROVED BY: -
DATE: -

Baker
MICHAEL BAKER ENGINEERING, INC.
420 RIVERVIEW, PORTLAND, CT 06480-1611

PROJECT TITLE:
SHORE LINE EAST RAILROAD STATIONS

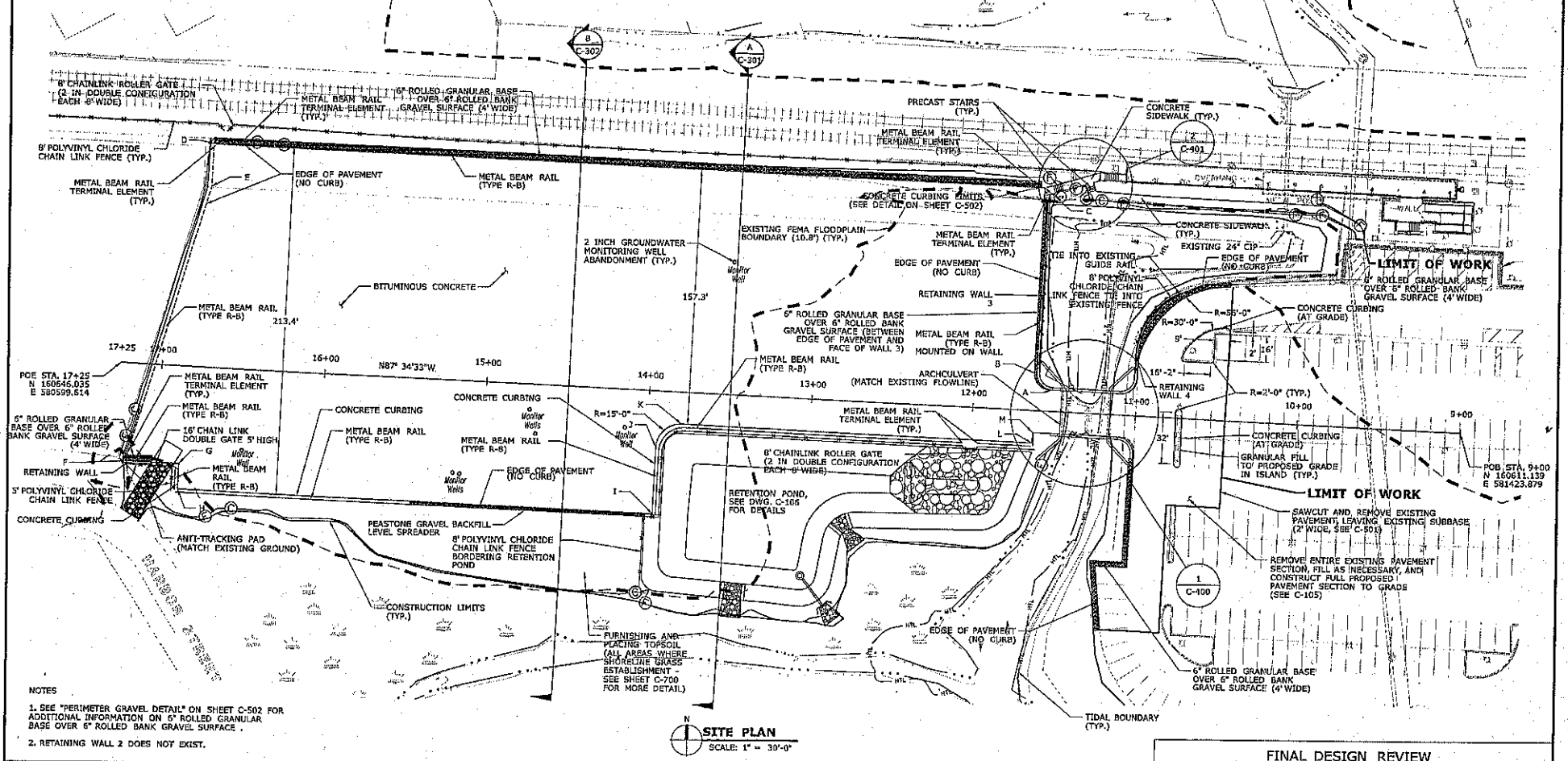
TOWN:
BRANFORD

DRAWING TITLE:
PARKING LOT SURVEY PLAN

PROJECT NO.
310-0047
DRAWING NO.
C-100
SHEET NO.
7 of 52

DESCRIPTION	ELEVATION
FEMA FLOODPLAIN BOUNDARY	10.8'
GROUND WATER ELEVATION	6.0'
HIGH TIDE LINE	3.21'
MEAN HIGH WATER	2.62'
MEAN LOW WATER	2.10'

LOCATION	NORTHING	EASTING	STATION	OFFSET
A	160635.09	581177.39	11+47.28	13.50'
B	160645.74	581161.77	11+63.33	23.46'
C	160789.39	581166.50	11+63.42	137.23'
D	160781.05	580654.82	16+75.56	137.23'
E	160754.95	580653.63	16+75.64	111.11'
F	160582.19	580602.93	17+19.51	-60.67'
G	160583.80	580635.22	16+86.79	-60.67'
H	160568.32	580634.57	16+86.79	-76.17'
I	160555.94	580926.93	13+94.17	-76.17'
J	160597.00	580928.67	13+94.17	-35.07'
K	160611.36	580944.29	13+79.17	-20.07'
L	160602.18	581160.98	11+62.30	-20.07'
M	160608.75	581161.24	11+62.30	-13.50'



NOTES

1. SEE "PERIMETER GRAVEL DETAIL" ON SHEET C-502 FOR ADDITIONAL INFORMATION ON 6" ROLLED GRANULAR BASE OVER 6" ROLLED BANK GRAVEL SURFACE .

2. RETAINING WALL 2 DOES NOT EXIST.

SITE PLAN

SCALE: 1" = 30'-0"

FINAL DESIGN REVIEW

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

Plotted:

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.

Date Plotted: January 06, 2009

DESIGNED/DRAFTED: DAB/MG
CHECKED BY: RBC
SCALE IN FEET 0 30 60
SCALE 1"=30'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

ENGINEER: BAKER ENGINEERING
APPROVED BY: -
DATE: -

Baker

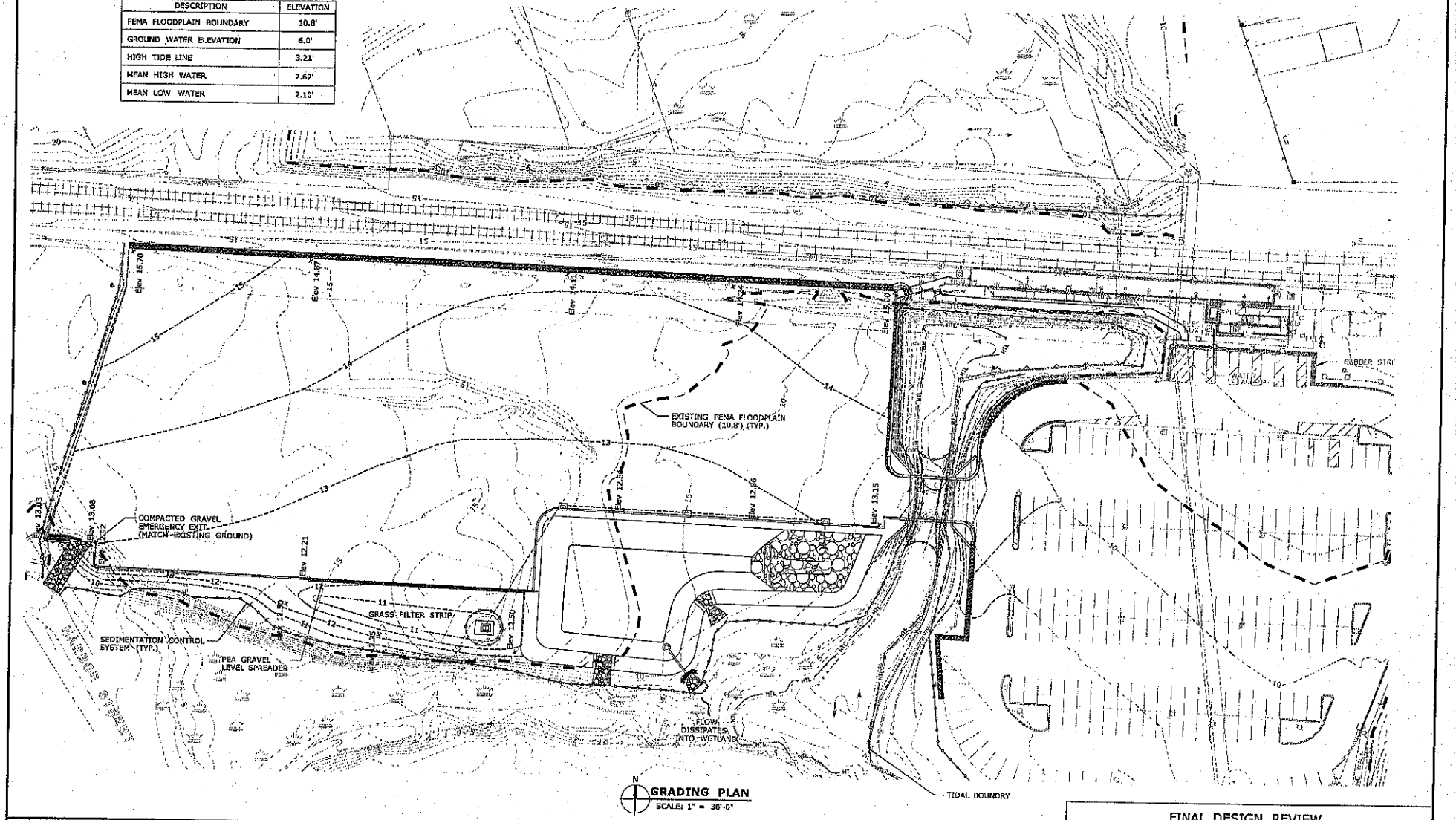
PROJECT TITLE: SHORE LINE EAST RAILROAD STATIONS

TOWN: BRANFORD

DRAWING TITLE: PARKING LOT SITE PLAN

PROJECT NO. 310-0047
DRAWING NO. C-102
SHEET NO. 9 of 52

DESCRIPTION	ELEVATION
FEMA FLOODPLAIN BOUNDARY	10.8'
GROUND WATER ELEVATION	6.0'
HIGH TIDE LINE	3.21'
MEAN HIGH WATER	2.62'
MEAN LOW WATER	2.10'



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GRADING PLAN
SCALE: 1" = 30'-0"

FINAL DESIGN REVIEW

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

Filename: PD_HSN_DRD_0614_0047_C-105.dgn

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.

Date Plotted: January 06, 2009

DESIGNER/DRAFTER: DAB/MG
CHECKED BY: RBC
SCALE IN FEET 0 30 60
SCALE 1"=30'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

ENGINEER: BAKER ENGINEERING
APPROVED BY: -
DATE: -

Baker

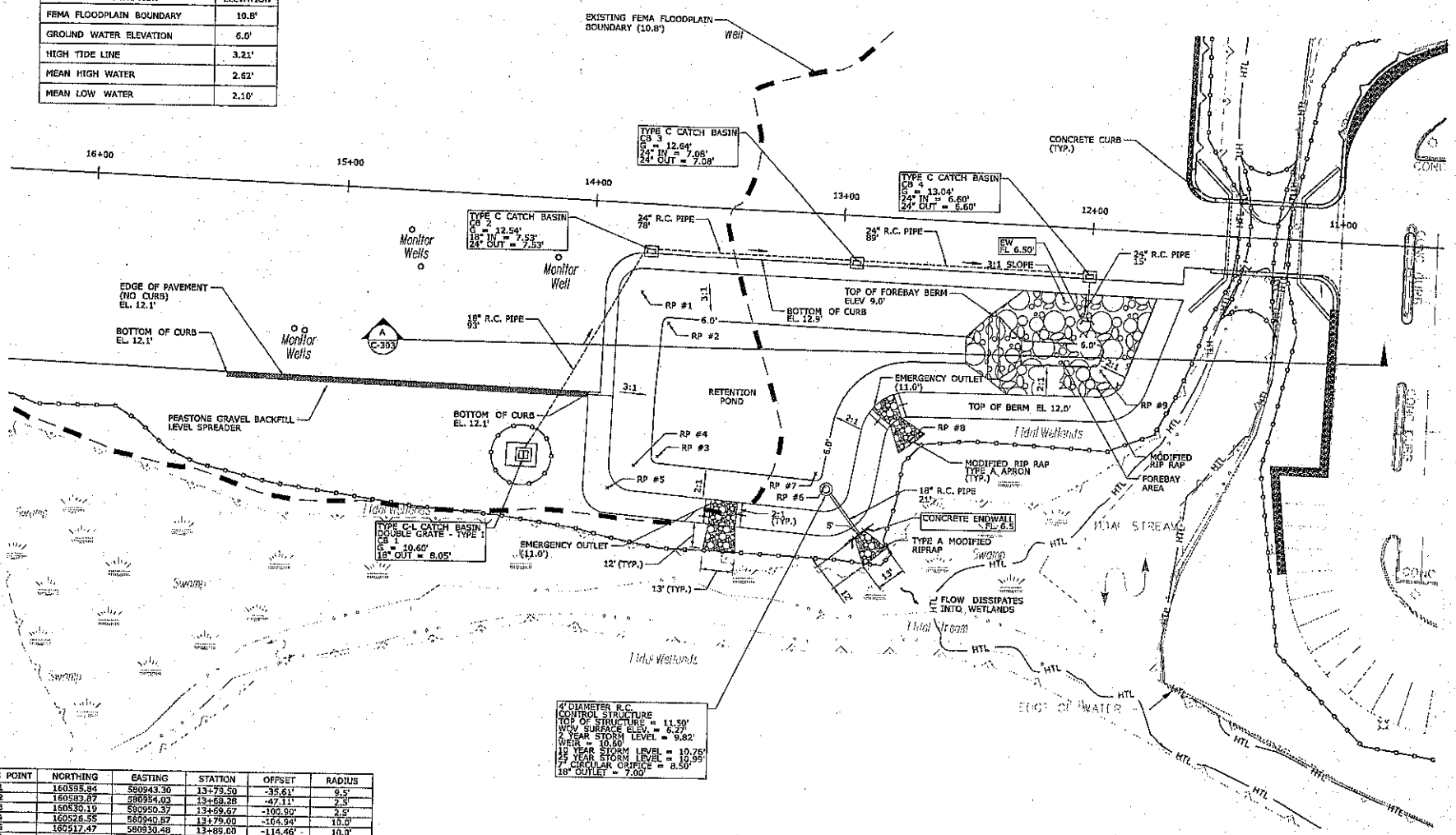
PROJECT TITLE: SHORE LINE EAST RAILROAD STATIONS

TOWN: BRANFORD

DRAWING TITLE: PARKING LOT GRADING PLAN

PROJECT NO. 310-0047
DRAWING NO. C-105
SHEET NO. 12 of 52

DESCRIPTION	ELEVATION
FEMA FLOODPLAIN BOUNDARY	10.8'
GROUND WATER ELEVATION	6.0'
HIGH TIDE LINE	3.21'
MEAN HIGH WATER	2.62'
MEAN LOW WATER	2.10'



RADIUS POINT	NORTHING	EASTING	STATION	OFFSET	RADIUS
1	160595.84	580943.30	13+79.50	-35.61'	9.5'
2	160583.07	580954.03	13+68.28	-47.11'	2.5'
3	160530.19	580950.37	13+69.67	-100.90'	2.5'
4	160526.55	580940.87	13+79.00	-104.94'	10.0'
5	160517.47	580930.48	13+89.00	-114.46'	10.0'
6	160519.45	581017.68	13+01.96	-108.79'	10.0'
7	160524.31	581014.03	13+05.81	-104.09'	2.5'
8	160538.00	581051.80	12+68.66	-88.81'	10.0'
9	160567.17	581128.22	11+93.54	-56.43	10.0'

N

RETENTION POND
SCALE: 1" = 20'-0"

FINAL DESIGN REVIEW

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

Filename: FD.HSH.DEF.0014.0047.C-106.dgn

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.

Date Plotted: January 06, 2009

DESIGNED/DRAFTED: DAB/MG
CHECKED BY: RBC
SCALE IN FEET 0 20 40
SCALE 1"=20'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

ENGINEER: BAKER ENGINEERING
APPROVED BY: -
DATE: -

Baker

PROJECT TITLE: SHORE LINE EAST RAILROAD STATIONS

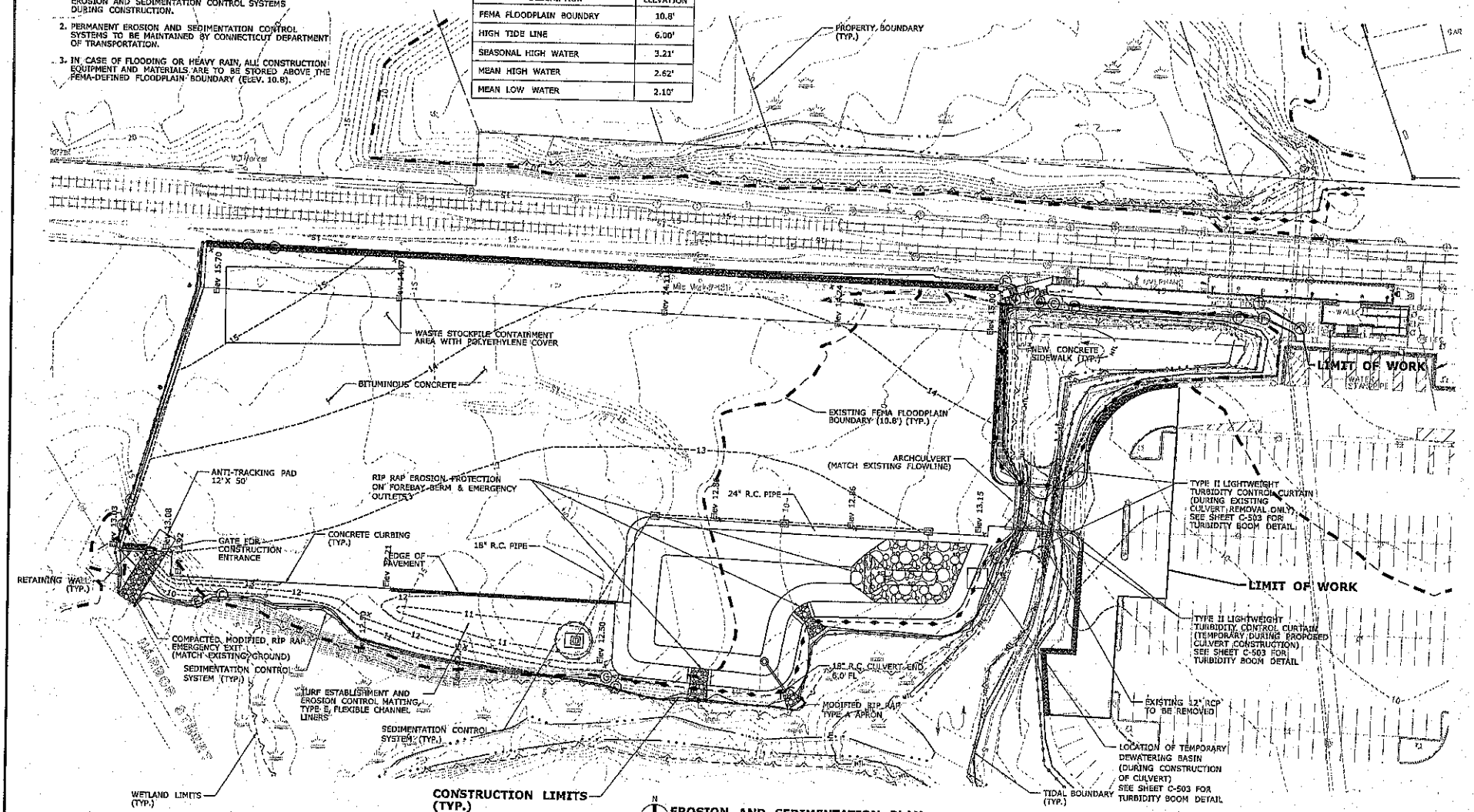
TOWN: BRANFORD

DRAWING TITLE: PARKING LOT RETENTION POND

PROJECT NO. 310-0047
DRAWING NO. C-106
SHEET NO. 13 of 52

NOTES:
1. CONTRACTOR IS RESPONSIBLE FOR MAINTENANCE OF EROSION AND SEDIMENTATION CONTROL SYSTEMS DURING CONSTRUCTION.
2. PERMANENT EROSION AND SEDIMENTATION CONTROL SYSTEMS TO BE MAINTAINED BY CONNECTICUT DEPARTMENT OF TRANSPORTATION.
3. IN CASE OF FLOODING OR HEAVY RAIN, ALL CONSTRUCTION EQUIPMENT AND MATERIALS ARE TO BE STORED ABOVE THE FEMA-DEFINED FLOODPLAIN BOUNDARY (ELEV. 10.8).

DESCRIPTION	ELEVATION
FEMA FLOODPLAIN BOUNDRY	10.8'
HIGH TIDE LINE	6.00'
SEASONAL HIGH WATER	3.21'
MEAN HIGH WATER	2.62'
MEAN LOW WATER	2.10'



EROSION AND SEDIMENTATION PLAN

SCALE: 1" = 30'-0"

FINAL DESIGN REVIEW

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

Filename: FD_MSH_SEQ_0014_0047_C-107.dgn

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.

Date Plotted: January 06, 2009

DESIGNED/ADAPTED: DAB/MG
CHECKED BY: RBC
SCALE IN FEET 0 30 60
SCALE 1"=30'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

ENGINEER: BAKER ENGINEERING
APPROVED BY: -
DATE: -

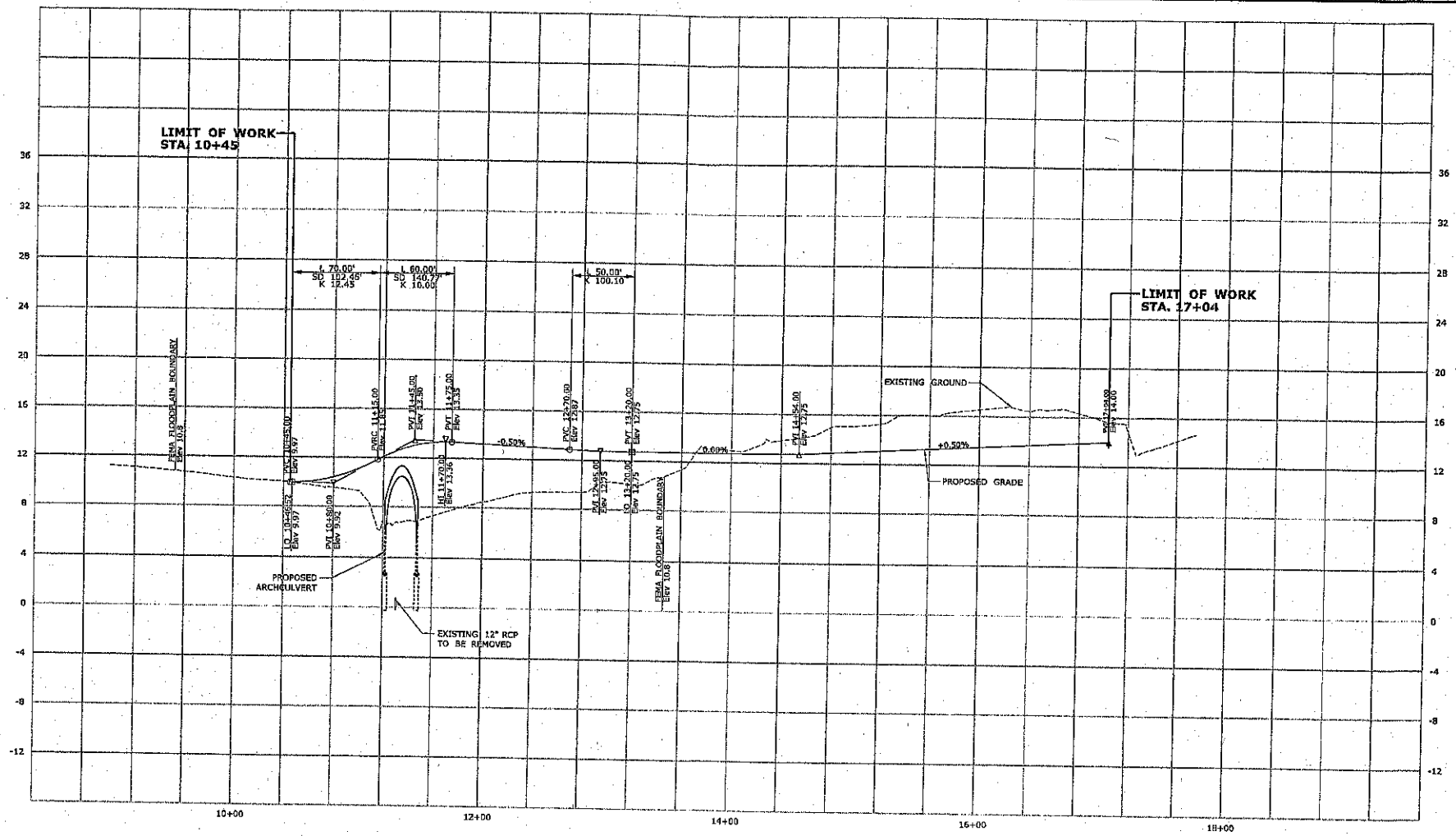
Baker

PROJECT TITLE: SHORE LINE EAST RAILROAD STATIONS

TOWN: BRANFORD

DRAWING TITLE: EROSION & SEDIMENTATION PLAN

PROJECT NO. 310-0047
DRAWING NO. C-107
SHEET NO. 14 of 52



VERTICAL SCALE 1" = 4'
HORIZONTAL SCALE 1" = 40'

80 40 0 40 80

PROFILE VIEW

FINAL DESIGN REVIEW

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

Filename: FD_HSM_PRO_0894_0047_C-300.dgn

THIS 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.

Date Plotted: January 05, 2009

DESIGNED/DRAFTED: DAB/MG
CHECKED BY: RBC
SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

ENGINEER: BAKER ENGINEERING
APPROVED BY: -
DATE: -

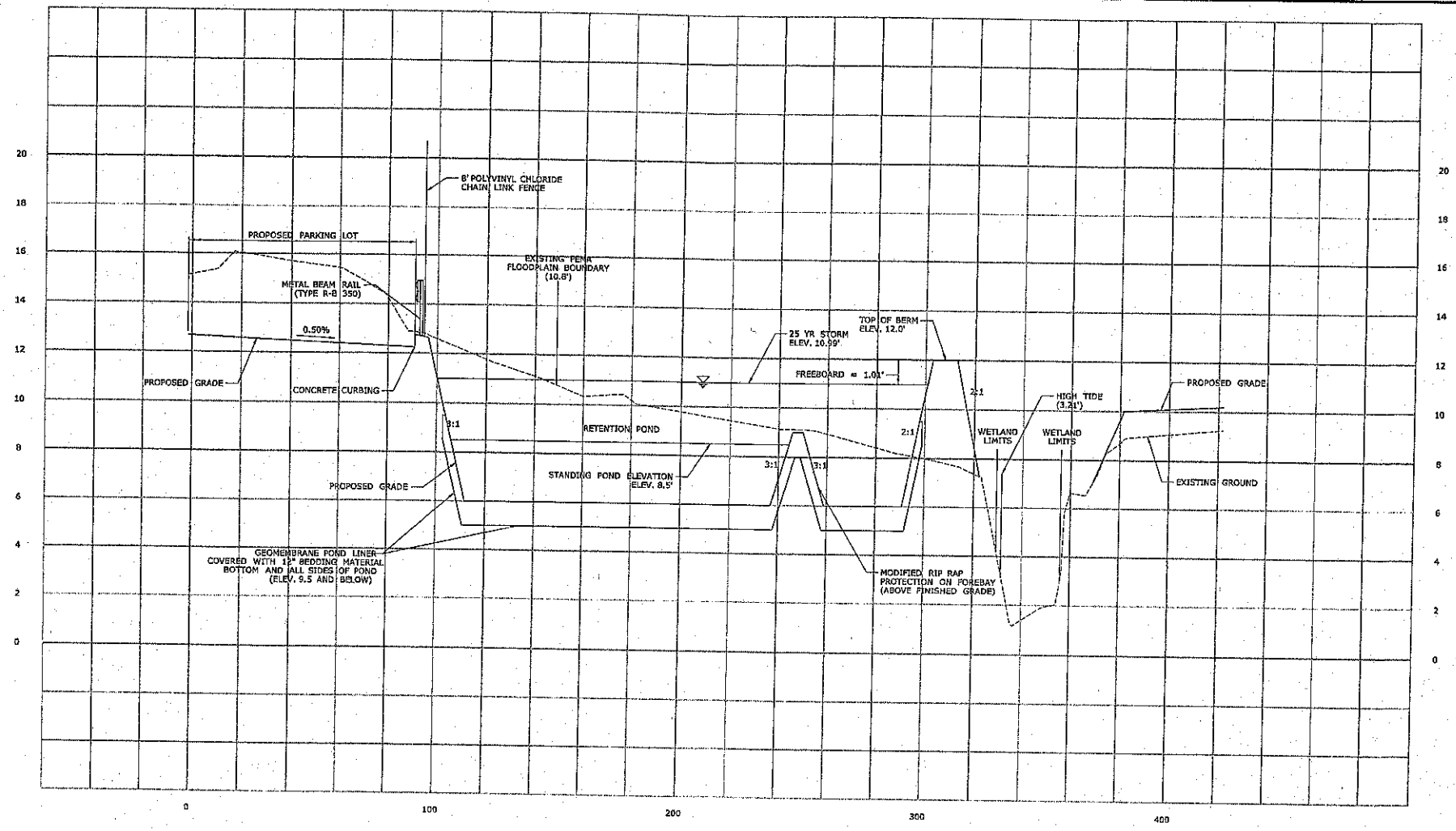
Baker
MICHEL BAKER ENGINEERS INC
AN ENTERPRISE OPERATING IN
ROCKY HILL, CONN

PROJECT TITLE:
SHORE LINE EAST
RAILROAD STATIONS

TOWN: BRANFORD

DRAWING TITLE:
PARKING LOT PROFILE

PROJECT NO. 310-0047
DRAWING NO. C-300
SHEET NO. 16 of 52



VERTICAL SCALE 1" = 2'
HORIZONTAL SCALE 1" = 20'
40 20 0 20 40

DETENTION POND (A / C-106)
SCALE: 1" = 20'-0"

FINAL DESIGN REVIEW

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

Filename: PD_MSM_KSC_0014_0047_C-303.dgn

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.

Date Plotted: January 05, 2009

DESIGNED/DRAFTED: DAB/MG
CHECKED BY: RBC
SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

ENGINEER: BAKER ENGINEERING
APPROVED BY: -
DATE: -

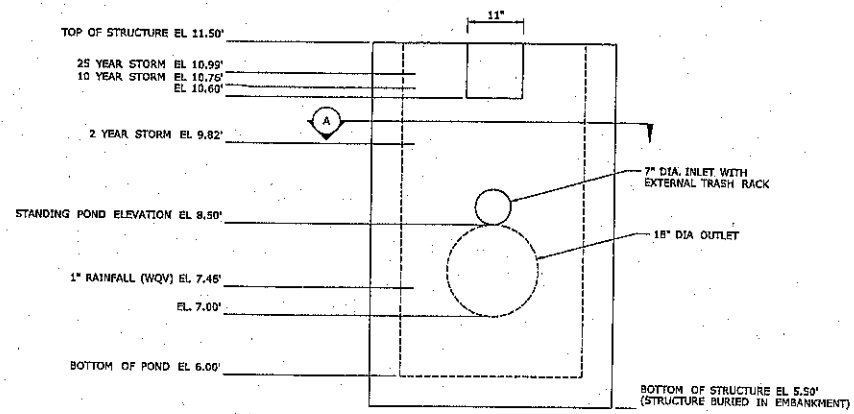
Baker

PROJECT TITLE: SHORE LINE EAST RAILROAD STATIONS

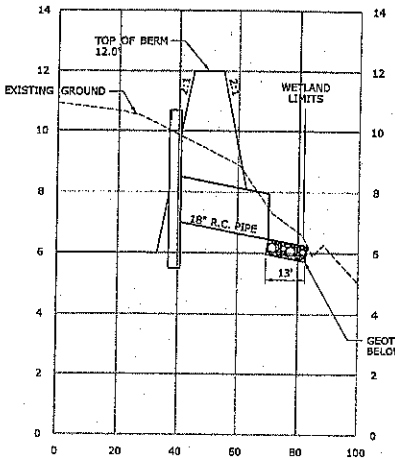
TOWN: BRANFORD

DRAWING TITLE: CROSS SECTION RETENTION POND

PROJECT NO. 310-0047
DRAWING NO. C-303
SHEET NO. 19 of 52



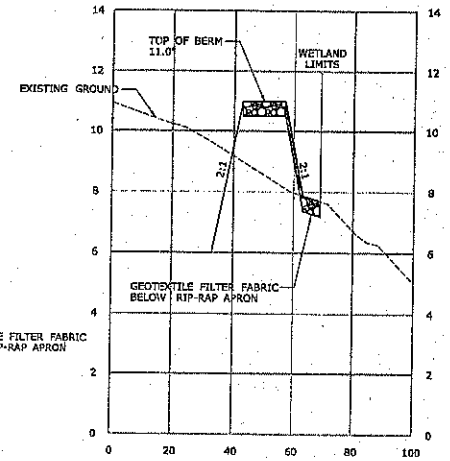
ELEVATION VIEW



SECTION B-B

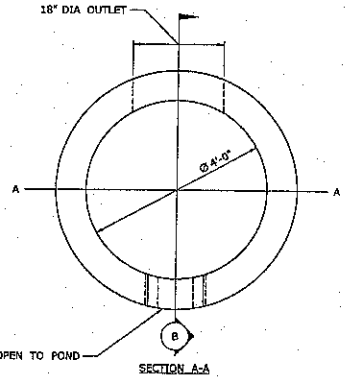
CONTROL STRUCTURE PROFILE VIEW

SCALE: 1" = 20'-0"



EMERGENCY OUTLET PROFILE VIEW

SCALE: 1" = 20'-0"

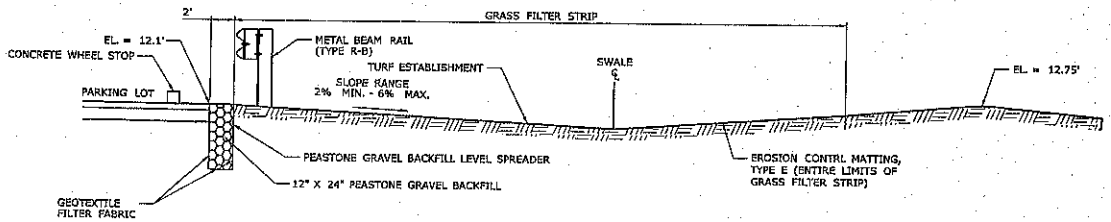


SECTION A-A

NOTE:
CONTROL STRUCTURE PAYMENT UNDER ITEM #0507602, SPECIAL MANHOLE. CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR SPECIAL MANHOLE TO ENGINEER FOR REVIEW.

4' DIA. CONTROL STRUCTURE DETAIL

SCALE: N.T.S



PEASTONE GRAVEL BACKFILL DETAIL AND GRASS FILTER STRIP TYPICAL SECTION

SCALE: N.T.S

NOTE: PEASTONE GRAVEL BACKFILL LEVEL SPREADER PAID FOR UNDER ITEM NO. 0213732, "PEASTONE GRAVEL BACKFILL." ITEM INCLUDES ONLY THE PEASTONE GRAVEL BACKFILL. GEOTEXTILE PAID FOR UNDER ITEM NO. 0755009, "GEOTEXTILE."

VERTICAL SCALE 1" = 2'
HORIZONTAL SCALE 1" = 20'
40 20 0 20 40

FINAL DESIGN REVIEW

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

Filename: FD_MSH_DET_0914_0047_C-500.dgn

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.

Date Plotted: January 06, 2009

DESIGNED/DRAWN BY: DAB/MG
CHECKED BY: RBC
SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

ENGINEER: BAKER ENGINEERING
APPROVED BY: -
DATE: -

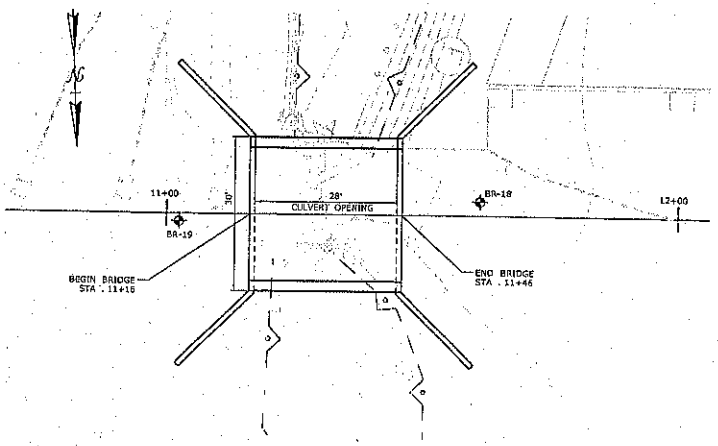
Baker

PROJECT TITLE: SHORE LINE EAST RAILROAD STATIONS

TOWN: BRANFORD

DRAWING TITLE: DETAILS

PROJECT NO. 310-0047
DRAWING NO. C-500
SHEET NO. 25 of 52



PLAN

TABLE OF QUANTITIES		
ITEM	Unit	Total
Turbidity Control Curtains	L.S.	1
Channel Excavation - Earth	C.Y.	100
Structure Excavation - Earth (Complete)	C.Y.	200
Subbase	C.Y.	30
Pervious Structure Backfill	C.Y.	200
Sedimentation Control System	L.F.	140
Processed Aggregate Base	Ton	40
Superpave 0.375"	Ton	15
Superpave 0.500"	Ton	15
Class "A" Concrete	C.Y.	55
Precast Concrete Arches	L.S.	1
Deformed Steel Bars	LB.	6600
Deformed Steel Bars - Epoxy Coated	LB.	1900
Membrane Waterproofing (Woven Glass Fabric)	S.Y.	80
Sand Cushion (Bridge)	C.Y.	14
Dampproofing	S.Y.	72
Temporary Sheet Piling	S.F.	4800
Sheet Piling Material Left in Place	S.F.	2400

CONCRETE DISTRIBUTION		
Superstructure (Parapets)	C.Y.	15
Substructure (Wingwalls)	C.Y.	0
Footings	C.Y.	40
TOTAL	C.Y.	55

GENERAL NOTES

SPECIFICATIONS: Connecticut Department of Transportation Form 816 (2004), Supplemental Specifications dated January 2008, and Special Provisions.

DESIGN SPECIFICATIONS: AASHTO LRFD Bridge Design Specifications (AASHTO 2004), with the Interim Specifications up to and including 2006, as supplemented by the Connecticut Department of Transportation Bridge Design Manual (2003).

ALLOWABLE DESIGN STRESSES:

Class "A" — Based on $f'c$ = 3000 psi.

Reinforcement (ASTM A615 Grade 60) — f_y = 60 ksi.

LIVE LOAD: HL - 93

FUTURE PAVING ALLOWANCE: None

FOUNDATION PRESSURES AND PILE LOADS: The various Limit State Load Combinations noted on the substructure plan sheets refer to the Load Combinations and Load Factors as given in the AASHTO LRFD Bridge Design Specifications.

DIMENSIONS: All dimensions shown on the plans are in inches unless noted otherwise. All elevations are given in feet. When elevations are given to less than three decimal places, the omitted digits shall be assumed to be zeros.

REMAIN-IN-PLACE FORMS: The use of remain in place forms on this structure is not allowed.

CLASS "A" CONCRETE: Class "A" Concrete shall be used for the cast-in-place Concrete Arch Footings, Parapets, and Wingwalls.

JOINT SEAL: See Special Provisions.

EXPOSED EDGES: Exposed edges of concrete shall be beveled 1" x 1" unless dimensioned otherwise.

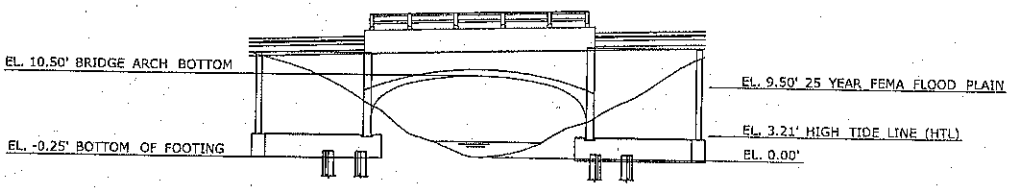
CONCRETE COVER: All reinforcement shall have 2" clear cover unless dimensioned otherwise.

REINFORCEMENT: All reinforcement shall be ASTM A615 Grade 60.

EPOXY COATED REINFORCING BARS: All reinforcement in the Parapets, including the wingwall parapets, shall be epoxy coated unless otherwise noted. These bars shall be included in the pay item for "Deformed Steel Bars - Epoxy Coated."

PREFORMED EXPANSION JOINT FILLER: The cost of furnishing and installing Preformed Expansion Joint Filler shall be included in the cost of the item "Class 'A' Concrete."

CONSTRUCTION JOINTS: Construction joints, other than those shown on the plans, will not be permitted without the prior approval of the Engineer.



ELEVATION (LOOKING SOUTH)

SCALE : 1"=20'

LEGEND

= EXISTING GRADE
= PROPOSED GRADE
= WATERCOURSE LIMITS
HTL — HTL = HIGH TIDE LINE (3.21' NVGD)
= WETLAND LIMITS
= EXISTING FEMA FLOODPLAIN BOUNDARY
= PROPOSED FEMA FLOODPLAIN BOUNDARY

SCALE IN FEET
0 15 30
SCALE 1"=30'

CONNECTICUT COORDINATE GRID

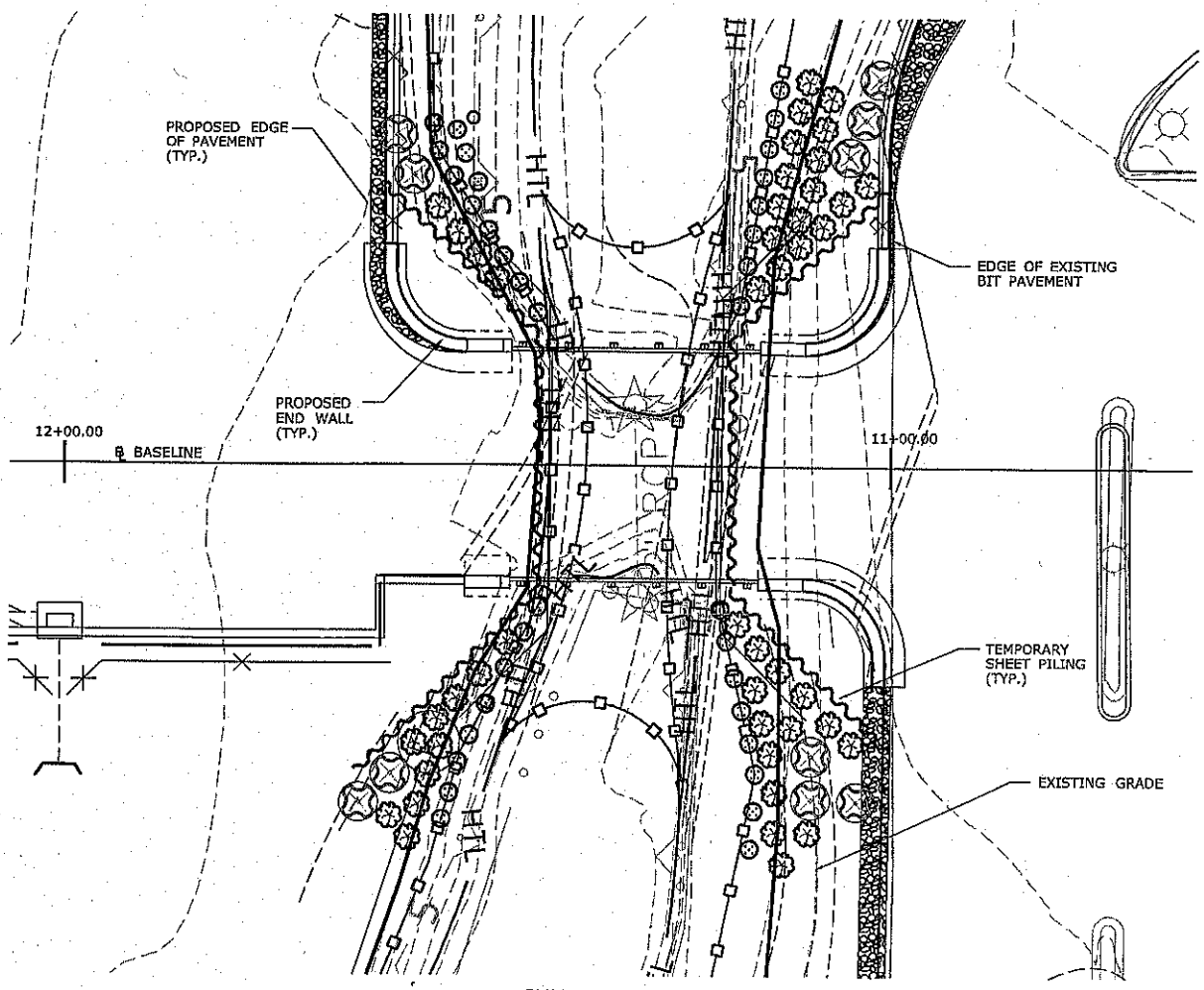
NOTICE TO BRIDGE INSPECTORS

The Department's Bridge Safety procedures require this bridge to be inspected for, but not limited to, all appropriate components indicated in the governing manuals for bridge inspection. Attention must be given to inspecting the following special components and details. (The listing for components for specific attention shall not be construed to reduce the importance of inspection of any other component of the structure.) The frequency of inspection of this structure shall be in accordance with the governing manuals for bridge inspection, unless otherwise directed by the Manager of Bridge Safety and Evaluation

Component or Detail	Structure Sheet Reference

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

PROJECT TITLE: SHORE LINE EAST RAILROAD STATIONS	Baker
TOWN: BRANFORD	PROJECT NO. 310-0047/0048
TITLE: BRANFORD PARKING LOT BRIDGE PLAN	DATE: MAY 5, 2008
	TITLE NO. BRP_S-100



CULVERT LANDSCAPING PLAN

LEGEND

- 35 SWEET PEPPERBUSH CLETHRA ALINFOLIA 18-24" #0949085
- 45 SWEET FERN COMTONIA PEREGRINA 18-24" #0949089
- 3 EA. SHADBLOW AMELANCHER CANADENSIS 18-24" #0949097 (30 TOTAL)

LEGEND

- = WATERCOURSE LIMITS
- HTL — HTL = HIGH TIDE LINE (3.21' NVGD)
- = WETLAND LIMITS

SCALE IN FEET

0 10 20

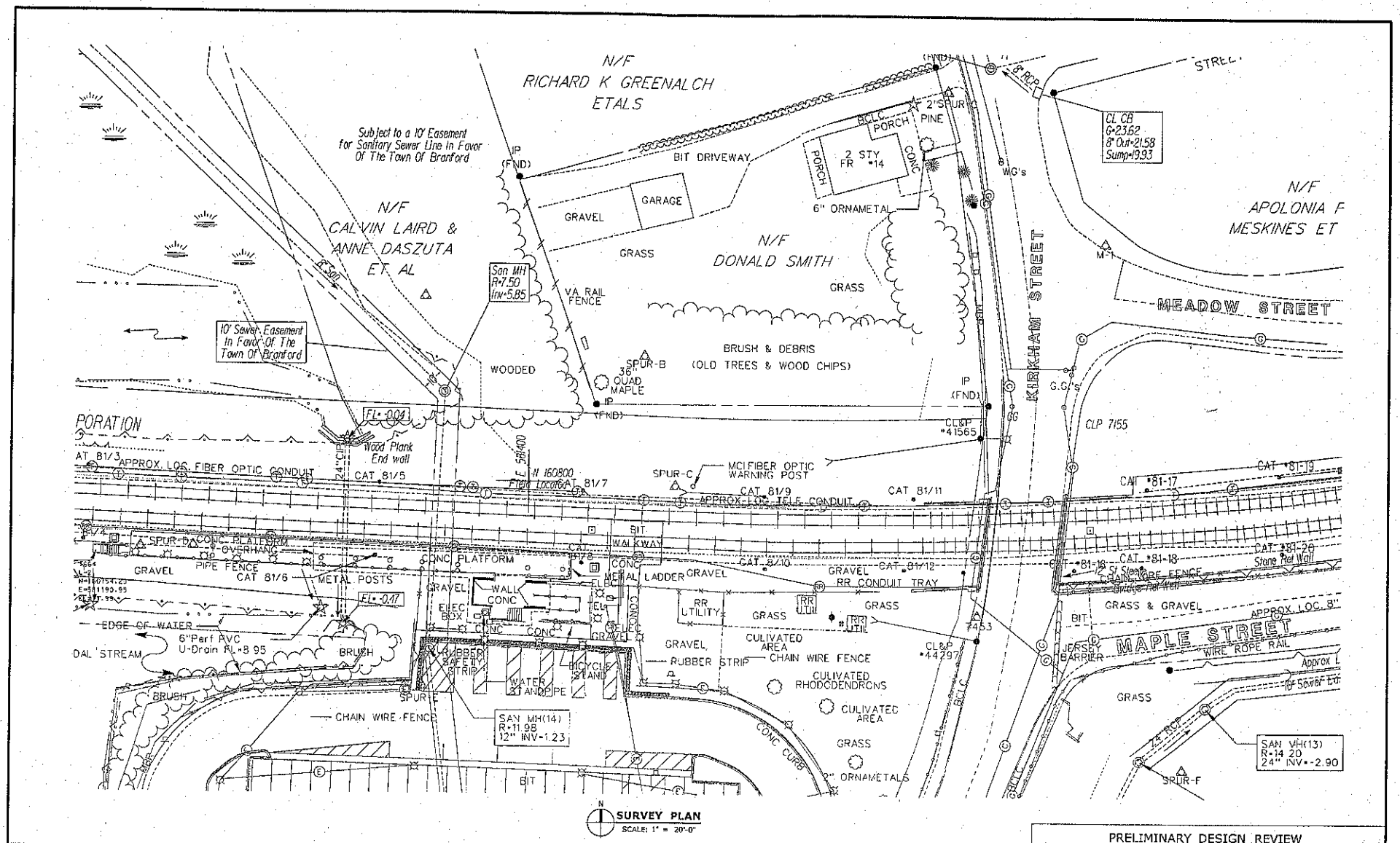
SCALE 1"=20'

COORDINATE GRID

CONNECTICUT

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

PROJECT TITLE: SHORE LINE EAST RAILROAD STATIONS	Baker
TOWN: BRANFORD	PROJECT NO. 310-0047/0048
TITLE: BRANFORD PARKING LOT CULVERT LANDSCAPING	DATE: JAN 2009
	FIG. NO. OLISP 10



SURVEY PLAN
SCALE: 1" = 20'-0"

PRELIMINARY DESIGN REVIEW

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.

SCALE IN FEET 0 20 40
SCALE 1"=20'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

ENGINEER: BAKER ENGINEERING
APPROVED BY: -
DATE: -

BakerWorld

PROJECT TITLE:
SHORE LINE EAST
RAILROAD STATIONS

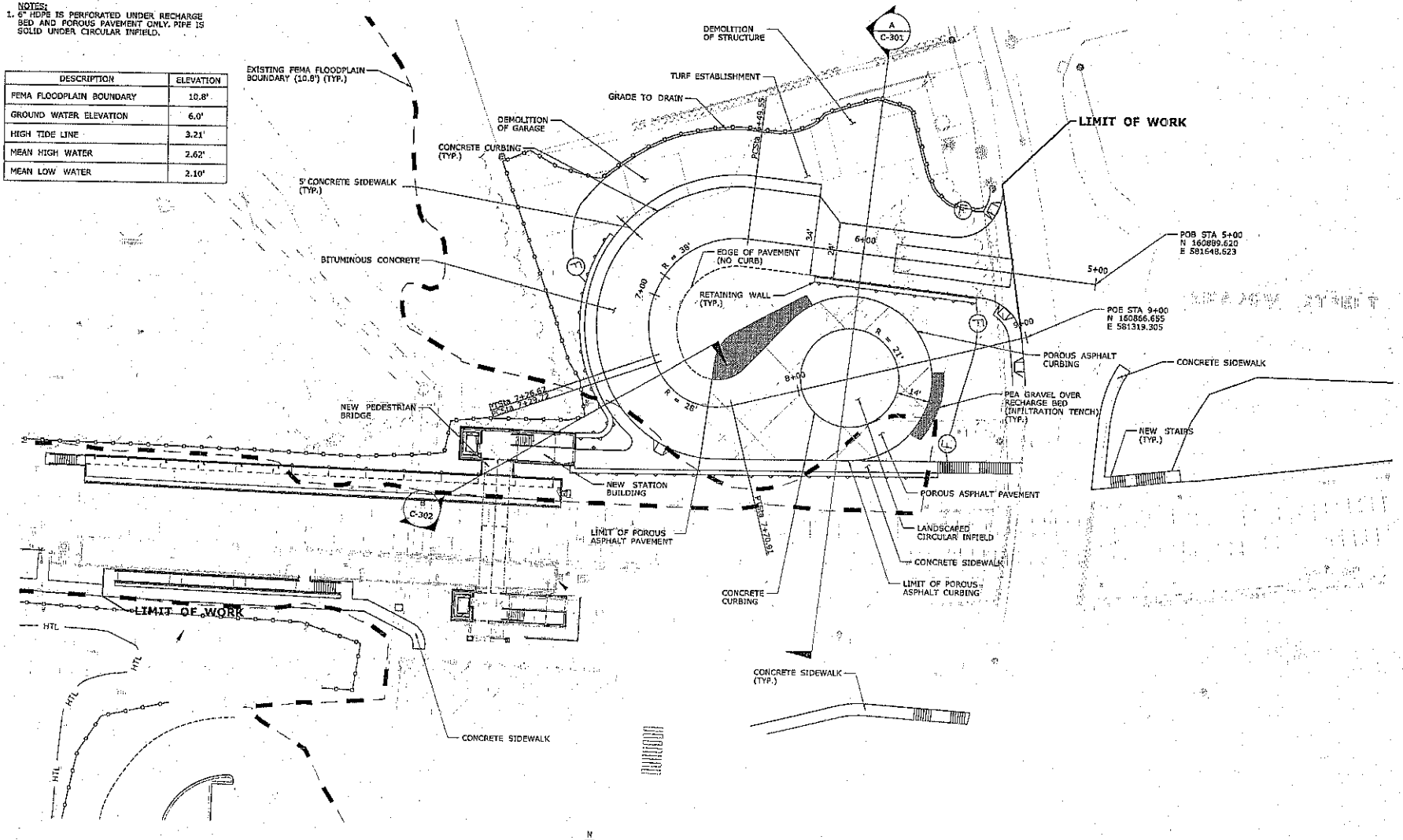
TOWN: BRANFORD

DRAWING TITLE:
BRANFORD NORTH
SURVEY PLAN

PROJECT NO. 310-0048
DRAWING NO. C-100
SHEET NO. S

NOTES:
1. 6" HDPE IS PERFORATED UNDER RECHARGE BED AND POROUS PAVEMENT ONLY. PIPE IS SOLID UNDER CIRCULAR INFIELD.

DESCRIPTION	ELEVATION
FEMA FLOODPLAIN BOUNDARY	10.8'
GROUND WATER ELEVATION	6.0'
HIGH TIDE LINE	3.21'
MEAN HIGH WATER	2.62'
MEAN LOW WATER	2.10'



SITE PLAN
SCALE: 1" = 20'-0"

PRELIMINARY DESIGN REVIEW

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS OF THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

DESIGNED (DRAFTER): CHECKED BY: -
SCALE IN FEET 0 20 40
SCALE 1"=20'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION
ENGINEER: BAKER ENGINEERING
APPROVED BY: - DATE: -

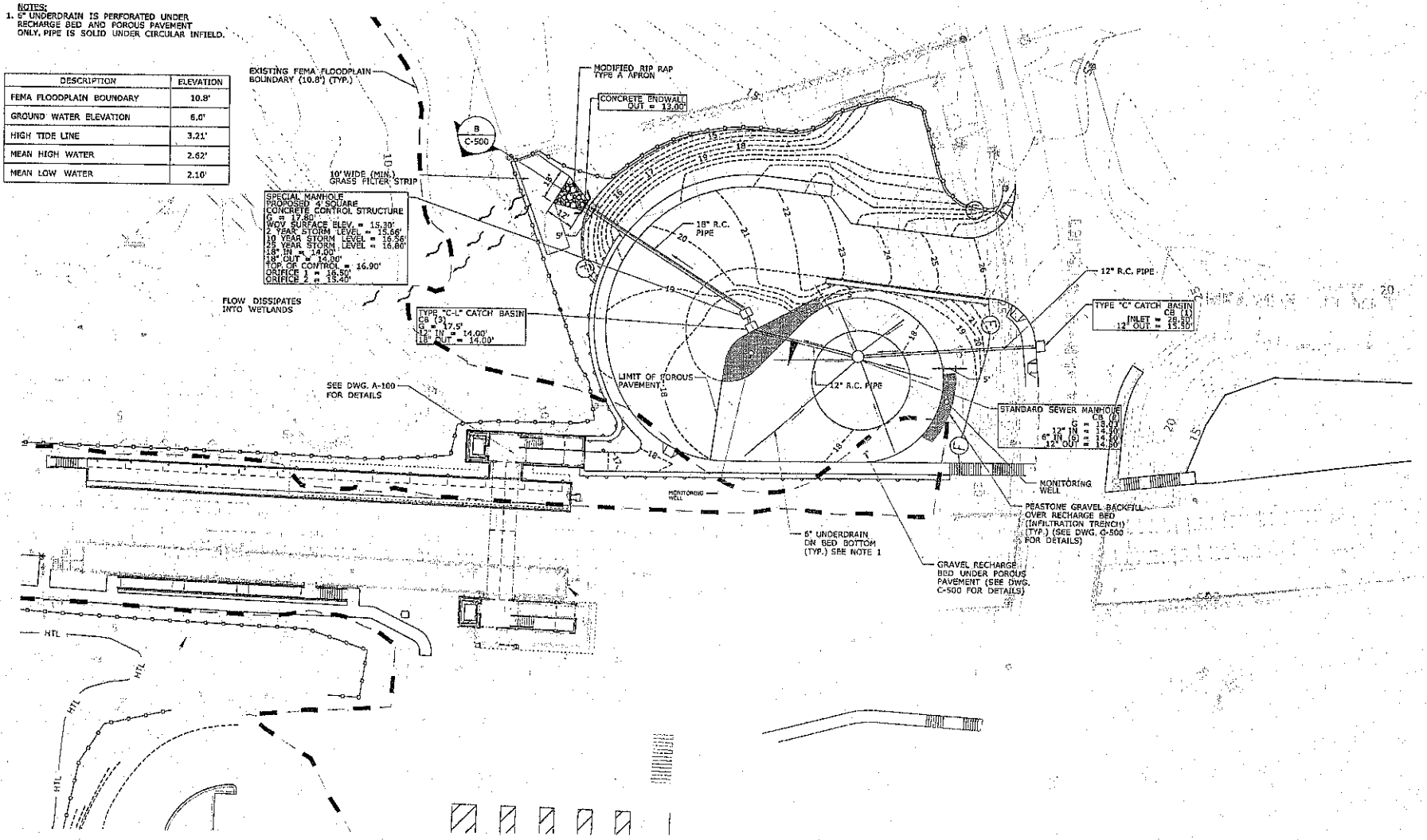
Baker

PROJECT TITLE: SHORE LINE EAST RAILROAD STATIONS

TOWN: BRANFORD
DRAWING TITLE: BRANFORD NORTH SITE PLAN
PROJECT NO. 310-0048
DRAWING NO. C-103
SHEET NO. S

NOTES:
1. 6" UNDERDRAIN IS PERFORATED UNDER RECHARGE BED AND POROUS PAVEMENT ONLY. PIPE IS SOLID UNDER CIRCULAR INFIELD.

DESCRIPTION	ELEVATION
FEMA FLOODPLAIN BOUNDARY	10.8'
GROUND WATER ELEVATION	6.0'
HIGH TIDE LINE	3.21'
MEAN HIGH WATER	2.62'
MEAN LOW WATER	2.10'



GRADING PLAN
SCALE: 1" = 20'-0"

PRELIMINARY DESIGN REVIEW

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

THE INFORMATION INCLUDED BEYOND BEARS THE SEAL OF A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF CONNECTICUT. INVESTIGATIONS BEYOND THE STATE AND IS THE RESPONSIBILITY OF THE PARTIES OF WORK WHICH WILL BE REQUIRED.

DESIGNED BY/DATE:
CHECKED BY:
SCALE IN FEET 0 20 40
SCALE 1"=20'

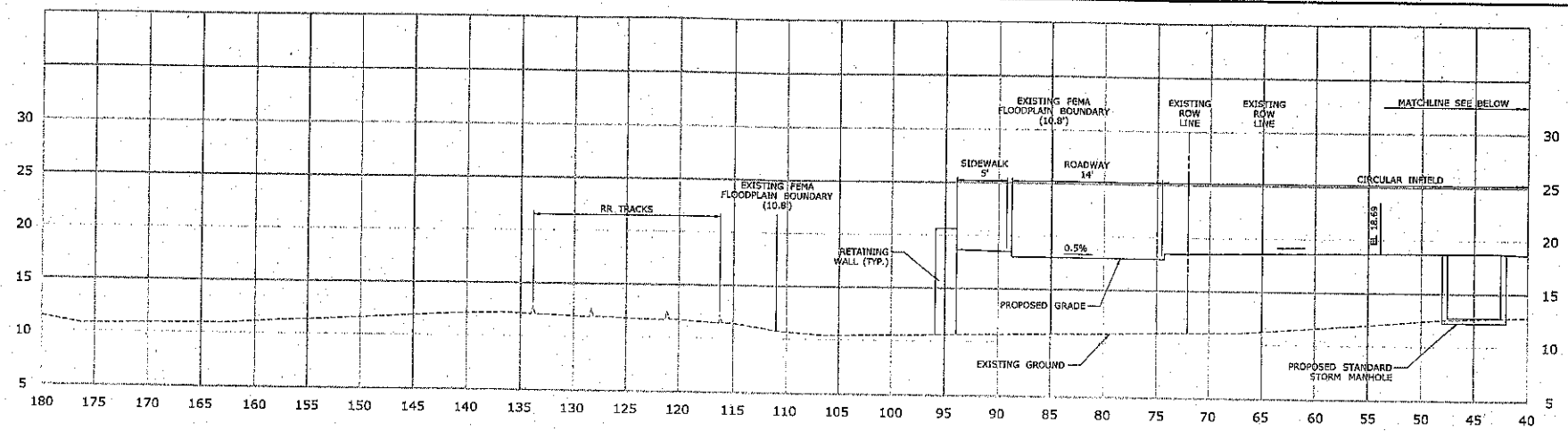
STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION
ENGINEER: BAKER ENGINEERING
APPROVED BY: DATE:

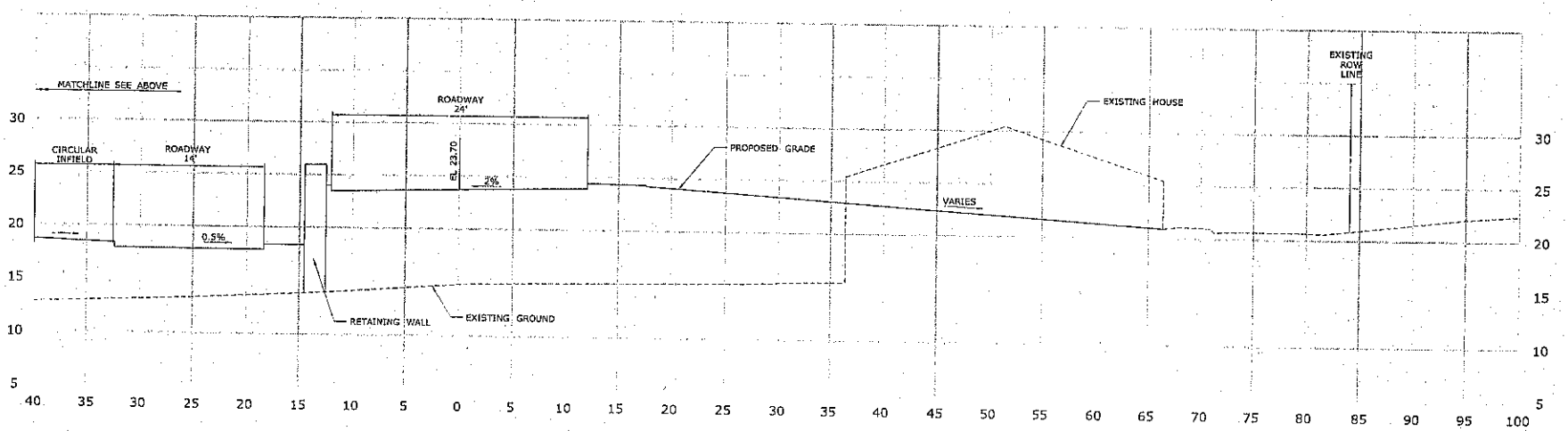
Baker

PROJECT TITLE: SHORE LINE EAST RAILROAD STATIONS

TOWN: BRANFORD
DRAWING TITLE: BRANFORD NORTH GRADING PLAN

PROJECT NO. 310-0048
DRAWING NO. C-107
SHEET NO. S





SECTION AT STA 6+00 (A / C-103)

SCALE: 1" = 5'-0"

PRELIMINARY DESIGN REVIEW

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

THE INFORMATION INCLUDING ESTIMATED QUANTITIES OF WORK SHOWN ON THESE SHEETS IS BASED ON PRIOR INVESTIGATIONS BY THE STATE AND IS IN NO WAY GUARANTEED TO INCLUDE THE CONDITIONS OR ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

Date Plotted: 5/24/99

DESIGNED/DRAFTED:
CHECKED BY:

SCALE IN FEET
5 0 5 10
SCALE 1"=5'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

ENGINEER: BAKER ENGINEERING
APPROVED BY:
DATE:

PROJECT TITLE: SHORE LINE EAST RAILROAD STATIONS

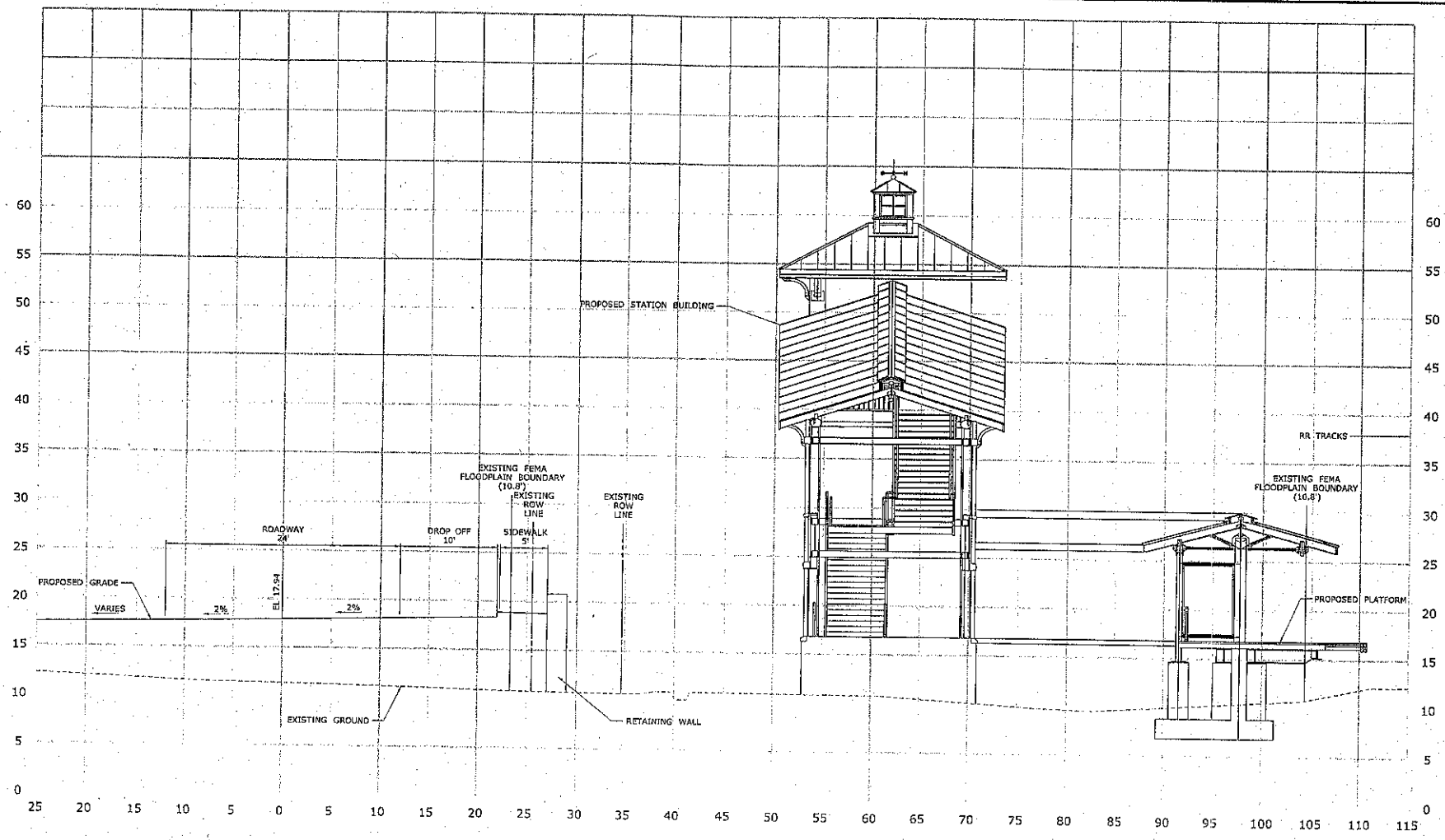
TOWN: BRANFORD

DRAWING TITLE: BRANFORD NORTH CROSS SECTIONS

PROJECT NO. 310-0048

DRAWING NO. C-301

SHEET NO. S



SECTION AT STA 7+35

SCALE: 1" = 5'-0"

B / C-103

PRELIMINARY DESIGN REVIEW

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 GUARANTEED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

DESIGN REVISION PEL

CHECKED BY: -

SCALE IN FEET 0 5 10

SCALE 1"=5'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

ENGINEER: BAKER ENGINEERING

APPROVED BY: -

DATE: -

Baker

PROJECT TITLE: SHORE LINE EAST RAILROAD STATIONS

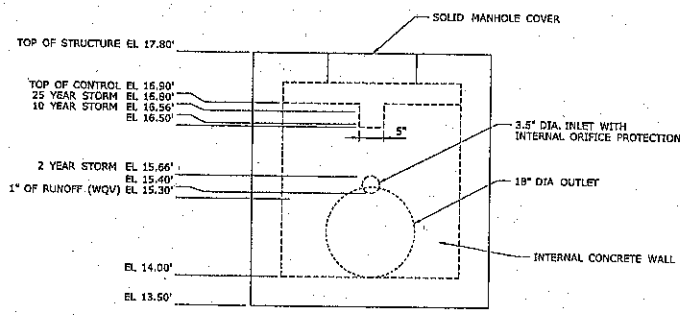
TOWN: BRANFORD

DRAWING TITLE: BRANFORD NORTH CROSS SECTIONS

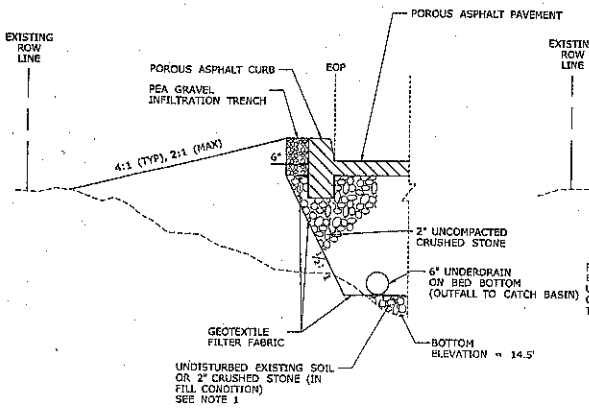
PROJECT NO. 310-0048

DRAWING NO. C-302

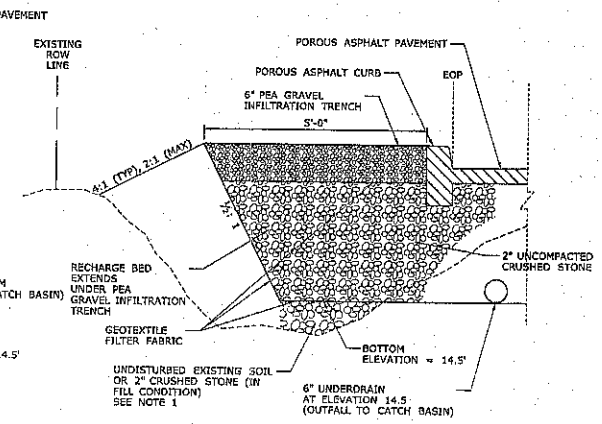
SHEET NO. $$$



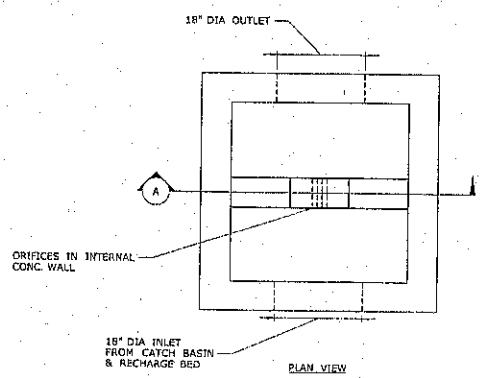
ELEVATION VIEW
SECTION A-A



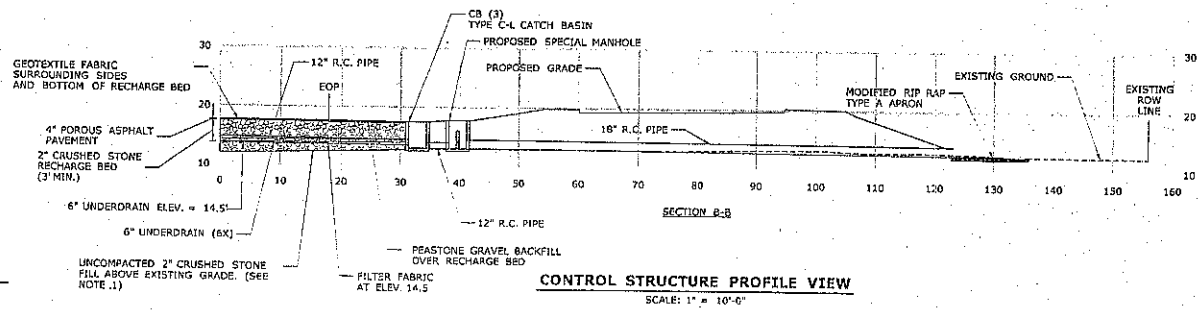
POROUS ASPHALT DETAIL
NTS



INFILTRATION TRENCH DETAIL
NTS



4' SQUARE CONTROL STRUCTURE DETAIL
SCALE: N.T.S



CONTROL STRUCTURE PROFILE VIEW
SCALE: 1" = 10'-0"

NOTE 1: ALL FILL UNDER RECHARGE BED AREAS SHALL BE UNIFORM UNCOMPACTED GRAVEL. VOLUME BETWEEN EXISTING GROUND AND ELEVATION 14.5 IS NOT CONSIDERED IN RECHARGE BED VOLUME CALCS. STANDARD COMPACTED FILL IS NOT TO BE USED UNDER GRAVEL RECHARGE BED SO AS NOT TO AFFECT FIELD-MEASURED INFILTRATION RATES.

PRELIMINARY DESIGN REVIEW

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK SHOWN ON THESE SHEETS IS BASED ON LIMITED COVER IDENTIFICATIONS OF THE STATE AND IS NOT WARRANTED TO CONFORM TO THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

DATE PLOTTED: 1/30/06

DESIGNED BY: DAB/MG
CHECKED BY: RBC
SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

ENGINEER: BAKER ENGINEERING
APPROVED BY:
DATE:

Baker

PROJECT TITLE:
SHORE LINE EAST RAILROAD STATIONS

TOWN: BRANFORD
DRAWING TITLE: DETAILS

PROJECT NO. 310-0048
DRAWING NO. C-500
SHEET NO. S

ATTACHMENT H

ENGINEERING DOCUMENTATION

Attachment H: Engineering Documentation

Part 1: Engineering Report Checklist

The following is a checklist of requirements that need to be completed, included and submitted as part of the Engineering Report. Please complete this checklist by identifying where each requirement listed is addressed in the Engineering Report (report title and page numbers). If an item is not applicable, place "NA" in the box. Attach the completed checklist as the cover sheet to engineering reports, as applicable, which fully describe the design of the proposed facilities or other actions and the hydraulic and hydrologic effects thereof. The application instructions (DEP-IWRD-INST-100) should be consulted for a complete description of each item listed. This checklist is required to be signed and sealed by a professional engineer licensed in the State of Connecticut.

Stormwater Management

Location of Item	Item Description
Drainage Rprt.	Description of the design storm frequency intensity, volume and duration
Drainage Rprt.	Watershed maps, existing and proposed
Drainage Rprt.	Computations for Tc
Drainage Rprt.	Imperviousness calculations
Drainage Rprt.	NRCS runoff curve numbers, volumetric runoff coefficients
Drainage Rprt.	Computations used to determine peak runoff rates, and velocities for each watershed area (24-hour storm): • Stream Channel Protection: 2-year frequency ("over-control" of 2-year storm) • Conveyance Protection: 10-year frequency • Peak Runoff Attenuation: 2-year, 10-year, and 100-year frequency • Emergency Outlet Sizing: safely pass the 100-year frequency or larger storm
Drainage Report	Hydrograph routing calculations
Drainage Rprt.	Description, schematics, and calculations for drainage and stormwater management systems, bridges and culverts
Drainage Report	Infiltration rates
throughout	Documentation of sources
CD attached	Computer disk containing input and output data and the associated program for all computer models used in the analyses
Drainage Report	Hard copy of input and output data including input/output tables
Drainage Report	Detention basin analysis including timing and duration of expected outflow, stream stability analysis and hydrograph summation

Flood Plain Assessment

Location of Item	Item Description
Drainage Report	Description or simulation of existing and proposed conditions upstream and downstream of the proposed activity
N/A	(For SCEL applications only) A determination of the effect of the proposed activity on flooding and flood hazards together with an equivalent encroachment on the opposite bank for the flood event establishing the encroachment lines
N/A	For any bridge or culvert placement or replacement with a drainage area of 100 acres or more, plan sheets showing the existing and proposed inundation area for the 2, 10, 25, 50, and 100 year discharges, carried to convergence
N/A	A description and analysis of the floodplain modifications required to restore any flood conveyance and flood storage capacity
N/A	Demonstration that backwater from the proposed activity will not impact an existing dam, dike, or similar structure
throughout	Backup data and complete hydraulic analysis for proposed modifications to the floodplain including location plan and plot for sections, profile sheet, summary sheet

Dams, Dikes, Diversion Channels, Similar Structures

Location of Item	Item Description
	Primary and emergency spillway and outlet structure erosion protection
	Dam breach analysis
	Geotechnical evaluation
	Construction Specifications for foundation preparation, embankment material, outlet structure, and construction inspection

Soil Erosion and Sediment Control Plan

Location of Item	Item Description
E&S Report	Narrative
Grading Plans	Drawings
ConnDOT Std Det	Details
Drainage Report	Calculations for Engineered Measures

Professional Certification

For any Engineering Report submitted as part of the IWRD permit application, the following certification must be signed and sealed by a professional engineer licensed to practice in Connecticut and submitted with the Engineering Report Checklist and Report.

"I certify that in my professional judgement, each requirement listed in the Engineering Report Checklist has been addressed in the Engineering Report submitted as part of the IWRD permit application as Attachment H, Part 1 and that the information is true, accurate and complete to the best of my knowledge and belief.

This certification is based on my review of the Engineering Report.

I understand that a false statement made in the submitted information may, pursuant to Section 22a-6 of the General Statutes, be punishable as a criminal offense under Section 53a-157b of the General Statutes, and may also be punishable under Section 22a-438 of the General Statutes."

Signature of Applicant

Date 1/23/2009

Edgar T. Hurle
Name of Applicant (print or type)

Transportation Planning Dir.
Title (if applicable)

Signature of Professional Engineer

Date 1/22/2009

Richard B. Cassin, P.E.
Name of Professional Engineer (print or type)

26059
P.E. Number (if applicable)

Affix P.E. Stamp Here
(if applicable)

STATE OF CONNECTICUT
RICHARD B. CASSIN
NO. 26059
LICENSED
PROFESSIONAL ENGINEER

Attachment H: Engineering Documentation

Part 2: Hydrologic and Hydraulic Consistency Worksheet

Inland Water Resources Division Permit Activities

This worksheet has four sections; only complete the section(s) applicable to the proposed project. Where a question requires a "Yes" or "No" answer, select the appropriate response and explain your response, if required, in the space provided.

Section I: **Floodplain Management** *(if the proposed project involves a structure, obstruction, encroachment or work in a watercourse, floodplain, or coastal high hazard area)*

Section II: **Stormwater Management** *(if the proposed project involves stormwater drainage or stormwater runoff)*

Sections III: **State Grants and Loans** and **Section IV: Disposal of State Land** *(only if the applicant is a state agency seeking flood management certification approval for state grants and loans or disposal of state land)*

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Definitions of terms used in these worksheets are found in Section 25-68b of the Connecticut General Statutes and Section 25-68h-1 of the Regulations of Connecticut State Agencies and in the National Flood Insurance Program Regulations (44 CFR, Chapter 1, Subchapter B, Part 59.1).

Section I: Floodplain Management

Section I: Floodplain Management

Name of Applicant: **Connecticut Department of Transportation**

Name of Proposed Project: **Branford RR Station**

1. General Criteria

a. *Critical Activity* - Does the proposed project involve the treatment, storage and disposal of hazardous waste or the siting of hospitals, housing for the elderly, schools or residences, in the 0.2 per cent [500 year] floodplain? ☐ Yes ☒ No

If yes, the base flood for the critical activity shall have a recurrence interval equal to the 500 year flood event; if no, the base flood for the activity shall have a recurrence interval equal to the 100 year flood event.

b. *Nonintensive Floodplain Uses* - Will the proposed project promote development in floodplains or will utilities servicing the project be located so as to enable floodplain development?

☐ Yes ☒ No

Explain:

c. *National Flood Insurance Program* (NFIP) - Will the proposed project be located within an area of special flood hazard designated by the Federal Emergency Management Agency (FEMA)?

☒ Yes ☐ No If yes, list the FEMA flood zone(s):

Zone A6 (EL 10.8)

Does the proposed project meet the NFIP minimum standards established in 44 CFR, Chapter 1, Subchapter B, Part 60.3, floodplain management criteria for flood-prone areas?

☒ Yes ☐ No

d. *Municipal Regulations* - Has the municipality in which the proposed project is to be located adopted floodplain regulations containing requirements that are more restrictive than the NFIP floodplain management criteria for flood-prone areas? ☐ Yes ☒ No

If yes, describe the more restrictive requirements:

Does the proposed project comply with the more restrictive standards of the municipality?

☐ Yes ☐ No

Section I: Floodplain Management (continued)

2. *Flooding and Flood Hazards*

a. *Flooding* - Will the proposed project pose any hazard to human life, health or property in the event of a base flood? ☐ Yes ☒ No

If yes, explain:

b. *Flood Velocities* - Will the proposed project cause an increase in flow velocity or depth during the base flood discharge? ☐ Yes ☒ No

If yes, the increase in velocity is: fps
and/or the increase in depth is: ft.

Will such increase in velocity or depth cause channel erosion or pose any hazard to human life, health or property? ☐ Yes ☐ No

Explain:

c. *Flood Storage* - Will the proposed project affect the flood storage capacity or flood control value of the floodplain? ☐ Yes ☒ No

If yes, describe the effects:

d. *Degrading or Aggrading Stream Beds* - Is the streambed currently degrading or aggrading?

☐ Degrading ☐ Aggrading ☒ Neither

Has the project design addressed degrading or aggrading streambed conditions?

☐ Yes ☐ No

e. *Ice Jams* - Is the watercourse prone to ice jams or floods due to ice? ☐ Yes ☒ No

Has the project design considered ice jams or floods due to ice? ☐ Yes ☒ No

Section I: Floodplain Management (continued)

f. *Storage of Materials & Equipment* - Will the construction or use of the proposed project involve the storage of materials below the 500 year flood elevation that are buoyant, hazardous, flammable, explosive, soluble, expansive or radioactive, or the storage of any other materials which could be injurious to human, animal or plant life in the event of a flood?

☒ Yes ☐ No

If yes, describe the materials and how such materials will be protected from flood damage, secured or removed from the floodplain to prevent pollution and hazards to life and property.

Because the majority of the site is within the 500-year floodplain, storage of materials that could be injurious or pose a risk to human, animal, or plant life will be permitted within the floodplain but outside the 100-year flood zone. In the event of a flood warning, the contractor is responsible for moving these materials outside the 500-year floodplain or off the premises.

Storage of materials that could be injurious to human health or the environment in the event of flooding is prohibited below the elevation of the 500 year flood. Other material or equipment may be stored below the 500 year flood elevation provided that such material or equipment is not subject to major damage by floods, and provided that such material or equipment is firmly anchored, restrained or enclosed to prevent it from floating away or that such material or equipment can be removed prior to flooding.

g. *Floodwater Loads* - Will structures, facilities and stored materials be anchored or otherwise designed to prevent floatation, collapse, or lateral movement resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy? ☒ Yes ☐ No

3. *Standards for Structures in Floodplains or Coastal High Hazard Areas*

Does the proposed project involve a new or substantially improved structure or facility located within a floodplain or coastal high hazard area? ☐ Yes ☒ No

If yes, complete this subsection; if no, skip to subsection 4 (***Topography Changes within Floodplain***).

a. *Structures in Coastal High Hazard Areas* - Will the structure or facility be located within an NFIP coastal high hazard area? ☐ Yes ☐ No

If no, skip to paragraph 3(b); if yes:

1. Will the structure or facility be located landward of the reach of mean high tide?

   ☐ Yes ☐ No

2. Will a new structure or facility be located on an undeveloped coastal barrier beach designated by FEMA? ☐ Yes ☐ No

3. If the structure or facility is/will be located within a coastal high hazard area, the structure or facility must be elevated on pilings or columns so that the bottom of the lowest horizontal structural member of the lowest floor (excluding the pilings or columns) is elevated to at least one foot above the base flood level and the pile or column foundation and structure attached thereto must be anchored to resist floatation, collapse and lateral movement due to the effects of wind, velocity waters, hurricane wave wash, and base flood water loads acting simultaneously on all building components.

   Does the proposed structure or facility meet these standards? ☐ Yes ☐ No

   The base flood elevation is: ft. (Datum:)

   The elevation of the lowest horizontal structural member is: ft. (Datum:)

Section I: Floodplain Management (continued)

4. Will the space below the lowest floor be either free of obstruction or constructed with non-supporting breakaway walls? ☐ Yes ☐ No

5. Will fill be used for structural support of any buildings within coastal high hazard areas?

   ☐ Yes ☐ No

b. *Structures in Floodplain Areas* - Are the structures residential or nonresidential?

   ☐ Residential ☐ Nonresidential If *nonresidential*, skip to paragraph 3(d) below.

c. *Residential Structures* - If the structure or facility is for human habitation will the lowest floor of such structure or facility, including its basement, be elevated one foot above the level of the 500 year flood?

   ☐ Yes ☐ No

   The 500 year flood elevation is: ft. (Datum:)

   The elevation of the lowest floor, including basement, is: ft. (Datum:)

d. *Non-residential Structures* - If the structure or facility is not intended for residential uses, will the lowest floor of such structure or facility, including its basement, be elevated to or above the 100 year flood height or be floodproofed to that height, or in the case of a critical activity, the 500 year flood height?

   ☐ Yes ☐ No

   If yes, the structure will be: ☐ Elevated ☐ Floodproofed

   The base flood elevation is: ft. (Datum:)

   The elevation of the lowest floor, including basement, is: ft. (Datum:)

   The structure is floodproofed to: ft. (Datum:)

   Note: for insurance purposes nonresidential structures must be floodproofed to at least one foot above the base flood elevation. DEP strongly encourages that the height of floodproofing incorporate one foot of freeboard.

e. *Utilities* - Will service facilities such as electrical, heating, ventilation, plumbing, and air conditioning equipment be constructed at or above the elevation of the base flood or floodproofed with a passive system? ☐ Yes ☐ No

f. *Water Supply Systems* - Does the proposed project include a new or replacement water supply system?
   ☐ Yes ☐ No

   If yes, is the water supply system designed to prevent floodwaters from entering and contaminating the system during the base flood? ☐ Yes ☐ No

g. *Sanitary Sewage Systems* - Does the proposed project include a new or replacement sanitary sewage or collection system? ☐ Yes ☐ No

   If yes, is the sanitary sewage system designed to minimize or eliminate the infiltration of flood waters into the systems and discharges from the systems into flood waters during the base flood?

   ☐ Yes ☐ No

h. *Foundation Drains* - Are foundation drains of buildings designed to prevent backflow from the 100 year frequency flood into the building?

   ☐ Yes ☐ No ☐ No foundation drains

Section I: Floodplain Management (continued)

4. *Activity within Floodplain*

Does the proposed project involve activity in a floodplain including but not limited to filling, dumping, construction, excavating, or grading?

☒ Yes ☐ No If no, skip to subsection 5 ***(Alterations of Watercourses)***.

If yes, does the proposed project include encroachments, including fill, new construction, substantial improvements, or other development within a NFIP adopted regulatory floodway?

☐ Yes ☒ No If yes, skip to paragraph 4(b) below.

a. *No Regulatory Floodway* - The NFIP requires that until a regulatory floodway is designated, that no new construction, substantial improvements, or other development (including fill) shall be permitted within Zones A1-30 and AE unless it is demonstrated that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase the water surface elevation of the base flood more than one foot at any point. (If no regulatory floodway has been adopted, project impacts may be evaluated by considering an equivalent conveyance loss on the opposite side of the river from the proposed project.)

Is the proposed project consistent with this requirement? ☒ Yes ☐ No

b. *Floodway Encroachments* - Will the proposed encroachment into the floodway result in any increase in flood levels during either the 100 year or 10 year discharges?

100 year: ☐ Yes; the increase is: (in 1/100ths of a foot) ☐ No

If yes, has the applicant received approval of such increase in accordance with 44 CFR, Chapter 1, Subchapter B, Part 65.12? ☐ Yes ☐ No

10 year: ☐ Yes; the increase is: (in 1/100ths of a foot) ☐ No

c. *Coastal Areas* - Flood hazard potential in coastal areas shall be evaluated considering surface profiles of the combined occurrence of tides, storm surges, and peak runoff. The starting water surface elevation for the base flood in watersheds with time of concentrations of over 6 hours shall be the 10 year frequency tidal surge level.

If the proposed project is in a coastal area, have the hydraulic analyses incorporated these criteria?

☒ Yes ☐ No ☐ Not in Coastal Area

5. *Alterations of Watercourses*

Does the proposed project include the construction or alteration to a natural perennial watercourse or man-made channel?

☒ Yes ☐ No If no, skip to subsection 6 ***(Culverts and Bridges)***; if yes, complete the following subsection:

a. *Topography Change* - Is the watercourse or channel located within a regulatory floodway or Zone A1-30 or AE as designated by the NFIP? ☒ Yes ☐ No

b. *Hydraulic Capacity* - Does the channel have a minimum flow capacity of a flood equal to at least the 25 year frequency flood? ☒ Yes ☐ No

The channel capacity is designed for the: **25** year flood.

Does the channel have an inner channel with a capacity of a 2 year frequency flood? ☒ Yes ☐ No

Section I: Floodplain Management (continued)

c. *Aquatic Habitat* - Channel alterations should be designed to create aquatic habitats suitable for fisheries, including suitable habitat for maintaining fish populations and to enable fish passage, and to maintain or improve water quality, aesthetics, and recreation.

Has the applicant had any pre-application meetings or correspondence with DEP Fisheries?

☒ Yes ☐ No

Check each of the following criteria that have been incorporated into the project design:

☒ 1. artificial channel linings have been avoided;

☒ 2. the channel will encourage ecological productivity and diversity;

☒ 3. the channel and its banks will be compatible with their surroundings;

☐ 4. the channel will vary in its width, depth, invert elevations, and side slopes to provide diverse aquatic habitat;

☐ 5. straightening existing channels and thereby decreasing their length has been avoided;

☒ 6. the channel will not create barriers to upstream and downstream fish passage;

☐ 7. the channel will contain pools and riffles and a low flow channel to concentrate seasonal low water flows;

☐ 8. the channel will contain flow deflectors, boulders and low check dams to enhance aquatic habitat;

☒ 9. stream bank vegetation will be preserved where feasible and disturbed stream bank areas will be replanted with suitable vegetation;

☐ 10. clean natural stream bed materials of a suitable size will be incorporated in the new channel; and

☒ 11. construction of the proposed project will be scheduled to minimize conflicts with spawning, stocking, and recreational fishing seasons.

Describe how the above aquatic habitat design criteria have been incorporated into the project design:

The Branford parking expansion project improves aquatic habitat by increasing fish passage (removing the existing 12" culvert and replacing with a structure that spans the entire natural channel width). This increases tidal flow while preserving the quality and character of the waterway. Through the use of turbidity curtains, temporary disturbances to the waterway will be minimal. At the conclusion of construction, a habitat better resembling the native condition will have been created.

Section I: Floodplain Management (continued)

6. *Culverts and Bridges*

Does the proposed project involve the repair or new construction of a culvert or bridge?

☒ Yes ☐ No If no, go to subsection 7 ***(Temporary Hydraulic Facilities)***.

If yes, complete this subsection:

a. *Fish Passage* - Does the culvert design allow for the passage of fish? ☒ Yes ☐ No

If yes, describe the specific design provisions for fish passage:

The arch culvert is designed to span the entire limits of the natural channel, providing for significantly improved fish passage over the existing 12" pipe culvert.

b. *Depressed Structural Floors* - Is the rigid structural floor of the culvert or bridge depressed below the normal stream bed to allow a natural stream bed to form over the floor?

☐ Yes ☐ No ☒ No rigid structural floor

c. *Multiple Openings* - The use of a single large culvert or bridge opening is preferred over the use of multiple small openings. Has the design minimized the use of multiple small openings?

☒ Yes ☐ No

If no, explain:

d. *Sag Vertical Curves* - Does the design utilize solid parapet walls in the sag part of a vertical curve?

☐ Yes ☐ No ☒ Not located in a sag vertical curve

e. *Debris Blockage* - Is the culvert or bridge prone to blockage by debris? ☒ Yes ☐ No

If yes, has the project design incorporated measures to minimize the potential for debris blockage?

☒ Yes ☐ No

f. *Topography Change* - Is the culvert or bridge located within a regulatory floodway or Zone A1-30 or AE as designated by the NFIP? ☒ Yes ☐ No

Section I: Floodplain Management (continued)

g. *State Highways* - Does the watercourse pass under a state roadway?

☐ Yes ☒ No If no, skip to paragraph 6(g)(2).

If yes, culverts and bridges for state highways shall be designed in accordance with the Connecticut Department of Transportation (DOT) Drainage Manual and all applicants should refer to it for specific design criteria. In general, however, the Drainage Manual requires the following:

(Place a check mark for all applicable criteria utilized)

☐ *Minor Structures* - Minor structures have a drainage area of less than one square mile in which there is no established watercourse. They shall be designed to pass the 25 year frequency discharge.

☐ *Small Structures* - Small structures have a drainage area of less than one square mile in which there is an established watercourse. *They* shall be designed to pass the 50 year frequency discharge.

☐ *Intermediate Structures* - Intermediate structures have a drainage area greater than one square mile and less than 10 square miles. They *shall* be designed to pass the 100 year frequency discharge with reasonable underclearance.

☐ *Large Structures* - Large structures have a drainage area greater than 10 square miles and less than 1000 square miles. They shall be designed to pass the 100 year frequency discharge with an underclearance not less than two feet.

☐ *Monumental Structures* - Monumental structures *have* a drainage area greater than 1000 square miles. They shall be designed to meet the requirements of the Connecticut Department of Environmental Protection, U.S. Army Corps of Engineers, and the U.S. Coast Guard.

☐ *Tidal Structures* - Tidal structures are subject to tidal action and shall be classified as minor, small, intermediate, etc. depending on their drainage area. These structures shall be designed in accordance with the previously listed *classifications*. However if the highway is subject to frequent tidal flooding, the design storm may be made consistent with the frequency of flooding by tidal action. The proposed culvert or bridge is classified as:

☐ Tidal, minor

☐ Tidal, small

☐ Tidal, intermediate

☐ Tidal, large

☐ Tidal, monumental

1. Has the structure been designed in accordance with the criteria established in the DOT Drainage Manual? ☐ Yes ☐ No

   If no, describe the lower design standards and the reasons for not complying with the DOT Drainage Manual:

Section I: Floodplain Management (continued)

2. Will the proposed culvert or bridge increase upstream water surface elevations in the event of a base flood above that which would have been obtained in the natural channel if the highway embankment were not constructed? ☐ Yes ☒ No

   If yes, is the increase in elevation more than one foot? Describe:

3. Will the proposed culvert or bridge be designed so that flooding during the design discharge does not endanger the roadway or cause damage to upstream developed property? (NOTE: The design discharge for culverts and bridges on state highways should be that which was determined by FEMA. If the applicant judges that the FEMA discharge is inappropriate, the project should be analyzed for both the applicant's computed flow and the FEMA discharge. The project, however, must still meet the standards of the NFIP.) ☒ Yes ☐ No

   Explain:

   New culvert is located in the area of the additional parking entrance. A 28' span pre-engineered structure will allow passage of flow from the upstream 24" cross drain under the railroad to the 48" cross drain downstream at Maple Avenue

h. *Local Roads & Driveways* - Local roads (not state highways) and driveways may be designed for flood frequencies and underclearances less stringent than those specified in the DOT Drainage Manual when (check all that have been incorporated into the project design):

☐ 1. the road is at or close to the floodplain grade

☒ 2. water surface elevations are not increased by more than one foot nor cause damage to upstream properties

☐ 3. provisions are made to barricade the road when overtopped

☒ 4. the road or driveway is posted as being subject to flooding

☒ 5. the road or driveway has low traffic volume

☐ 6. alternate routes are available

The culvert or bridge has been designed to pass the: **50** year frequency discharge with an underclearance of: **0.7** feet.

Utilizing the DOT Drainage Manual classifications listed under paragraph 6(g) above, the culvert or bridge is classified as a: **small tidal** structure.

Section I: Floodplain Management (continued)

h. If the culvert or bridge is designed to standards lower than which is stipulated in the DOT Drainage Manual, list such standards and the reasons for the lower design standards:

The proposed culvert is a small structure (as classified by the 2000 ConnDOT Drainage Manual).It is designed to accommodate the 50-year storm event. The drainage area for the culvert, asdetermined using the USGS StreamStats database, is approximately 0.2 square miles. The design ensures that 0.7' of freeboard over the theoretical 50-year elevation of 9.8' isprovided. This is less freeboard than the recommended 1.0'. However, the actual elevation ofthe 50-year flood at this culvert will likely be significantly lower than the FIRM elevation of 9.8' due to the significantly smaller culverts that bookend the site.

i. *Downstream Peak Flows* - Will the proposed culvert or bridge increase downstream peak flows by decreasing existing headwater depths during flooding events? ☐ Yes ☒ No

If yes, describe the selected design criteria and the impacts to downstream properties:

7. *Temporary Hydraulic Facilities*

Temporary hydraulic facilities include all channels, culverts or bridges which are required for haul roads, channel relocations, culvert installations, bridge construction, temporary roads, or detours. They are to be designed with the same care which is used for the primary facility.

If the proposed activity involves a temporary hydraulic facility(s), has such facility been designed in accordance with Chapter 6, Appendix F, "Temporary Hydraulic Facilities," of the DOT Drainage Manual?

☒ Yes ☐ No ☐ No temporary hydraulic facilities

If yes, the design flood frequency is the: **2** year flood.

Describe the temporary facilities:

The temporary facilities consist of cofferdams installed outside the wetland limits, bounded by turbidity control curtains. The top of the cofferdams is to be no lower than Elevation 7.0'. Beyond keeping the construction zone dry, the cofferdams, in concert with the turbidity control curtains, will provide a clear passage for tidal flows.

Section II: Stormwater Management

Name of Applicant: **Connecticut Department of Transportation**

Name of Proposed Project: **West Parking Lot, Branford Railroad Station**

1. *Stormwater Runoff*

The proposed project will (check all that apply):

- ☒ Increase the area of impervious surfaces
- ☒ Increase runoff coefficients
- ☒ Alter existing drainage patterns
- ☒ Alter time of concentrations
- ☐ Change the timing of runoff in relation to adjacent watersheds

Will the proposed project impact downstream areas by increasing peak flow rates, the timing of runoff, or the volume of runoff? ☐ Yes ☒ No

If yes, describe the downstream impacts for the 2, 10 and 100 year frequency discharges:

The pre and post development peak flow rates at the downstream design point are as follows:

Return Frequency (Year)	Peak Discharges (CFS)	
	Pre-Development	Post-Development
2		
10		
100		

The above peak discharges were computed utilizing the: hour duration storm. This duration storm was selected because:

Section II: Stormwater Management (continued)

Describe the location of the design point and why this location was chosen:

2. *Stormwater Detention Facilities*

Does the proposed project include the construction of any stormwater detention facilities?

☒ Yes ☐ No If no, skip to subsection 3 ***(Storm Drainage Systems)***.

If yes, has the DEP determined whether a dam construction permit is required? ☐ Yes ☒ No

The pre and post development peak flow rates at the downstream design point are as follows:

Return Frequency (Year)	Peak Discharges (CFS)		
	Pre-Development	Post-Development (without detention)	Post-Development (with detention)
2	1.5(BS)/ 0.1(BN)	7.4 / 1.0	1.2 / 0.1
10	3.4 / 0.6	12.5 / 2.1	3.1 / 0.4
100	N/A (Tidal)	N/A (Tidal)	N/A (Tidal)

The above peak discharges were computed utilizing the: **24** hour duration storm. This duration storm was selected because:

SCS Unit Hydrograph Method is applicable to the site.

Describe the location of the design point and why this location was chosen:

The location of the design point for Branford South (BS) is on the south side of the site by the tidal wetlands. The point was chosen because all of the runoff flows to the south and the detention facility is located in the south part of the site.

The location of the design point for Branford North (BN) is the northwest corner of the site. The point was chosen because the existing runoff flows in a general east-to-west direction, and the northern portion of the site retains the existing topography

Section II: Stormwater Management (continued)

If the proposed project increases peak flow rates for the 2, 10 or 100 year frequency discharges, describe the impacts to downstream areas:

Will the detention facility aggravate erosion along the downstream channel? ☐ Yes ☒ No

In certain situations, detention of stormwater aggravates downstream flooding. This occurs when the discharge from a subwatershed is delayed by a detention facility so that it adds to the peak discharge from another subwatershed. Adding the hydrographs of the two subwatersheds results in a higher peak discharge over that which would occur if detention were not present.

Is the location of the detention facility within the watershed suitable for detention? ☐ Yes ☐ No

Explain:

3. *Storm Drainage Systems*

Does the proposed project include the construction of subsurface storm drainage systems?

☒ Yes ☐ No If no, you have completed Section II of the worksheets.

If yes, complete this subsection:

a. *DOT Standards* - Is the proposed storm drainage system designed in accordance with the Connecticut Department of Transportation's (DOT) Drainage Manual? ☒ Yes ☐ No

If no, describe the lower design standards and the reasons for not complying with the Drainage Manual:

b. *Design Storm* - Is the storm drainage system designed for a ten year frequency storm without closing the use of the facility? ☒ Yes ☐ No

c. *Future Development* - Has the design of the system considered future development of adjacent properties? ☐ Yes ☒ No

Section II: Stormwater Management (continued)

d. *Outlet Protection* - Have the outlets from the system been designed to minimize the potential for downstream erosion? ☒ Yes ☐ No

e. *Overland Flow* - Has the use of curbing been minimized to encourage overland dispersed flow through stable vegetated areas? ☒ Yes ☐ No

f. *Vegetated Filter Strips* - Has the design incorporated the use of vegetated filter strips or grass swales to improve the quality of water outletting from the storm drainage system? ☒ Yes ☐ No

g. *Stormwater Treatment* - Describe features of the stormwater collection system intended to improve the quality of stormwater runoff prior to its discharge to surface waters.

At Branford South, runoff will be collected in catch basins and piped to the forebay of the retention pond. Approximately 50% of the runoff will pass through a grass swale, improving water quality. The forebay is sized to hold approximately 20% of the WQV. The main basin and control structure then retain the remaining WQV. Retaining the WQV provides settlement time, improving water quality.

At Branford North, runoff will be collected in catch basins or will sheet flow onto porous pavement. The runoff is detained in the gravel recharge bed below the porous pavement. The recharge bed allows for infiltration and detains the WQV for 24 hours through the use of a low-flow orifice, promoting settlement. A grass filter strip is proposed at outlet.

h. *E & S Control Plan* - Has the design and installation of the storm drainage system been coordinated with the soil erosion and sediment control plan prepared in accordance with the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control? ☒ Yes ☐ No

Explain:

The runoff from both regions will be stored and released at controlled flows into the tidal wetlands through detention/retention. This runoff will be released onto a 12 foot strip of erosion control rip rap. The calculations for the design of the outlet protection are shown in Section 4.0 of the Drainage Report.

ATTACHMENT I

FLOOD CONTINGENCY PLAN

ATTACHMENT I - FLOOD CONTINGENCY PLAN

Construction Operation Plan - During construction, the Contractor is bound by the conditions set forth in ConnDOT's *"Standard Specifications for Roads, Bridges and Incidental Construction"*, Form 816 (2004). Specifically, Section 1.10 - Environmental Compliance, addresses the need for the Contractor to maintain a stable work area and to coordinate with the National Oceanic and Atmospheric Administration (N.O.A.A.) weather service for information pertaining to storms. These provisions are fully described under Items 9 and 10 of the "Best Management Practices."

In the event of flooding, the contractor is responsible for moving materials harmful to human, animal, or plant life outside the 500-year floodplain or off the premises. Other material or equipment may be stored below the 500 year flood elevation such that the material or equipment is not subject to major damage by floods, and that such material or equipment will be firmly anchored, restrained or enclosed to prevent it from floating away or that such material or equipment can be removed prior to flooding.

ConnDOT will have construction inspection personnel assigned to the project in order to oversee the Contractor's operations to insure compliance with the provisions of the Standard Specifications. The inspection personnel will be assigned through ConnDOT's Office of Construction, District 3, New Haven (203-389-3020).

Notice to proceed for construction of the additional parking lot is expected in December 2009 and construction is expected to be completed within one year. At the preconstruction meeting, typically held two weeks prior to construction, appropriate field personnel will be assigned to coordinate activities during construction.

Additionally, ConnDOT's Office of Environmental Planning (860-594-2920) will assign personnel to review the Contractor's erosion and sedimentation control plans, which are mandatory for all construction projects. ConnDOT can invoke the "24 hour rule" as prescribed in Section 1.10 of the Standard Specifications in order to force the Contractor to correct any deficiencies found on the project affecting environmental issues. The Office of Environmental Planning will oversee the Contractor for the life of the contract as necessary to insure compliance with all environmental requirements.

Post Construction Operation Plan – After completion of the project, the additional parking lot will have an elevation ranging from 14.5 to 12.2 feet NGVD 29. ConnDOT will maintain responsibility for the integrity of the facility after completion of the project. If there are any issues that need to be addressed, the Office of Rail (860-594-2900) should be contacted. Signs will be posted notifying motorists that parking is within a floodprone area.

In the event of a flood, an emergency access gate and gravel drive will be employed at the southwest corner of the new parking lot to evacuate vehicles. Additionally, signs will be installed at the overflow parking similar to those at the existing Branford Station parking lot which warn commuters that the area is subject to flooding. The station platform Passenger Information Display (PIDS) is also capable of broadcasting emergency information both in audio and visual formats.

ATTACHMENT Q

OTHER INFORMATION

Shore Line East Expansion Program - Branford Railroad Station
Branford, Connecticut

1. Figure Q-1 – Project Site
2. Fish and Wildlife Service Correspondence
3. Natural Diversity Database Correspondence
4. Site Photographs

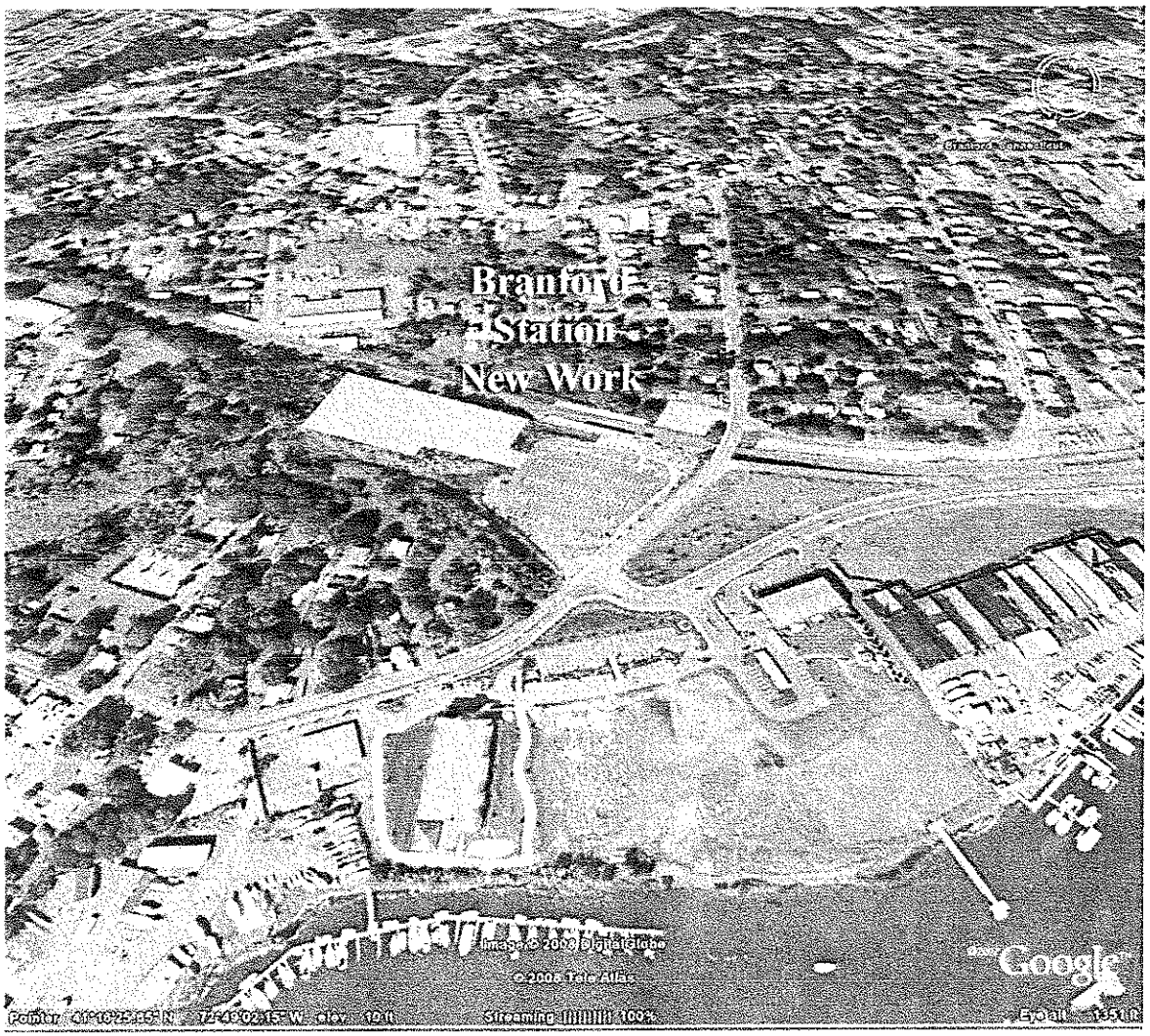


Figure Q-1, Aerial Image of the Project Site looking north (courtesy Google Earth)

FITZGERALD & HALLIDAY, INC.
72 Cedar Street, Hartford, Connecticut 06106
Tel. (860) 247-7200
Fax (860) 247-7206

October 1, 2007

Mr. Michael J. Bartlett
New England Field Offices Supervisor
United States Fish & Wildlife Service
70 Commercial Street, Suite 300
Concord, NH 03301-5087

Subject: Shoreline East Expansion - Branford
Branford, Connecticut

Dear Mr. Bartlett,

Fitzgerald & Halliday, Inc. is presently under contract to prepare environmental impact documents and permits for the above referenced State of Connecticut project. A review of the Connecticut Department of Environmental Protection (CTDEP) State and Federal Listed Species and Significant Natural Communities GIS database dated May 2007 for the project study area indicates that there are locations of potential conflict with an endangered species and/or significant natural community.

To further support FHI's investigation into potential threatened and endangered species concerns and/or significant wildlife habitats, FHI requests that your office kindly forward us any federal threatened and endangered species information related to this project study area. A map depicting the project study area and CTDEP State and Federal Listed Species and Significant Natural Communities data is enclosed. We look forward to receiving any information you can provide us, and to future coordination with your office.

Very truly yours,

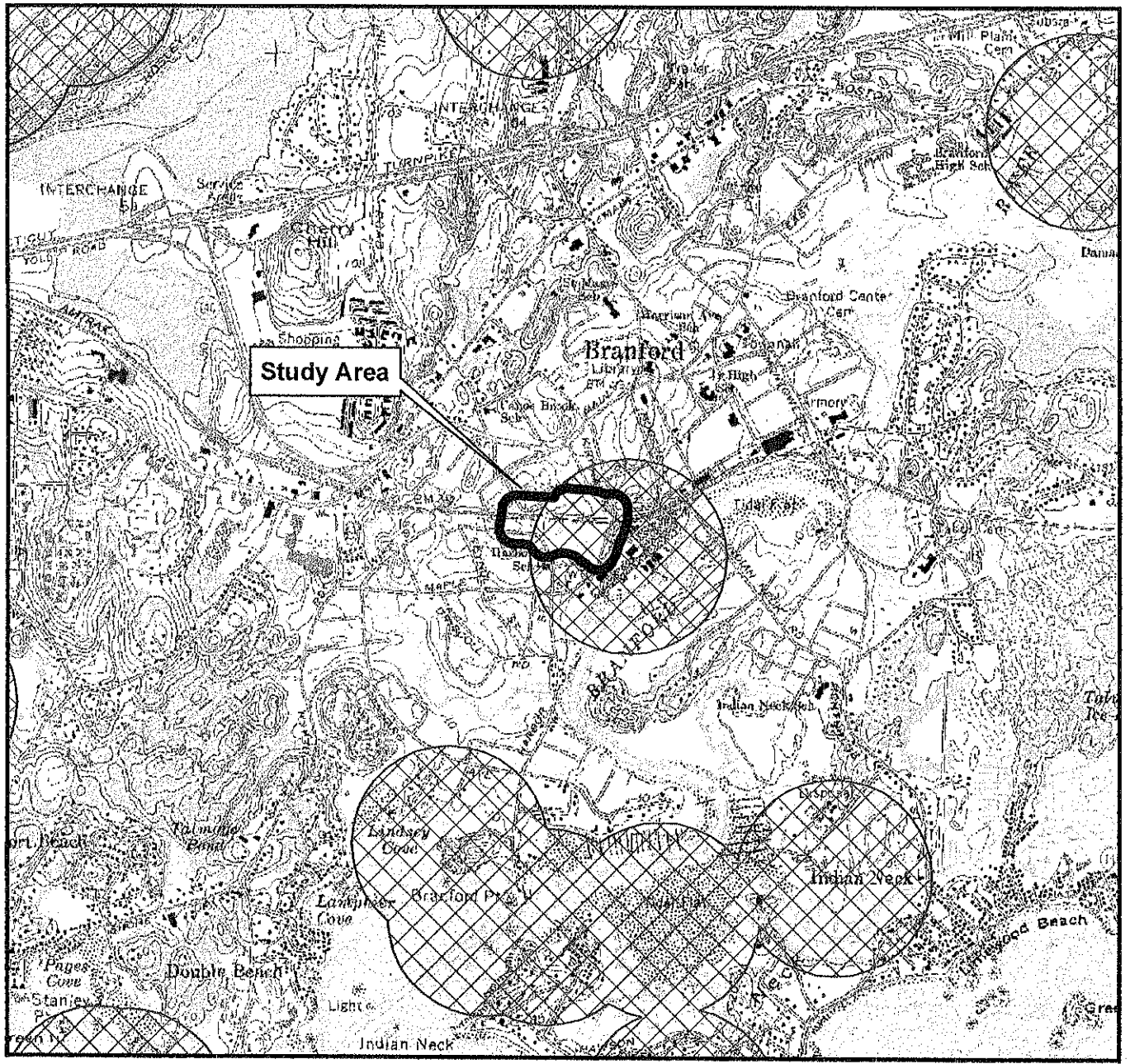
FITZGERALD & HALLIDAY, INC.

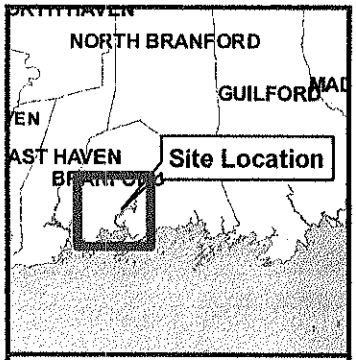
David Laiuppa

David Laiuppa
Planner II

Enclosure

Cc: J. DiLuca, P. Stanton (FHI), file P463.13





Study Area

CT NDDB - 2007

U.S.G.S. Quadrangle: Branford, CT

1:24,000

CT DEP Natural Diversity Database - 2007

Shoreline East Expansion Branford, CT

September 2007 - Fitzgerald & Halliday, Inc. - Project # 463.13 - original in color

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New England Field Office
70 Commercial Street, Suite 300
Concord, New Hampshire 03301-5087

November 2, 2007

Reference:	Project	Location
	Site assessment	Branford, CT

David Laiuppa
Fitzgerald & Halliday, Inc.
72 Cedar St.
Hartford, CT 06106

Dear Mr. Laiuppa:

This responds to your recent correspondence requesting information on the presence of federally-listed and/or proposed endangered or threatened species in relation to the proposed activity(ies) referenced above.

Based on information currently available to us, no federally-listed or proposed, threatened or endangered species or critical habitat under the jurisdiction of the U.S. Fish and Wildlife Service are known to occur in the project area(s). Preparation of a Biological Assessment or further consultation with us under Section 7 of the Endangered Species Act is not required.

This concludes our review of listed species and critical habitat in the project location(s) and environs referenced above. No further Endangered Species Act coordination of this type is necessary for a period of one year from the date of this letter, unless additional information on listed or proposed species becomes available.

In order to curtail the need to contact this office in the future for updated lists of federally-listed or proposed threatened or endangered species and critical habitats, please visit the Endangered Species Consultation page on the New England Field Office's website:

www.fws.gov/northeast/newenglandfieldoffice/EndangeredSpec-Consultation.htm

In addition, there is a link to procedures that may allow you to conclude if habitat for a listed species is present in the project area. If no habitat exists, then no federally-listed species are present in the project area and there is no need to contact us for further consultation. If the above conclusion cannot be reached, further consultation with this office is advised. Information describing the nature and location of the proposed activity that should be provided to us for further informal consultation can be found at the above-referenced site.

Thank you for your coordination. Please contact us at 603-223-2541 if we can be of further assistance.

Sincerely yours,

Anthony P. Tur
Endangered Species Specialist
New England Field Office

From: Johnson, Mark [mailto:Mark.Johnson@ct.gov]
Sent: Tuesday, May 20, 2008 11:12 AM
To: scott.hill@po.state.ct.us
Subject: DOT Project 310-0047 and 0048

Scott-

I received the information you sent me on May 13 regarding this project. My interest in the project is the current condition of the tidal creeks and associated tidal wetland vegetation, particularly as they relate to fish and fish habitat, and whether any improvements might be possible, as well as safeguarding the existing habitat. I don't foresee any need for seasonal restrictions on the work to protect fisheries resources.

I discussed the project with John Bernick (Project Engineer). It appears that the only connection of this tidal wetland to the Branford River is via an underground pipe about 150 yds long that transits the Anchor Reef parcel from Maple St to the Branford River. I am not certain that fish - primarily mummichog, a small species of killifish that are typically found in tidal wetlands - would pass that far underground, but it is possible. Also, I am not sure if the wetland is of sufficient size and character to support mummichog spawning. Mummichogs are preyed upon by a variety of larger fish and birds, and if conditions exist for mosquito breeding, mummichogs would help control their population.

John said one part of the project calls for the replacement of a culvert over the tidal creek with an arch roadway, which will improve the hydraulic connection to the north of the site. I also noted the various stormwater control and treatment measures that are planned for the parking lot, which should help protect the tidal wetland.

I understand that John is tentatively planning a presentation to Office of Long Island Sound Programs and the Corps to go over the project, and may also organize a site visit. During their permit process, OLISP typically addresses tidal wetland issues that might be of interest to me. However, please include me on the invitation list for these meetings. The site visit in particular would give me a better feel for the hydraulic connections and potential value of the tidal wetlands as fish habitat.

Thanks,

Mark Johnson, Senior Fisheries Biologist (Coastal)

CT DEP Marine HQ
P.O. Box 719; 333 Ferry Road
Old Lyme, CT 06371
Phone: 860-434-6043; Fax: 860-434-6150
Email: mark.johnson@ct.gov

STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION

October 25, 2007

David Laiuppa
Fitzgerald & Halliday, Inc.
72 Cedar Street
Hartford, CT 06106

Re: Shoreline East Expansion, Branford

Dear Mr. Laiuppa:

I have reviewed Natural Diversity Data Base maps and files regarding the area delineated on the map you provided and listed above. According to our information, there are no known extant populations of Federal or State Endangered, Threatened or Special Concern Species at the site in question.

Natural Diversity Data Base information includes all information regarding critical biologic resources available to us at the time of the request. This information is a compilation of data collected over the years by the Environmental and Geographic Information Center's Geological and Natural History Survey and cooperating units of DEP, private conservation groups and the scientific community. This information is not necessarily the result of comprehensive or site-specific field investigations. Consultations with the Data Base should not be substituted for on-site surveys required for environmental assessments. Current research projects and new contributors continue to identify additional populations of species and locations of habitats of concern, as well as, enhance existing data. Such new information is incorporated into the Data Base as it becomes available.

Please contact me if you have further questions regarding this information (424-3585). Thank you for consulting the Natural Diversity Data Base. Also be advised that this is a preliminary review and not a final determination. A more detailed review may be conducted as part of any subsequent environmental permit applications submitted to DEP for the proposed site.

Sincerely,

Nancy Murray
Biologist/Senior Environmental Analyst NDDB
Program Coordinator

NM/blm

Connecticut Department of Transportation
State Project No. 310-0047, 310-0048 – Branford Railroad Station Improvements

View south along tidal creek at proposed crossing

View north along tidal creek at proposed crossing

View west along tidal creek south of parcel

Army Corps of Engineers Programmatic General Permit
Inland Wetland Category Determination Form

THIS SECTION TO BE COMPLETED BY INITIATING UNIT

Project Number: 310-0057 Submittal Date: May 20, 2011

☒ Please attach project description (including wetland impacts), location map and plans.

Town: Guilford Coordinates: Long. W 72° 40' 24.91"

Waterway: N/A Lat. N 41° 16' 32.65"

It has been determined that there: ☐ are ☒ are not threatened or endangered species in the project area based upon NDDB mapping.

Fill[1] ☐ will ☒ will not be placed within any FEMA established Floodway.

Waters and wetland impacts[2]: 0 acres permanent impact (include all fill & excavation in wetlands & watercourses) 0 acres temporary impact (include temporary structures, clearing, access to site, draining, flooding, etc.). Total waters and wetland impacts: 0 acres

SECTION A

Please check all applicable requirements under Sections B and C and skip Section D if the project meets the following:

☒ Total waters and wetland impact is less than 5000 s.f.

☐ The tributary watershed to the culvert crossing is ≤1 sq. mile (640 acres). ☒ N.A. Project does not involve a culvert crossing

If the project does not meet the above requirements and the total waters and wetland impact is ☒ ≤1 acre, please skip Section B and check all applicable requirements under Sections C and D. Projects with waters and wetland impacts >1 acre are not PGP eligible and require submission of an application for an Individual Permit to the Corps.

SECTION B: CATEGORY 1 PROJECTS ONLY

- **For replacement of an existing roadway crossing using BRIDGES & OPEN-BOTTOM STRUCTURES, the structure:**

☐ Does not result in a change in the normal surface elevation[3] of the upstream waters, waterway or wetland

- **For new construction or replacement of an existing roadway crossing using a CULVERT:**

☐ The culvert gradient (slope) is ≤ the streambed gradient immediately upstream or downstream of the culvert

- **For STREAM BANK STABILIZATION projects:**

☐ Stabilization involves ≤200 total feet of stream bank, calculated as the sum of the lengths of work along each bank

☐ No fill within the streambed beyond the toe of slope of the stream bank

SECTION C: CATEGORY 1 AND CATEGORY 2 PROJECTS

- **For new construction or replacement of an existing roadway crossing using BRIDGES & OPEN-BOTTOM STRUCTURES, the structure:**

☐ Spans at least 1.2 times the watercourse bank full width[4]

☐ Has an openness ratio[5] ≥ 0.25 meters

☐ Allows for continuous flow[6] of the 50-year frequency storm flows

☐ Has a riparian bank on one or both sides for wildlife passage

- **For new construction or replacement of an existing roadway crossing using a CULVERT:**

☐ For a crossing consisting of a single box or pipe arch culvert, the inverts are set ≥ 12" below the streambed elevation

☐ For a crossing constructed using multiple box or pipe arch culverts, the inverts of one of the boxes or pipe arch culverts are set ≥ 12" below the streambed elevation ☐ N.A. Project does not meet the requirements in Section A and is not new construction

☐ The culvert is backfilled with natural substrate material matching upstream and downstream streambed substrate

☐ The structure allows for continuous flow[6] of the 50-year frequency storm flows

☐ For a crossing constructed using a pipe culvert, the inverts are set such that ≥ 25% of the pipe or 12", whichever is less, is set below the natural streambed elevation ☐ N.A. Project does not meet Section A requirements and is not new construction

☐ The structure does not impede the passage of fish and other aquatic organisms. Please attach copies of reports of meetings and/or other correspondence with DEP Fisheries ☐ N.A. Project is new construction and does not meet the requirements in Section A

- **For STREAM BANK STABILIZATION projects**

☐ There is an average of 1 cubic yard of fill or less per linear foot below ordinary high water[7]

SECTION D: CATEGORY 2 PROJECTS ONLY

- **For new construction or replacement of an existing roadway crossing using a CULVERT:**

☐ The use of a bridge or open-bottom structure is determined to be not practicable ☐ N.A. Project is not new construction

☐ There is no practicable alternative location for the crossing that would have less environmental impacts ☐ N.A. Project is not new construction

☐ The existing culvert is to be replaced using a box or pipe arch culvert

☐ Total waters and wetland impact is ≤1 acre

☐ The culvert has an openness ratio[5] ≥ 0.25 meters ☐ N.A. Project is not a culvert replacement

☐ The new structure does not result in a change in the normal surface elevation[3] of the upstream waters, waterway or wetland ☒ N.A. Project is not a culvert replacement

Special concerns / Notes: _____

Contact person: Bruce A. Olmstead Extension: X-3186

THIS SECTION TO BE COMPLETED BY ENVIRONMENTAL PLANNING

This project has been determined to qualify for:

☐ **Category I** – No further *Federal* permit processing is necessary.

☐ **Category I** – May be eligible as Category I, but backup information must be presented to DEP regarding why specific conditions have not been met (see notes section below)

☐ **Category II** – This project must be presented at the Corps/DOT monthly Project Manager's Meeting for review by all regulatory agencies. The Corps application Form ENG 4345 and CT PGP addendum must be prepared.

☐ **Category III** – Individual Corps Permit is required.

If the project design changes, affecting water resource impacts or water crossing elements, the project must be resubmitted for review by Environmental Planning

Special concerns / Notes: No 404 permit required

Completed By: K. Lesay Extension: X2933 Date: 5/19/11

Coastal Consistency Review Form

Please complete this form in accordance with the instructions (DEP-INST-004). Print or type unless otherwise noted.

Note: Fill out this form only if your project is in the Coastal Area as defined in CGS Section 22a-94(a).

DEP USE ONLY
Application No.: _____
Analyst Assigned: _____
Date Received (OLISP): _____

Part I: Project Information

1. Name and phone number of the applicant exactly as it appears on the *Permit Application Transmittal Form* (DEP-APP-001).

   Applicant: **Mr. Alexander, Mark W.**
   Title (Mr., Mrs., Ms., Dr., etc.) Last Name First Name Middle Initial Suffix (Jr., P.E., Ph.D.)

   Phone: **860-594-2931** Date: **4/01/2011**

2. Name of Preparer: **Bruce A. Olmstead** **Proj. Engineer**
   Title (if applicable)

3. Street Address or Description of Location of the Project Site:

   Old Whitfield Street, Guilford Connecticut: 0.5 acres adjacent to and north and west of existing Shore Line East Station.

   City or Town: **Guilford, CT**

4. Brief Project Description:

   This project will extend the existing north ADA accessible high level platform at Guilford Shore Line East Railroad Station approximately 170 feet. Construction will include sidewalk and pavement rehabilitation for this site which is within the Coastal Boundary. The storm water from the site will be treated and ultimately discharge into Guilford Harbor.

5. Is the project located within the coastal boundary as defined in CGS Section 22a-94(b)?

   ☒ Yes ☐ No

   If you answered **Yes** to this question, complete the entire form.

   If you answered **No** to this question, skip Parts II through V and complete Parts VI, VII and VIII.

Part II: Identification of Applicable Coastal Use and Activity Policies and Standards

Identify all statutory goals and policies in or referenced by Section 22a-92 of the Coastal Management Act applicable to the proposed activities.

- ☒ General Development* - CGS Sections 22a-92(a)(1), 22a-92(a)(2), 22a-92(a)(9), 22a-92(a)(9)
- ☐ Water-Dependent Uses - CGS Sections 22a-92(a)(3), 22a-92(b)(1)(A)
- ☐ Ports and Harbors - CGS Section 22a-92(b)(1)(C)
- ☐ Coastal Structures and Filling - CGS Section 22a-92(b)(1)(D)
- ☐ Dredging and Navigation - CGS Sections 22a-92(c)(1)(C), 22a-92(c)(1)(D)
- ☐ Boating - CGS Section 22a-92(b)(1)(G)
- ☐ Fisheries - CGS Section 22a-92(c)(1)(I)
- ☐ Coastal Recreation And Access - CGS Sections 22a-92(a)(6), 22a-92(C)(1)(j), 22a-92(c)(1)(K)
- ☐ Sewer and Water Lines - CGS Section 22a-92(b)(1)(B)
- ☐ Fuel, Chemicals And Hazardous Materials - CGS Sections 22a-92(b)(1)(C), 22a-92(b)(1)(E), 22a-92(c)(1)(A)
- ☒ Transportation - CGS Sections 22a-92(b)(10)(F), 22a-92(c)(1)(F), 22a-92(c)(1)(G), 22a-92(c)(1)(H)
- ☐ Solid Waste - CGS Section 22a-92(a)(2)
- ☐ Dams, Dikes and Reservoirs - CGS Section 22a-92(a)(2)
- ☐ Cultural Resources - CGS Section 22a-92(b)(1)(J)
- ☐ Open Space and Agricultural Lands - CGS Section 22a-92(a)(2)

* applicable to all proposed activities

Part III: Consistency With Applicable Statutory Coastal Use and Activity Goals and Policies

Explain how the proposed activity is consistent with the applicable coastal activities goals and policies identified in Part II and describe any mitigation necessary to offset adverse impacts:

The existing site is urbanized and is a working Shore Line East Station. The expansion of the north platform will allow additional service to the station. Amenities are also provided to encourage multimodal use by providing pedestrian access from New Whitfield Street to the west and commuter bicycle racks has been included. The expansion of the station will reduce roadway congestion by allowing the rail system to accommodate future growth.

The project will includea large planting area where proposed roof drains and new sidewalk area with a ballast strip subsurface drainage feature.

Part IV: Identification of Applicable Coastal Resources and Coastal Resource Policies

Identify the coastal resources and associated statutory policies that apply to your project by placing a check mark in the appropriate space(s) in the following table.

Coastal Resources	on-site	adjacent to work site	off-site but potentially affected by the project
General Resources* - CGS Sections 22a-93(7), 22a-92(a)(2)	X	X	X
Beaches & Dunes - CGS Sections 22a-93(7)(C), 22a-92-(b)(2)(C), 22a-92(c)(1)(K)			
Bluffs & Escarpments - CGS Sections 22a-93(7)(A), 22a-92(b)(2)(A)			
Coastal Hazard Area - CGS Sections 22a-93(7)(H), 22a-92(a)(2), 22a-92(b)(2)(F), 22a-92(b)(2)(J), 22a-92(c)(2)(B), 22a-92(a)(5)			
Coastal Waters & Estuarine Embayments - CGS Sections 22a-93(5), 22a-93(7)(K), 22a-93(7)(L), 22a-93(7)(G), 22a-92(a)(2), 22a-92(c)(2)(A)			X
Developed Shorefront - CGS Sections 22a-93(7)(I), 22a-92(b)(2)(G)			
Freshwater Wetlands and Watercourses - CGS Sections 22a-93(7)(F), 22a-92(a)(2)			
Intertidal Flats - CGS Sections 22a-93(7)(D), 22a-92(b)(2)(D), 22a-92(c)(1)(K)			
Islands - CGS Sections 22a-93(7)(J), 22a-92(b)(2)(H)			
Rocky Shorefront - CGS Sections 22a-93(7)(B), 22a-92(b)(2)(B)			
Shellfish Concentration Areas - CGS Sections 22a-93(7)(N), 22a-92(c)(1)(I)			
Shorelands - CGS Sections 22a-93(7)(M), 22a-92(b)(2)(I)			
Tidal Wetlands - CGS Sections 22a-93(7)(E), 22a-92(a)(2), 22a-92(b)(2)(E), 22a-92(c)(1)(B)			

* applicable to all proposed activities

Part V: Consistency with Applicable Statutory Coastal Resource Goals and Policies

Explain how the proposed activity is consistent with the applicable statutory coastal resource goals and policies identified in Part IV and describe any mitigation necessary to offset adverse impacts:

Reconstruction of an existing station in an already developed parcel, is consistent with the General Resource Policy of protecting open space. By providing an upgrade to a mass transportation facility in an urban area and by encouraging multimodal access, this project will decrease highway congestion and is therefore consistent with the General Resource Policy of protecting air quality.The scope of the site work on project is limited to replacing in kind the existing pavement and adding

Part V: Consistency with Applicable Statutory Coastal Resource Goals and Policies (Cont.)

approximately 75 feet of additional sidewalk. The existing drainage system will not be modified. The proposed sidewalk and platform roof drainage will discharge toward a major planting area or stone ballast gravel recharge bed to provide stormwater pretreatment. The project is therefore consistent with the Fresh Water Wetlands and Watercourses policy of limiting turbidity, flood danger and polution. Construction will conform to the State's Best Management Practies and the construction contract will include a sedimentation and erosion control plan designed to comply with the Fresh Water Wetland and Watercourses policy of preventing erosion and siltation.

Part VI: Identification of Potential Adverse Impacts

Identify the adverse impact categories that apply to the proposed activity. The "applicable" space must be checked if the proposed activity has the potential to generate any adverse impacts defined in the Coastal Management Act and referred to in the following table. If the category is applicable to the proposed activity, you may describe in Part VII project design features which may eliminate or minimize the potential for identified adverse impacts.

Potential Resource Impacts	Applicable	Not Applicable
Characteristics & Functions of Resources - CGS Section 22a-93(15)(H)		X
Coastal Flooding - CGS Section 22a-93(15)(E)		X
Coastal Waters Circulation Patterns - CGS Section 22a-93(15)(B)		X
Drainage Patterns - CGS Section 22a-93(15)(D)		X
Patterns of Shoreline Erosion and Accretion - CGS Section 22a-93(15)(C)		X
Visual Quality - CGS Section 22a-93(15)(F)		X
Water Quality - CGS Section 22a-93(15)(A)	X	
Wildlife, Finfish, Shellfish Habitat - CGS Section 22a-93(15)(G)		X

Potential Impacts on Water Dependent Uses	Applicable	Not Applicable
Locating a non-water-dependent use on a site suited to or planned for a water-dependent use - CGS Section 22a-93(17)		X
Replacing an existing water-dependent use with a non-water-dependent use - CGS Section 22a-93(17)		X
Siting a non-water-dependent use which reduces or eliminates public access to marine or tidal waters - CGS Section 22a-93(17)		X

Part VII: Consistency with Statutory Adverse Impact Policies

Explain how all potential adverse impacts identified, as applicable, in Part VI have been avoided, eliminated or minimized.

This project is extremely limited in both land area and scope of work. The project will incorporate stormwater treatment measures including plantings and a type of gravel recharge beds, that will result in a no measureable change in the peak stormwater flow from the site. Through the use of pre-treatment these measures are designed to avoid any impacts from siltation, turbidity, and rise of temperature to water quality in the area. After treatment, the storm water will discharge to a sluice brook that ultimately discharges into Guilford Harbor. These systems have been checked and are adequate for this purpose. Construction will be governed by the State's Best Management Practices and the construction contract will include a Sedimentation and Erosion Control Plan.

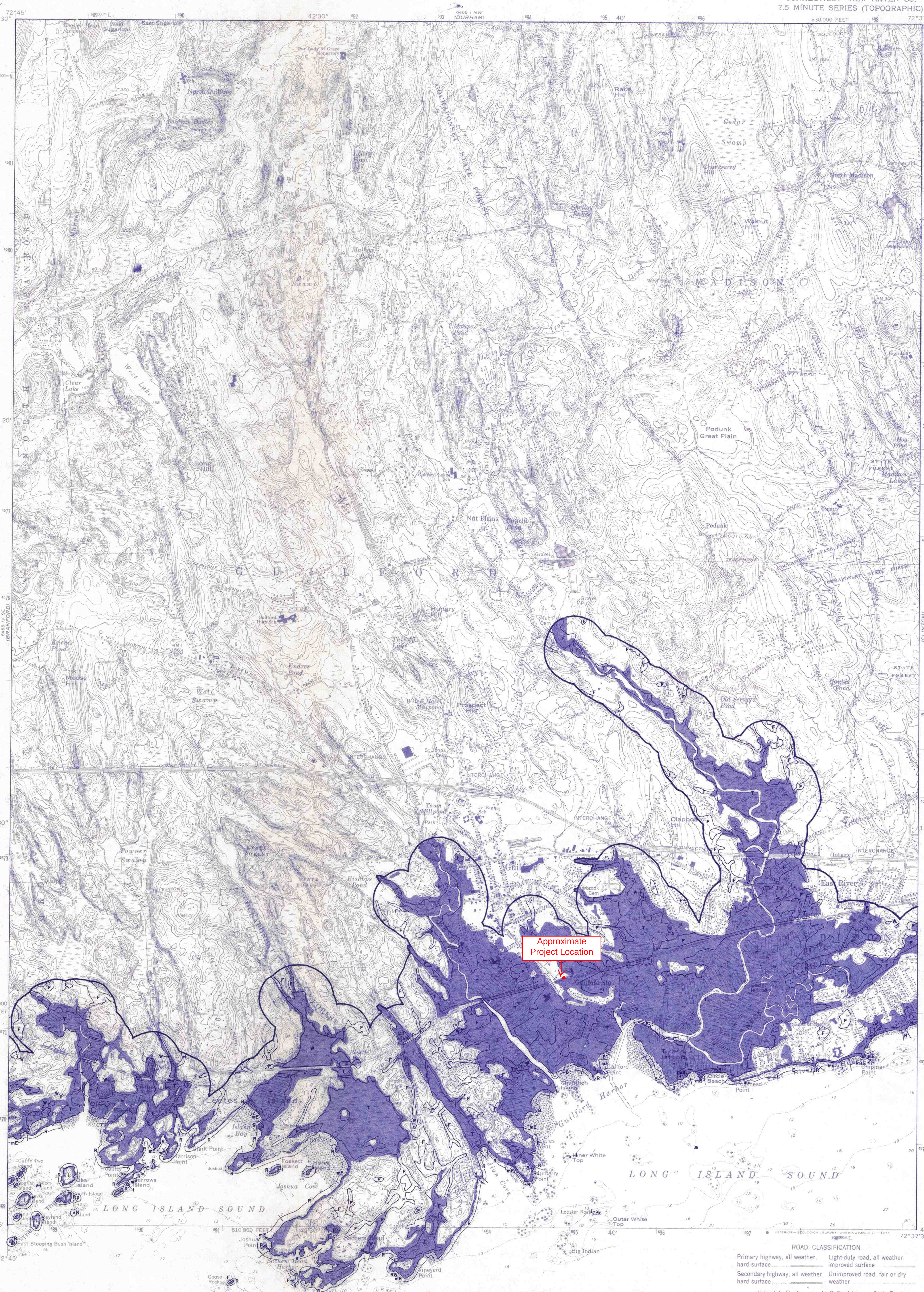
Part VIII: Remaining Adverse Impacts

Identify any adverse impacts which remain after incorporating all measures to eliminate or minimize such adverse impacts, and explain why no feasible and prudent alternatives exist that would further avoid or reduce such impacts.

None

STATE OF CONNECTICUT

GUILFORD QUADRANGLE
CONNECTICUT–NEW HAVEN CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)



LEGEND

COASTAL LAND RESOURCES

E — COASTAL BLUFFS AND ESCARPMENTS: Steep, seaward sloping marine cliffs or escarpments composed of unconsolidated bouldery to stony or sandy to gravelly soils. The slopes are active and the shores retreating(eroding). The slopes may be mantled with a sparse shrub or herb cover of salt spray tolerant plants. (Sources: 1,2)

mE — modified BLUFFS AND ESCARPMENTS: Bluffs and escarpments which have been temporarily stabilized by erosion control structures (revetment, bulkhead or seawall) positioned seaward of the marine cliff or escarpment. (Source: 1)

B — BEACHES AND DUNES: Moderately sloping shores composed of water worked sand, gravel or cobble deposits(beach) and when present, wind deposited sands(dunes or sand flats). The beach (proper) is positioned between mean low water and coastal bluffs/escarpments or dunes or vegetation. The map designations include all areas of sandy beach fill. Dunes and sand flats positioned landward and elevated above the beach, support coastal grasslands dominated by beach grass (*Ammophila breviligulata*). (Sources: 1,2,3,4)

mB — modified BEACHES AND DUNES: Beach systems temporarily stabilized by an erosion control structure (revetment, seawall or bulkhead) positioned between the dune ridge and the beach. (Source: 1)

R — ROCKY SHOREFRONTS: Shorefront composed of bedrock or armored with a dense aggregate of boulder and stone. Includes rugged nearly vertical rock cliffs or gently seaward sloping rock and bouldery lands. (Source: 1)

COASTAL 'FLOOD' HAZARD AREA: 100 year coastal flood hazard area as identified by the Federal Emergency Management Agency (FEMA). On those coastal islands currently unmapped by FEMA, the flood hazard area is conservatively approximated by the 10' contour interval. (Sources: 2,5)

F — FRESHWATER WETLANDS AND UNDESIGNATED TIDAL WETLANDS: Areas defined in Section 22a-38 of the Connecticut General Statutes as "land, including submerged land, not regulated pursuant to sections 22a-28 to 22a-35('Tidal' Wetlands and Watercourses Act), inclusive, which consists of any of the soil types designated as poorly drained, very poorly drained, alluvial and floodplain...(Inland Wetlands and Watercourses Act)." Includes all freshwater wetland soils and any poorly to very poorly drained soils of the Pawcatuck and Westbrook series (tidal wetland soils) that are unmapped and unregulated by the state tidal wetland program. (Sources: 1,5)

I — ISLANDS: A land mass of bedrock or till encircled by coastal waters. (Note: All critical coastal resource components of the island such as bluffs and escarpments, beaches and dunes, rocky shorefront and wetlands should be managed accordingly whether or not these are displayed on this map) (Sources: 1,2)

SHORELANDS: Upland areas at elevations in excess of the 100 year still water flood level and located within the coastal boundary. (Sources: 2,5)

D — DEVELOPED SHOREFRONT: Port and harbor areas which have been highly engineered and developed resulting in the functional impairment or substantial alteration of their natural physiographic features or systems. (Sources: 1,3,4,7)

W — WATER: Open water bodies such as but not limited to lakes and ponds subject to regulation under Sections 22a-36 to 22a-45 of the Connecticut General Statutes. (Source: 2)

INTERTIDAL RESOURCES

T — REGULATED TIDAL WETLANDS: Official state designated and regulated tidal wetlands located within the coastal boundary. The areas depicted on this map shall in no way supersede the official state regulated tidal wetland maps at the scale of 1:2400. (Source: 6)

INTERTIDAL FLATS: Level to gently sloping areas subjected to alternating periods of tidal inundation and exposure. Sediment is variable ranging from mud to sand. (Source: 2)

COASTAL WATERS

EM — ESTUARINE EMBAYMENTS: Protected coastal water bodies with an open connection to the Sound including tidal rivers, bays, coves and lagoons. (Source: 2)

NW — NEARSHORE WATERS: Those waters and submerged lands between mean low water and a depth approximated by the 10 meter bathymetric contour. (Source: 2)

OW — OFFSHORE WATERS: Those waters and submerged lands seaward of a depth approximated by the 10 meter bathymetric contour. (Source: 2)

COASTAL BOUNDARY: As defined in Section 22a-94 of the Connecticut General Statutes as amended by Public Act 79-535. (Lands and waters seaward of the inside edge of this line are subject to the provisions of the Connecticut Coastal Management Act)

SOURCES:
1. False Color Infrared Aerial Photographs (1:12000), 1974
2. U.S.G.S. 7½ Minute Quadrangle
3. Surficial Geology Maps (U.S.G.S. or Connecticut Geological and Natural History Survey)
4. Soil Conservation Service, Coastal Soil Maps (1:24000), 1979
5. Flood Insurance Maps Prepared by the Federal Emergency Management Agency (hazard boundary maps, preliminary flood insurance rate maps or final flood insurance rate maps, whichever ones were most current at this printing)
6. State Regulated Tidal Wetland Maps (1:2400)
7. Coastal Area Management, Land Use Overlays (1:24000)

This map is intended as a guide to identify the approximate locations of coastal resources. Map designations conform to the resource definitions in Section 22a-93 of the Connecticut General Statutes as amended by Public Act 79-535. Boundary lines are as precise as this map and source information permit. This map shall not supersede any existing and more precise official tidal wetland map, state or municipal inland wetlands map or FEMA flood insurance map. Specific questions or comments relating to the map units or the application of this map, should be directed to the Connecticut Coastal Area Management Program.

SCALE 1:24 000

CONTOUR INTERVAL 10 FEET
DATUM IS MEAN SEA LEVEL
DEPTH CURVES AND SOUNDINGS IN FEET—DATUM IS MEAN LOW WATER
SHORELINE SHOWN REPRESENTS THE APPROXIMATE LINE OF MEAN HIGH WATER
THE MEAN RANGE OF TIDE IS 5.4 FEET

UTM GRID AND 1972 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

ROAD CLASSIFICATION

Primary highway, all weather, hard surface — Light-duty road, all weather, improved surface
Secondary highway, all weather, hard surface — Unimproved road, fair or dry weather
Interstate Route — U. S. Route — State Route

GUILFORD, CONN.
N4115—W7237.5/7.5
1968
PHOTOREVISED 1972
AMS 6466 I SW—SERIES V816

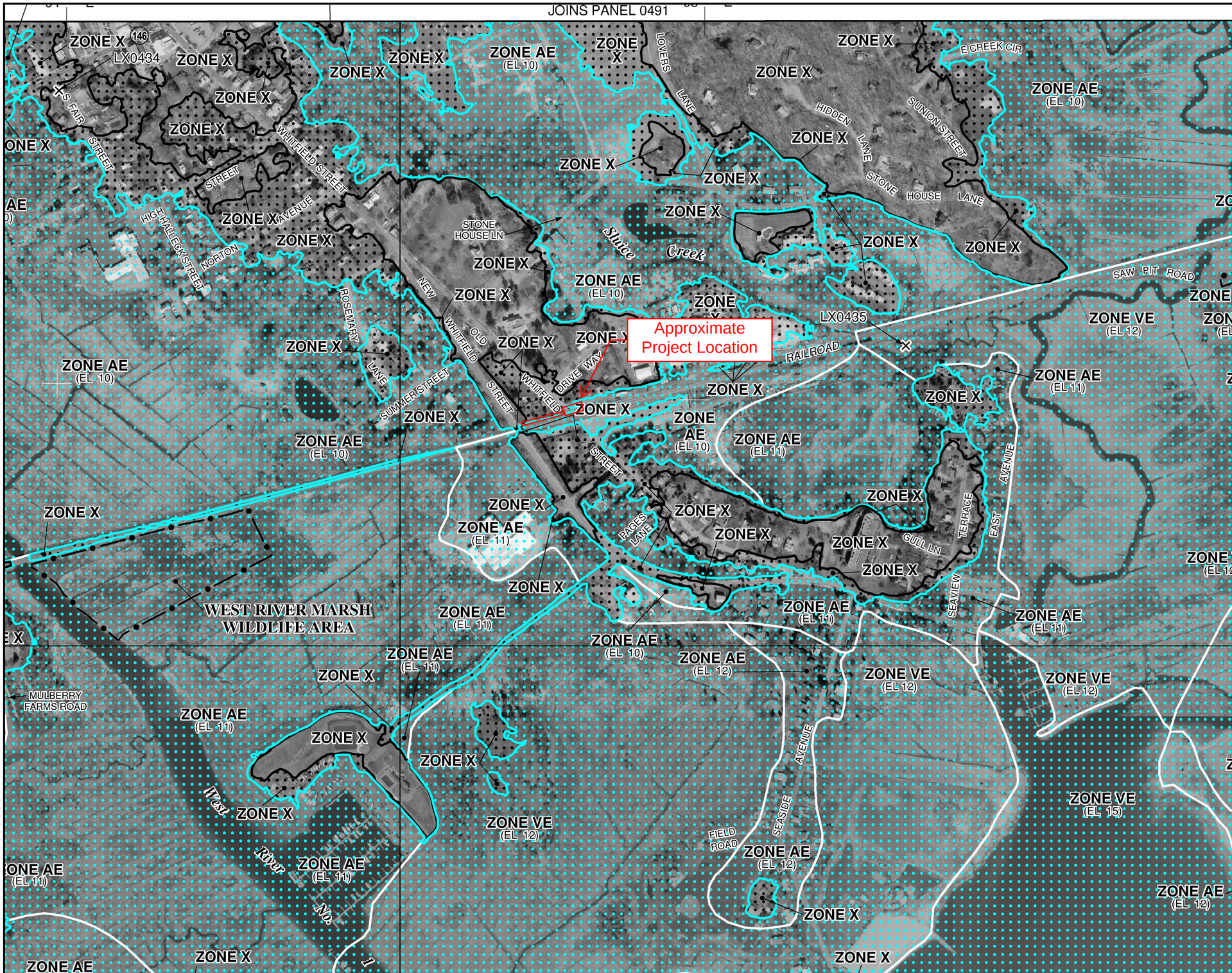
QUADRANGLE LOCATION

Base Map U.S.G.S. 7½ minute quadrangle

97

COASTAL RESOURCES

1979. Prepared by Coastal Area Management Program,
Connecticut Department of Environmental Protection.



MAP SCALE 1" = 500'

250 0 500 1000 FEET

METER

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0493H

FIRM

FLOOD INSURANCE RATE MAP

NEW HAVEN COUNTY, CONNECTICUT

(ALL JURISDICTIONS)

PANEL 493 OF 635

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
GUILFORD, TOWN OF	090077	0493	H
MADISON, TOWN OF	090079	0493	H

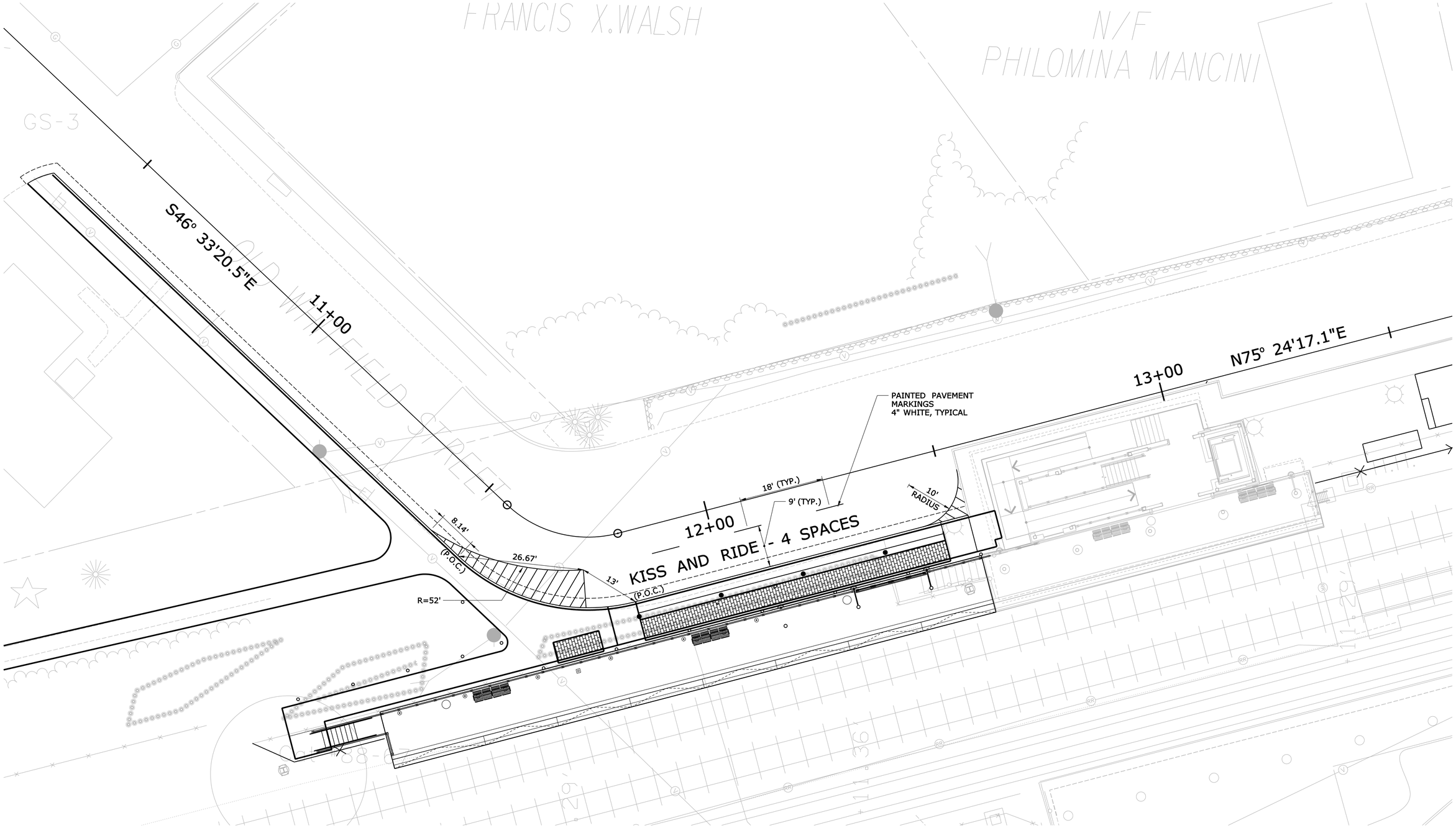
Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
09009C0493H

EFFECTIVE DATE
DECEMBER 17, 2010

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov



N

STRIPING PLAN

SCALE: 1" = 10'-0"

FINAL DESIGN REVIEW

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

Filename: FD_MSH_SPM_0059_0039_C-103.dgn

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.

Date Plotted: February 9, 2011

DESIGNER/DRAFTER: P. BRAND

CHECKED BY: A. MARGIOTTA

0 10 20

SCALE 1"=10'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

ENGINEER: BAKER ENGINEERING

APPROVED BY: -

DATE: -

Baker

MICHAEL BAKER ENGINEERING, INC.
500 ENTERPRISE DRIVE, SUITE 2B
ROCKY HILL, CT 06067

PROJECT TITLE:

SHORE LINE EAST RAILROAD STATIONS

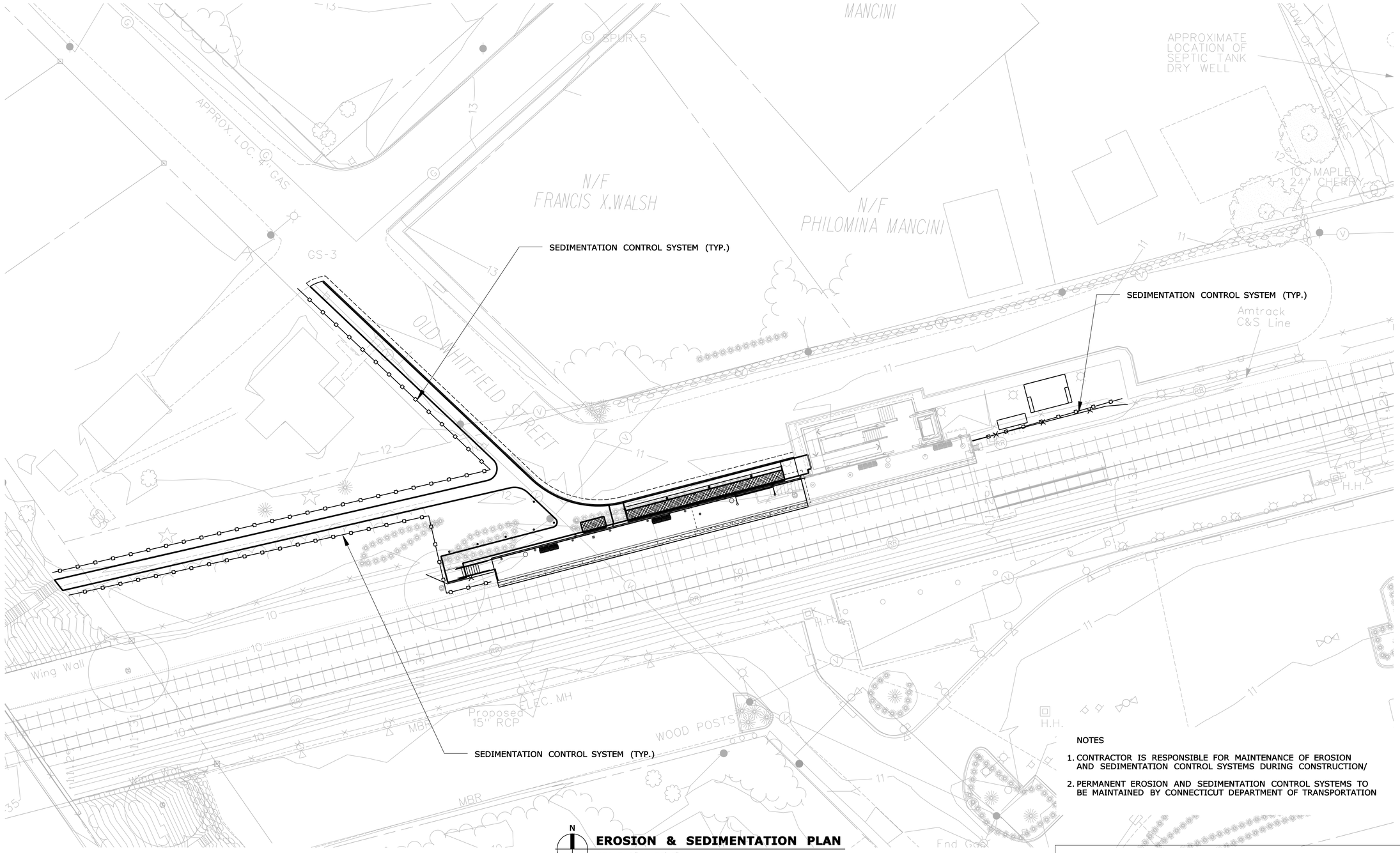
TOWN: **GUILFORD**

DRAWING TITLE: **STRIPING PLAN**

PROJECT NO. **310-0039**

DRAWING NO. **C-103**

SHEET NO. **7 of 57**



NOTES

1. CONTRACTOR IS RESPONSIBLE FOR MAINTENANCE OF EROSION AND SEDIMENTATION CONTROL SYSTEMS DURING CONSTRUCTION/
2. PERMANENT EROSION AND SEDIMENTATION CONTROL SYSTEMS TO BE MAINTAINED BY CONNECTICUT DEPARTMENT OF TRANSPORTATION

N

EROSION & SEDIMENTATION PLAN

SCALE: 1" = 20'-0"

FINAL DESIGN REVIEW

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

Filename: FS_MSH_SED_0059_0039_C-106.dgn

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.

Date Plotted: February 9, 2011

DESIGNER/DRAFTER: P. BRAND

CHECKED BY: A. MARGIOTTA

0 40 80
SCALE 1"=40'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

ENGINEER: BAKER ENGINEERING

APPROVED BY: -

DATE: -

Baker
MICHAEL BAKER ENGINEERING, INC.
500 ENTERPRISE DRIVE, SUITE 2B
ROCKY HILL, CT 06067

PROJECT TITLE:
SHORE LINE EAST RAILROAD STATIONS

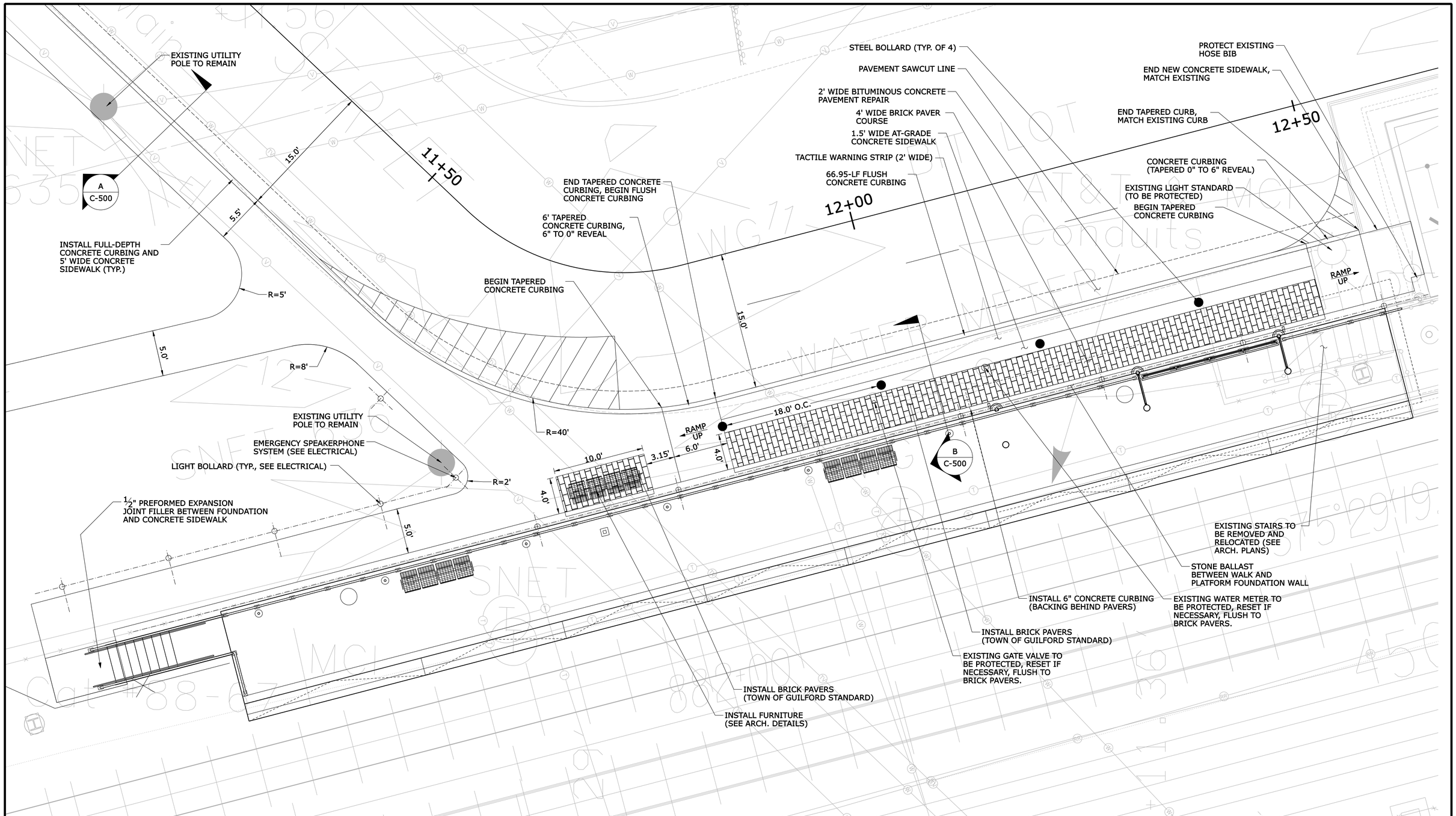
TOWN: GUILFORD

DRAWING TITLE: EROSOIN & SEDIMENTATION PLAN

PROJECT NO. 310-0039

DRAWING NO. C-106

SHEET NO. 10 of 57



FINAL DESIGN REVIEW

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

Filename: FD_MSH_CIV_0059_0039_C-400.dgn

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.

Date Plotted: February 9, 2011

DESIGNER/DRAFTER: P. BRAND
CHECKED BY: A. MARGIOTTA

0 20 40
SCALE 1"=20'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

ENGINEER: BAKER ENGINEERING
APPROVED BY: -
DATE: -

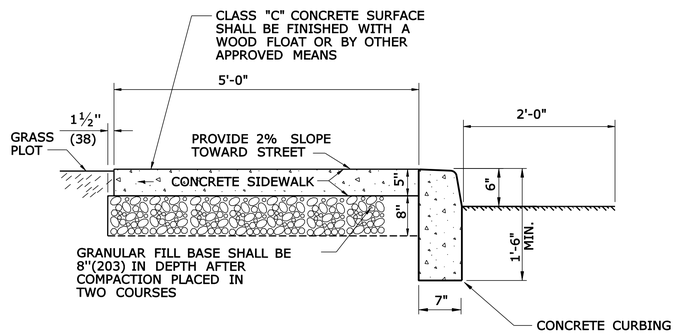
Baker
MICHAEL BAKER ENGINEERING, INC.
500 ENTERPRISE DRIVE, SUITE 2B
ROCKY HILL, CT 06067

PROJECT TITLE:
SHORE LINE EAST RAILROAD STATIONS

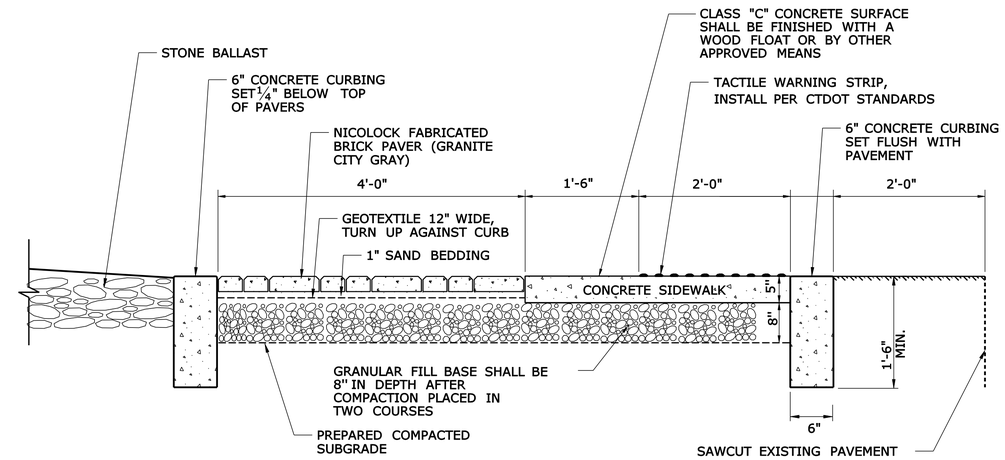
TOWN: **GUILFORD**

DRAWING TITLE: **ENLARGED PLAN**

PROJECT NO. **310-0039**
DRAWING NO. **C-400**
SHEET NO. **11 of 57**



SECTION A C-400
SCALE: N.T.S.



SECTION B C-400
SCALE: N.T.S.

FINAL DESIGN REVIEW

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

Filename: FD_MSH_CIV_0059_0039_C-500.dgn

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.

Date Plotted: February 9, 2011

DESIGNER/DRAFTER: P. BRAND
CHECKED BY: A. MARGIOTTA
SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

ENGINEER: BAKER ENGINEERING
APPROVED BY: -
DATE: -

Baker
MICHAEL BAKER ENGINEERING, INC.
500 ENTERPRISE DRIVE, SUITE 2B
ROCKY HILL, CT 06067

PROJECT TITLE:
SHORE LINE EAST RAILROAD STATIONS

TOWN: GUILFORD

DRAWING TITLE: TYPICAL SECTIONS

PROJECT NO. 310-0039
DRAWING NO. C-500
SHEET NO. 12 of 57

NOTES:

THE CONTRACTOR SHALL REFER TO ITEM #0949003A - FURNISHING, PLANTING AND MULCHING TREES, SHRUBS, VINES AND GROUND COVER PLANTS, AND THE LATEST SUPPLEMENTAL REQUIREMENTS OF SECTION 9.49 OF THE FORM 816 FOR INFORMATION ON FURNISHING, PLANTING, MAINTENANCE OF PLANTS, AND THE REPLACEMENT OF UNSATISFACTORY PLANTS OR MATERIALS.

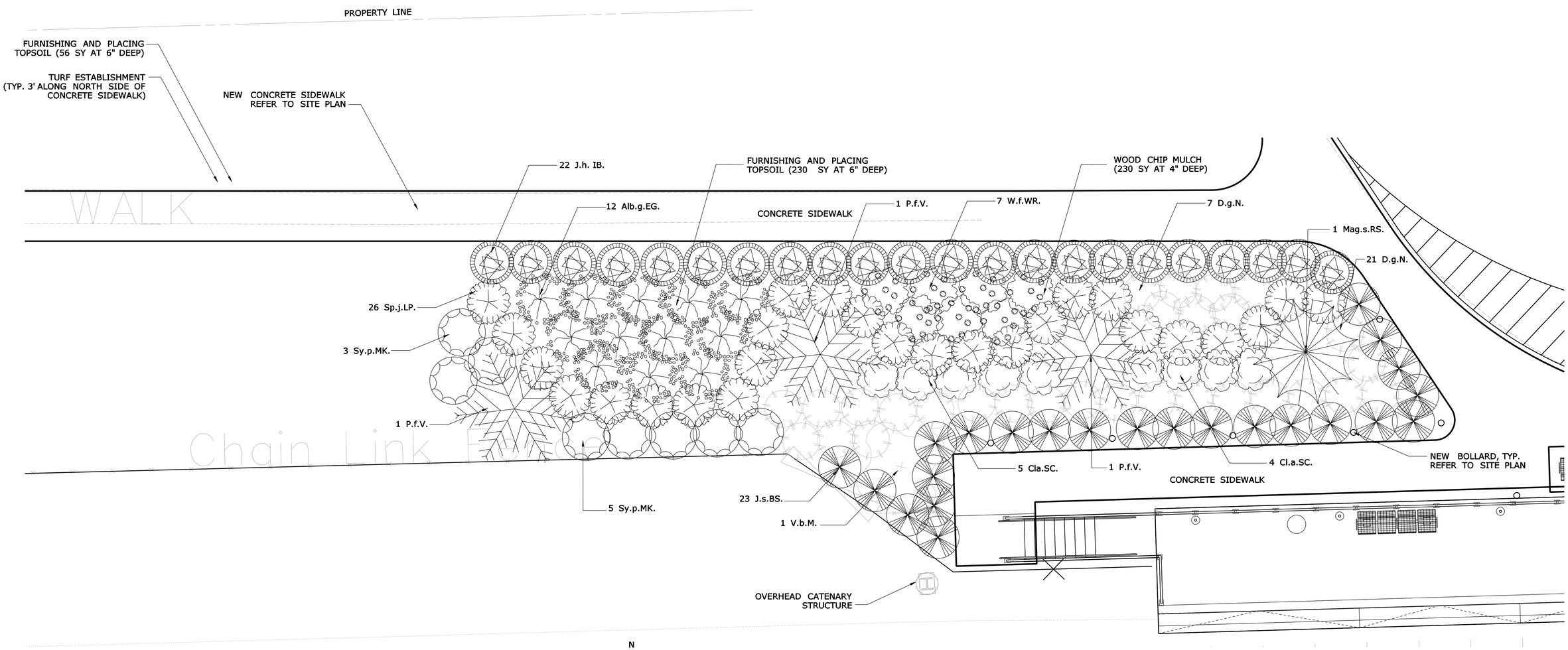
THIS PLAN IS INTENDED FOR LANDSCAPING PURPOSES ONLY. REFER TO SITE/CIVIL DRAWINGS FOR ALL OTHER SITE CONSTRUCTION INFORMATION.

PLANTS ARE DEPICTED AT MATURITY AND MAY BE MAINTAINED AT A LESSER SIZE.

SEE STANDARD SHEETS FOR TYPICAL PLANTING DETAILS.

PLANT LIST

QTY	SYMBOL	BOTANICAL NAME	COMMON NAME	SIZE/FORM	SPACING
12	Alb.g.EG.	Abelia x grandiflora 'Edward Goucher'	Abelia x grandiflora 'Edward Goucher'	3 Gal. Pots	5' On Center
9	Cl.a.SC.	Clethra alnifolia 'Sixteen Candles'	Clethra alnifolia 'Sixteen Candles'	3 Gal. Pots	4' On Center
29	D.g.N.	Deutzia gracilis 'Nikko'	Deutzia gracilis 'Nikko'	1 Gal. Pots	4' On Center
22	J.h.IB.	Juniperus horizontalis 'Icee Blue'	Juniperus horizontalis 'Icee Blue'	1 Gal. Pots	4' On Center
23	J.s.BS.	Juniperus squamata 'Blue Star'	Juniperus squamata 'Blue Star'	1 Gal. Pots	4' On Center
1	Mag.s.RS.	Magnolia stellata 'Royal Star'	Magnolia stellata 'Royal Star'	6'-7' Ht.B.B.	As Shown
3	P.f.V.	Pinus flexilis'Vanderwolf'	Pinus flexilis'Vanderwolf'	7'-8' Ht.B.B.	As Shown
26	Sp.j.LP.	Spirea japonica 'Little Princess'	Compact Spirea	2 Gal. Pots	4' On Center
8	Sy.p.MK.	Syringa patula 'Ms. Kim'	Dwarf Korean Lilac	6 Gal. Pots	5' On Center
1	V.b.M.	Viburnum x burkwoodii 'Mohawk'	Burkwood Viburnum Hybrid	4'-5' Ht.B.B.	As Shown
7	W.f.WR.	Weigela florida 'Wine and Roses'	Compact Weigela	3 Gal. Pots	4' On Center



LANDSCAPE PLAN

SCALE: 1" = 20'-0"

FINAL DESIGN REVIEW

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

Filename: FD_MSH_LDS_0059_0039_C-700.dgn

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.

Date Plotted: February 9, 2011

DESIGNER/DRAFTER: A. SAMPSON
CHECKED BY: D. TUDRYN

0 20 40
SCALE 1"=20'

STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION

ENGINEER: BAKER ENGINEERING
APPROVED BY: -
DATE: -

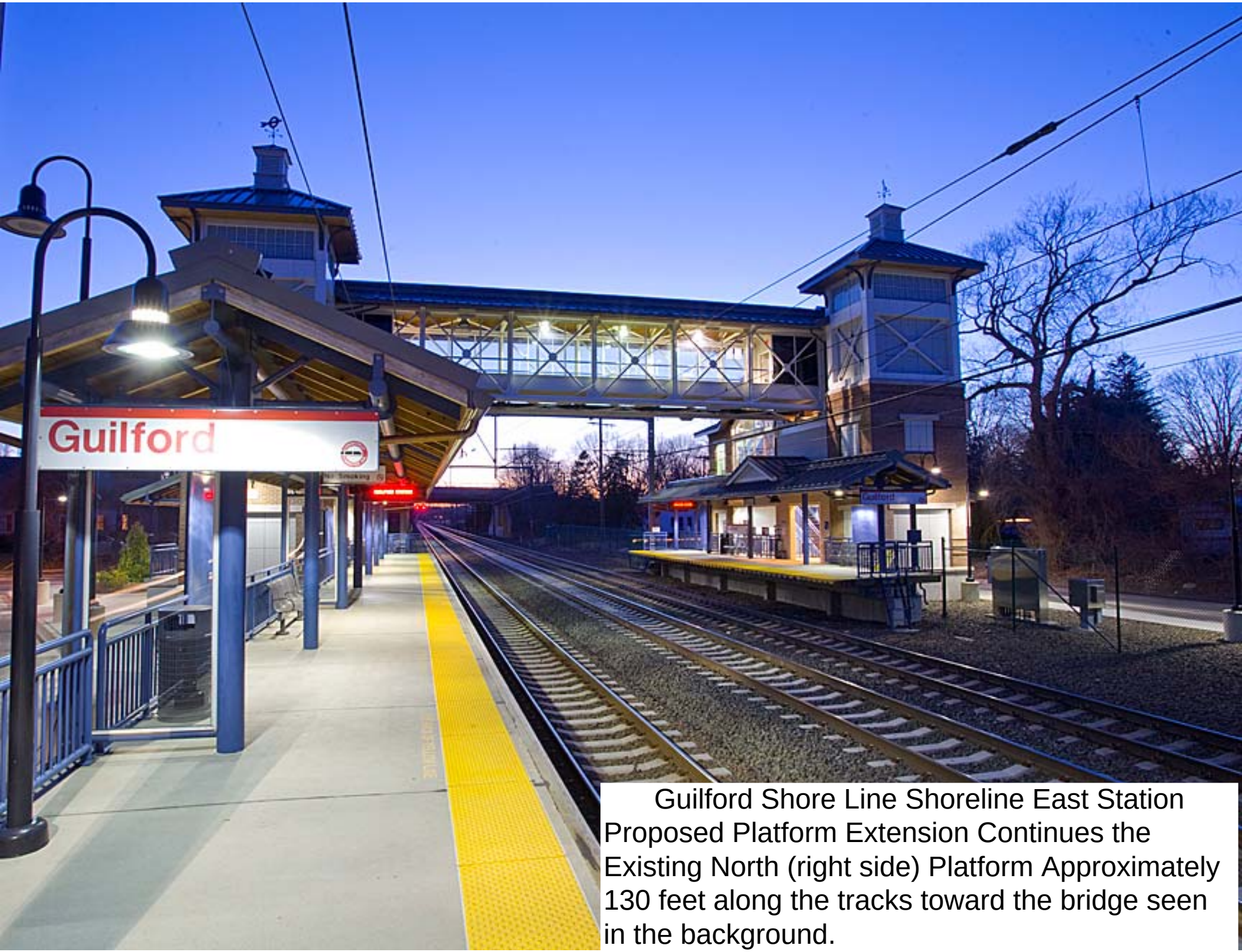
Baker
MICHAEL BAKER ENGINEERING, INC.
500 ENTERPRISE DRIVE, SUITE 2B
ROCKY HILL, CT 06067

PROJECT TITLE:
SHORE LINE EAST RAILROAD STATIONS

TOWN: **GUILFORD**

DRAWING TITLE: **LANDSCAPE PLAN**

PROJECT NO. 310-0039
DRAWING NO. C-700
SHEET NO. 13 of 57



Guilford Shore Line Shoreline East Station Proposed Platform Extension Continues the Existing North (right side) Platform Approximately 130 feet along the tracks toward the bridge seen in the background.

INTER

DEPARTMENTAL

MEMO

To: Mr. Mark W. Alexander
Transportation Assistant Planning Director

From: John Gaucher, Environmental Analyst III
DEP Office of Long Island Sound Programs

Date: April 18, 2011

Subject: **State Project No. 310-0057**
Platform Extension – Guilford Railroad Station
Guilford

Thank you for coordinating with this office in the review of the above-referenced project to extend a high level platform at the Guilford Railroad Station. As you know, pursuant to Section 22a-100 of the Connecticut Coastal Management Act (CCMA), any actions proposed by DOT within the coastal boundary, which may significantly affect coastal resources, must be fully consistent with the policies and standards of the CCMA.

We have received the coastal management consistency review form, project location map, and plans with your request for coastal consistency concurrence. The proposal shows that the platform and other minor work to associated sidewalks and paved areas will not have a significant impact on coastal resources and is therefore consistent with all applicable CCMA policies.

Thank you for your coordination on this project. If you have any questions or if we I can be of further assistance with this or any other coastal management or Long Island Sound matter, please contact me directly at 424-3660 or via email at john.gaucher@ct.gov.

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MH-MK

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

FLOOD MANAGEMENT GENERAL CERTIFICATION
Project No.: 310-0057
Description: Guilford Shore Line East Station Plaform

Town: Guilford
Date: April 26, 2011

memorandum

to: Mr. Michael E. Masayda
Trans. Principal Engineer
Hydraulics and Drainage
Bureau of Engineering and Construction

from: Theodore H. Nezames
Trans. Principal Engineer
Facilities 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:

(X) Minor Safety Improvements and Streetscape Projects
(X) Roadway Repaving, Maintenance & Underground Utilities
(X) Minor Stormwater Drainage Improvements
( ) Removal of Sediment from a Floodplain
( ) Wetland Creation or Enhancement
( ) Scour Repairs at Structures; (*Must acquire another State permit to be eligible*)
( ) Guide Rail Installation
( ) Deck and Superstructure Replacements
( ) Minor Bridge Repairs
( ) Fisheries Enhancements
( ) Surveying and Testing

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 April 13, 2011) 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	Bruce Olmstead — Digitally signed by Bruce Olmstead DN: cn=Bruce Olmstead, o=CTDOT, ou=1305, email=bruce.olmstead@ct.gov, c=US Date: 2011.04.26 08:03:17 -04'00'	Title Trans. Engineer III
Signature		Date April 14, 2011

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	Date 5-4-11

Rev. 4/07

cc: James Fallon
Environmental Planning File
DEP Flood Management Certification File
Hydraulics and Drainage File

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

memorandum

COM-09A REV. 2/91 Printer on Recycled or Reclaimed Paper

subject: **ENVIRONMENTAL REVIEW FORM**

Project No : 310-57

Bridge Number :NA

Town/City : Guilford

Date : Apr 8, 2011

to: Mr. Theodore H. Nezames
Transportation Principal Engineer
Bureau of Engineering and Construction

from: Mark W. Alexander
Transportation Assistant Planning Director
Bureau of Policy and Planning

Mark Alexander

Digitally signed by Mark Alexander
DN: cn=Mark Alexander, o, ou, email=Mark.W.Alexander@ct.gov, c=US
Date: 2011.04.08 07:44:40 -04'00'

The Office of Environmental Planning has reviewed the subject activity and notes the following environmental concerns and makes certain recommendations:

1. Socio-Economic

☐ Investigate displacement of families, businesses.

☐ Investigate potential impacts to minorities, local institutions, emergency services, and low-income neighborhoods.

☒ No apparent conflict with or impact to socio-economic resources.

☐ Project area is in a census tract containing certain ethnic populations with over 5% Limited English Proficiency.

☐ A conceptual stage relocation survey may be required. Please contact the Rights of Way Administrator.

Other :

2. Parks/Wildlife Refuges/Scenic Roads/Bikeways

☐ Investigate whether publicly owned parks, recreation areas and/or wildlife and waterfowl refuges are to be affected. Investigate Possible Section 4(f) and/or Section 6(f) Processing.

☐ This road has been/is in the process of being designated as a Scenic road under P.A. 87-280. Contact the Scenic Roads Committee Chairman, for further information.

☐ There may be a conflict and/or impact to a State Bikeway. Contact the Office of Intermodal Planning, Bikeway/ Pedestrian Coordinator.

☒ No apparent conflict/impact on publicly owned parks, recreation areas, refuges, scenic roads and/or bikeways.

Other :

Name: Kevin Fleming

Extension: 2924

3. Historical and Archaeological Resources

The Office of Environmental Planning (OEP) makes recommendations on possible project impacts to historical and archaeological resources based on the source of funding and permits that the project requires. If Federal funding is involved then the **National Historical Preservation Act Section 106 Review** process is initiated with consultation among the lead Federal Agency, the State Historic Preservation Office (SHPO), and CTDOT OEP. Projects that are fully State funded or a combination of State and local funds are reviewed by the **Connecticut Environmental Policy Act (CEPA)** process. Consultation is then among the lead State Agency (ConnDOT), the SHPO, and with the local municipality. For information about the State and Federal regulations applicable for CEPA and Section 106 go to http://www.cultureandtourism.org/cct/site/default.asp then choose Programs and Services\History Division. Projects that impact historical and archaeological resources as determined under **Section 106** review may also require a **Section 4(f)** review. **Section 4(f)** is a U.S.DOT regulation applicable to Federally funded transportation projects that acquire/use/affect property, or easements on property, where a historic resource is located. (For information on Section 4(f) for Historic Properties go to http://www.environment.fhwa.dot.gov/projdev/4fpolicy.asp

The Office of Environmental Planning makes the following recommendations based on research and/or field review of the project Area of Potential Effect (APE) for potential impacts to historical and archaeological resources. The recommendations are **provisional** and **will be finalized by consultation** by OEP with SHPO and the relevant Local, State, and Federal agencies. After consultation the SHPO will send a "Letter of Effect" to the project initiating unit.
Please contact OEP at 594-2926 if a " Letter of Effect" from the SHPO for this project is not received by the project initiating unit within 30 days of receipt of the completed Environmental Review Form from OEP.

☒ The OEP recommends "**No Historic Properties Affected**" within the APE of this project under Section 106/ Section 4(f) and/or CEPA.

☐ Possible **CEPA** processing required **OR**

☐ **Possible Section 106** and **Section 4 (f)** processing required because of possible effect to **known** historic:

◯ Structures(s)	◯ Bridge(s)	◯ State Register Historic District(s)	◯ Local Historic District(s)
◯ Cemetery(ies)	◯ Tribal Land(s)	◯ National Historic Landmark(s)	◯ National Register Historic District(s)
◯ Town Green(s)	◯ Archaeological Site(s)	◯ State Archaeological Preserve(s)	

Avoidance is recommended. Please contact OEP (X2926) for coordination.

☐ The project APE has moderate to high archaeological sensitivity. Avoidance or further investigation is recommended by OEP. Please contact OEP (X2926) for coordination.

☐ The project APE has a bridge(s) **OR**

☐ The project APE has a structure(s) that could be eligible for the National Register of Historic Places. Avoidance or further investigation is recommended by OEP. Please contact OEP (X2926) for coordination.

☐ The project APE is adjacent to or includes a portion of Route 15, the Merritt Parkway. Please contact OEP (X2926) for coordination.

☐ A bridge on the project has been identified as listed in the Connecticut's Historic Bridge inventory. Rehabilitation must be carried out in accordance with the Connecticut Bridge Inventory Preservation Plan (1991). Please contact OEP (X2926) for coordination.

☐ The project will effect a resource that is in the ☐ Quinebaug-Shetucket Heritage Corridor or ☐ The Upper Housatonic Valley Heritage Area. Please contact OEP (x2926) for coordination

Comments: **SHPO letter dated November 17, 2006 (attachment of ER Request) includes review of the current platform expansion area and a determination of "No Effect" is still applicable. A reminder that the nearby Engine House and Water Tower structures, while within AMTRAK right of way, are still of interest to the town and have historic value. Impacts to these structures during the construction of the present project should be avoided.**

Name: Robert Cless

Extension: 2952

Attachments :

☐ Map ☐ Photograph ☐ Other

4. Water Resources and Permits

☒ Inland Wetlands or Watercourses ○ (IN) ● (NEARBY) the project area; an Inland Wetland Permit ● (MAY) ○ (WILL) be required from the DEP/IWRD and the ACOE. Please contact the DOT Office of Environmental Planning. ● Area should be field checked for Inland Wetlands and/or delineated.

☒ Tidal Wetlands or Coastal, Tidal or Navigable Waters ○ (IN) ● (NEARBY) the project area; a Tidal Wetlands or Structures and Dredging Permit ● (MAY) ○ (WILL) be required from the DEP/OLISP. Please contact the DOT Office of Environmental Planning. ● Area should be field checked for Coastal Wetlands and/or delineated.

☒ The project is located ● (WITHIN) ○ (ADJACENT TO) the Coastal Area Management (CAM) boundaries and ○ (MAY) ● (WILL) require a Coastal Consistency Review Form. Please contact the DOT Office of Environmental Planning, for assistance. ○ If Coastal Permits are sought, a separate CAM is not required

☒ A flood hazard area is located ● (AT) ○ (NEARBY) the project; a Flood Management Certification ○ (MAY) ● (WILL) be required from the DEP/IWRD if the drainage area to the site is greater than one square mile. Please contact the DOT Office of Environmental Planning. ○ Project may qualify as a Flood Management General Certification. Please contact the DOT Hydraulics and Drainage Unit x3234.

Flood Insurance Rate Panel Number: **09009C0493H / ZONE AE**

☐ Stream Channel Encroachment Lines (SCEL) have been established by DEP in this project area; a SCEL permit ○ (MAY) ○ (WILL) be required from the DEP/IWRD. Please contact the DOT Hydraulics and Drainage Unit x3234. SCEL Map Number:

Other water resource concerns:

○ a. Surface Supply Watershed, Name of Watershed:
○ b. Potential Water Company Lands, Name of Water Company:
○ c. Wells: ○ Community ○ Non-community ○ Aquifer Protection, See Comments:
○ d. Sole Source Aquifer: ○ Pootatuck (Newtown - Monroe), ○ Pawcatuck (Stonington & N. Stonington)
○ e. Wild and Scenic River: ○ Farmington River (East Branch), ○ Eightmile River
○ f. Aquifer Protection Area: ○ Level A (Final) ○ Level B (Preliminary)

Additional Site Information:

● a. Drainage Basin Number(s) :

○ b. Impaired Body of Water : **5110 / 5109**

● c. Approximate Area - **N: 41.276** **E: -72.674**

Method of Determination: ○ GPS ● USGS - Quadrangle Map (# & name) : **97 Guilford**

☒ For projects requiring state water resource permits, the Erosion and Sedimentation Control Plan (E&S) and hydraulic computations will be submitted to the DEP as part of the permit application. For projects, which do not require water resource permits the E&S plan must be submitted to the District Environmental Inspector.

☒ The DEP and/or ACOE permit applications will be prepared by ● Initiating Unit ○ Environmental Planning

☐ The Office of Environmental Planning has reviewed the information submitted for this project. It has been our experience that under normal circumstance projects of this magnitude would not negatively impact water resources. If you have any concerns, please contact the Office of Environmental Planning.

Comments :

5. Natural Resources

☐ Prime farmlands may be present. ◯ If area is within a DOT ROW, farmland status does not apply.

Threatened or Endangered Species:

☐ It has been determined that there are no threatened or endangered species in the project area. (This determination has **NOT** been sent to the DEP, Natural Resources Division.)

Map Reference Date

☒ There is an indication that there may be threatened or endangered species present in the area. (This determination has been sent to the DEP, Natural Resources Division, a copy of the letter is attached.)
Project is located ◉ (IN) ◯ (NEARBY) (UPSTREAM/DOWNSTREAM WITHIN A ½ MILE)
◉ See Attached Mapping

☐ The Office of Environmental Planning has reviewed the information submitted for this project. It has been our experience that under normal circumstance projects of this magnitude would not negatively impact natural resources. If you have any concerns, please contact the Office of Environmental Planning

Bridge Surface Preparation Containment Recommendations

This determination is a preliminary recommendation, using available mapping and aerial photos. The project engineer must determine if adjustment in the containment level and environmental controls are required or if further investigation is required.

☐ Level 1/Class 1 Containment, Area of Concern: **Level 1** - This is an enhanced containment system to be utilized in situations which warrant exceptional protection for environmental and social resources. Level 1 protection will be utilized for structures over, or in the immediate vicinity of, public water supply reservoirs (or their tributaries), schools, outdoor recreational areas, playgrounds, or other areas of concern.

☐ Level 2/Class 3 Containment, Area of Concern: **Level 2** - This is an enhanced containment system to be utilized in situations that warrant exceptional protection for environmental and social resources. Level 2 protection will be utilized for structures over, or in the immediate vicinity of wetlands (both tidal and inland), watercourses, and waterbodies (other than public supplies), critical habitats, populated areas, hospitals, and public buildings. Level 2 protection shall be used unless Level 1 protection is warranted.

6. Department Stormwater Policy

Named Watercourse Signage

Please see the Department Policy regarding the installation of signage for named watercourses which transverse the Department's roadways.

Does the following project require a sign for a watercourse? ◯ Yes ◉ No If yes, see below.

Bridge #	Town	Name of Waterbody	Scour Critical
			◯ Yes ◯ No If yes, see below
			◯ Yes ◯ No If yes, see below

If the noted bridge is scour critical, an elevation board is required. Please contact Bridge Safety

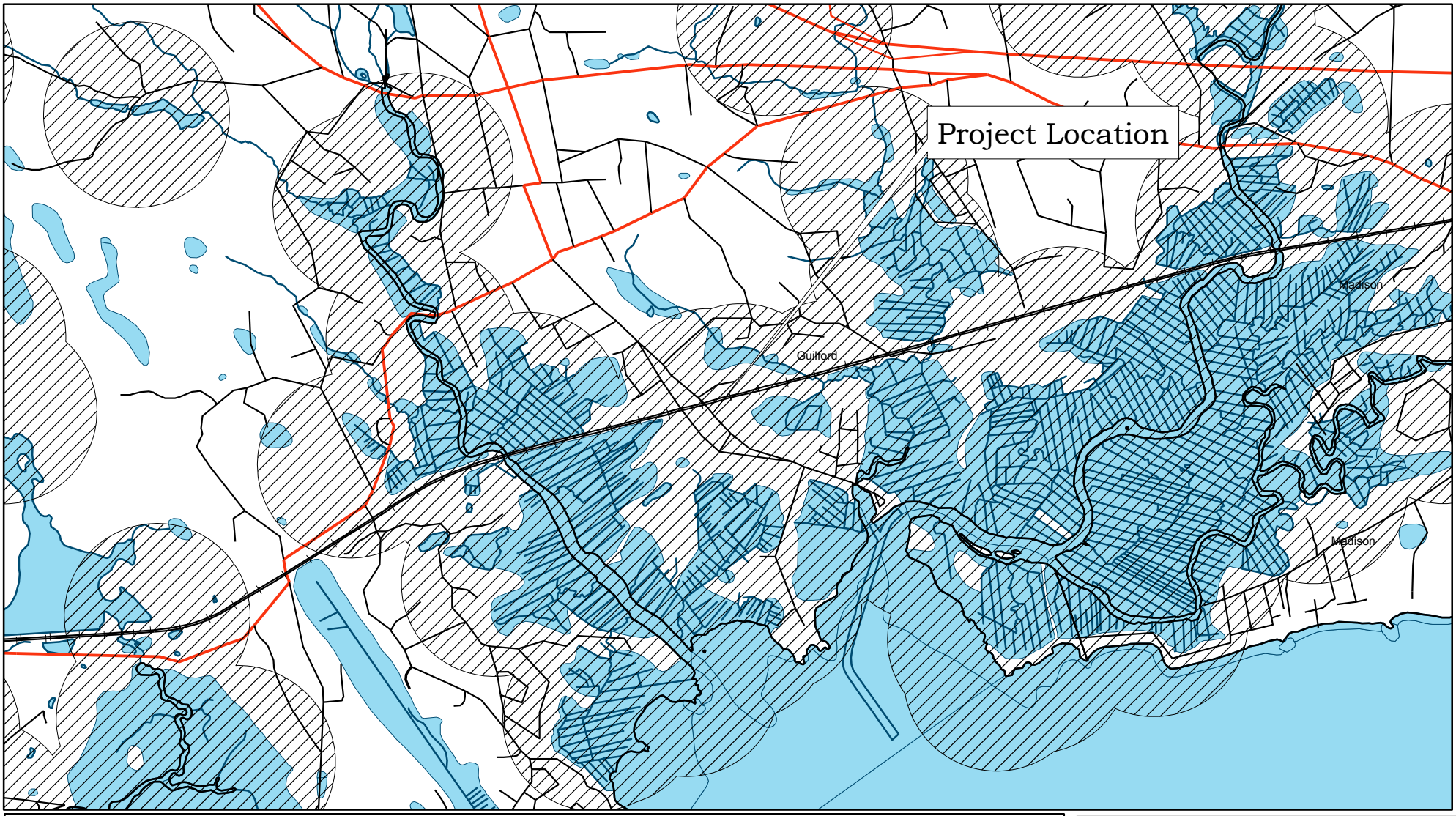
Stormwater Permit

☐ Does the project disturb > than 1 acre of land? ◯ Yes ◯ No ◉ Unknown If yes, Stormwater Permit needed.

Throughout the duration of a project design, the Project Engineer is responsible to request an update of Sections 4, 5 and 6 of this Environmental Review Form every three years.

Name: Christopher Samorajczyk

Extension: 2938



Map data maintained by the Connecticut Departments of Environmental Protection and Public Health. Map printed by the Connecticut Department of Transportation. NDDB layer revised June 2008

Environmental Resources: Scale 1:24,000

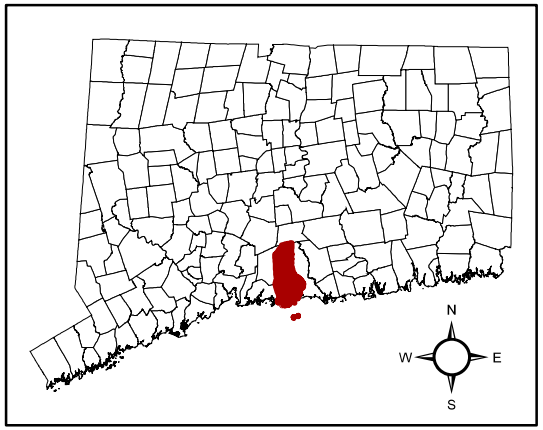
Project No. 310-57
Town of Guilford

LEGEND

NATURAL_DIVERSITY_DATABASE

TOWNS

0.5 0 0.5 1 Miles



7. Air Quality

☐ An Indirect Source Review is not required.

☐ An Indirect Source Review is required. The Office of Environmental Planning will prepare the application.

☐ This project is included in the State/Regional Transportation Improvement Program which the FHWA has determined to be in conformance.

☐ Air Quality conformity determination is **not** required. This project type is exempt under the Clean Air Act pursuant to 40 CFR 93.126.

Project Type:

If the project is Federally funded, please include the following paragraph in the Categorical Exclusion request letter to the FHWA:

"*This project is located within the boundaries of the portion of the state which has been classified as* attainment maintenance *for carbon monoxide (CO),*
as non-attainment *for PM 2.5 and non-attainment for Ozone*
and attainment maintenance *for PM 10. This project type has been determined to be exempt from the requirement that a conformity determination be made in accordance with the Final Rule on conformity*".

☐ Air Quality Conformity Determination is required. Contact the Office of Environmental Planning for Information (594-2944)

☐ Carbon Monoxide analysis may be required for this project. An intersection level of service (LOS) analysis is required to determine conformity. If the LOS for the build condition is D, E, or F, a carbon monoxide air quality assessment is required and will be prepared by the Office of Environmental Planning. Transmit the following information by memorandum to this Office:

1. Appropriate traffic (peak hour).
2. Proposed signalization showing:
   a. sequencing and timing
   b. lane arrangement (40ft. or Metric equivalent Scale)

Other:

☐ Please insert the following paragraph in the Categorical Exclusion request letter to FHWA:

"This project is located within the boundaries of the portion of the state which has been classified as non-attainment for PM 2.5 and attainment maintenance for PM 10 and a project level conformity determination is required. However, this project is not of the type listed in 40 CFR 93.123 (b)(1) as an air quality concern. Therefore, Clean Air Act and 40 CFR 93.116 requirements are met without an explicit PM 2.5/PM 10 hotspot analysis."

☐ The project is located in an area that has been classified as non-attainment for PM 2.5 and/or attainment maintenance for PM 10, and a project level qualitative hotspot analysis is required to determine conformity. Please contact the Office of Environmental Planning

ENVIRONMENTAL REVIEW FORM

Project No: 310-57

Town/City: Guilford

☐ This project is exempt from an analysis or discussion of Mobile Source Air Toxics (MSAT) effects for one or both of the following reasons, in accordance with FHWA Interim Guidance Memorandum dated February 3, 2006 (http://www.fhwa.dot.gov/environment/airtoxic/020306guidmem.htm):

○ Project is categorically excluded under 23 CFR 771.117(c); and/or

○ Project is exempt under the Clean Air Act pursuant to 40 CFR 93.126

☐ This project has no meaningful potential Mobile Source Air Toxics (MSAT) effects. The following language must be included in the project record in order to satisfy FHWA's MSAT documentation requirements in accordance with FHWA Interim Guidance Memorandum dated September 30, 2009 (http://www.fhwa.dot.gov/environment/airtoxic/020306guidmem.htm):

"The purpose of this project is to (*insert major deficiency that the project is meant to address*)

By constructing (*insert major elements of the project*).

This project will not result in any meaningful changes in traffic volumes, vehicle mix, location of the existing facility, or any other factor that would cause an increase in emissions impacts relative to the no-build alternative. As such, FHWA has determined that this project will generate minimal air quality impacts for Clean Air Act criteria pollutants and has not been linked with any special MSAT concerns. Consequently, this effort is exempt from analysis for MSATs.

Moreover, EPA regulations for vehicle engines and fuels will cause overall MSATs to decline significantly over the next 20 years. Even after accounting for a 64 percent increase in VMT, FHWA predicts MSATs will decline in the range of 57 percent to 87 percent, from 2000 to 2020, based on regulations now in effect, even with a projected 64 percent increase in VMT. This will both reduce the background level of MSATs as well as the possibility of even minor MSAT emissions from this project."

☐ This project has potential MSAT effects and a MSAT qualitative or quantitative analysis is required. Please contact Environmental Planning for information (594-2082).

☑ Other: Project is 100% state funded and is considered not regionally significant. Therefore, an air quality conformity determination is not required. If funding sources change this Environmental Review must be revisited.

Name: James Kocaba

Extension: 2082

8. Noise

☒ No noise analysis required.

☐ A noise analysis is required.

Provide the following for a detailed highway traffic noise analysis:

Plans to include 5 foot contours
Spot elevations
Buildings out to five hundred feet
Connecticut grid markers (northing and easting)
Roadway Profiles
Cross Sections to include ground elevations out to buildings as shown on plans

Provide the following for a detailed transit noise analysis:

Fixed Guideway :

source / type
average number of locomotives per train
average number of cars per train
average throttle setting of diesel-powered locomotives and DMU's
train speed in miles per hour
average hourly volume of train traffic, in trains per hour
average hourly volume of train traffic, in trains per hour (7am to 10 pm)
average hourly volume of train traffic, in trains per hour (10 pm to 7 am)

existing and proposed number of vehicles (hourly)
existing and proposed speeds for vehicles
average hourly volume of vehicle traffic, in vehicles per hour
average hourly volume of vehicle traffic, in vehicles per hour (7am to 10 pm)
average hourly volume of vehicle traffic, in vehicles per hour (10 pm to 7 am)

Contact the Office of Environmental Planning for further information at 594-2945.

☐ Other

Name: Desmond P. Dickey

Extension: 2945

9. Recommendations

☐ a. Federal/State or Federal/Local Funds. The Office of Environmental Planning recommends that this activity be classified a **CATEGORICAL EXCLUSION**. This recommendation does not preclude the need for a Coastal Area Management Consistency Statement, environmental permits, Section 4(f) Statements, Section 106 processing or other environmental coordination. IF THE PROJECT IS FEDERAL HIGHWAY ADMINISTRATION FUNDED AND/OR FEDERAL TRANSIT ADMINISTRATION, A CATEGORICAL EXCLUSION DETERMINATION TO THAT EFFECT MUST BE SUBMITTED BY YOUR OFFICE TO THE FHWA/FTA FOR APPROVAL OF THE EXCLUSION WITH THIS FORM ATTACHED. No significant environmental impacts are foreseen resulting from the activity(s). No further analysis is required under CEPA.

☐ b. Federal/State or Federal/Local Funds. The Office of Environmental Planning recommends a **FEDERAL ENVIRONMENTAL ASSESSMENT/STATE ENVIRONMENTAL IMPACT EVALUATION** be prepared Contact this Office for scheduling.

☐ c. Federal/State or Federal/Local Funds. The Office of Environmental Planning recommends a **FEDERAL ENVIRONMENTAL IMPACT STATEMENT/STATE ENVIRONMENTAL IMPACT EVALUATION** be prepared. Contact this Office for scheduling.

10. Recommendations

☒ a. State Funds. The Office of Environmental Planning feels this activity does not require an Environmental Impact Evaluation as no significant environmental impacts are foreseen resulting from the activity(s). No further analysis is required under CEPA. This recommendation does not preclude the need for environmental permits or other environmental coordination

☐ b. State Funds. The Office of Environmental Planning recommends that the Environmental Concerns noted, plus any others that may arise, be investigated through the preparation of an **ENVIRONMENTAL IMPACT EVALUATION**. Contact this Office for scheduling.

11. Recommendations

☐ Further analysis is needed to establish in which category this activity falls. The Office of Environmental Planning recommends that further information based upon your investigation of Environmental Concerns No. 1-7 be developed, and that your office subsequently contact the Office of Environmental Planning so that a determination can be made.

12. Recommendations

☐ This project does not meet the definition of a major metropolitan transportation investment, as defined in 23 CFR Part 450.104, and does not require a Major Investment Study.

13. Comments:

Print Form

Reset Form

Name: Keith T. Hall

Extension: 2926

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

memorandum

subject: **ENVIRONMENTAL REVIEW REQUEST FORM**

Project No.: 310-57
Town/City: Guilford
Bridge No.: N/A
Federal Project No. N/A

date: ***Feb 17, 2011***

to: Mr. Mark W. Alexander
Transportation Assistant Planning Director
Bureau of Policy and Planning

from: Theodore H. Nezames
Transportation Principal Engineer
Bureau of Engineering and Construction

Theodore H Nezames
2011.02.17 17:59:45 -05'00'

Please review the information below to determine what, if any, environmental, socioeconomic, or cultural documentation and mitigation will be required for this project.

1. The following items are attached:

- (●) **Detailed** Project Description (project number, location, scope) [required]
- (●) Site Location Map [required]
- ( ) Purpose and Need Statement [preferred]
- ( ) Aerial Photograph with the project limits delineated [preferred]
- ( ) Photographs showing project features and context
- ( ) Concept/Sketch Plans Location on server: _____
- (●) Preliminary Design Plans (with proposed project and slope limits, existing and proposed right-of-way (ROW) lines and edges of pavement, existing and proposed drainage features, delineated (or potential) wetlands, State Plane North American Datum - 1983 coordinates of project limits and major features) [as available]
  Location on server: X:\Z_V8_CTDOT_NON_PROJECTS\Facilities\SLE\Guilford 90%

2. The Department of Transportation Project Contact/Ext/Room:

Bruce Olmstead at x3186 or Keith Hall at x3301 both of the Facilities Design Unit

3. This Environmental Review Request is as follows:

- ( ) **Original**
- (●) **Resubmittal** *The originating office will advise the Office of Environmental Planning and resubmit the Environmental Review Request if a change in the project scope and/or conditions (e.g., project or slope limits, taking lines, other) causes any of the responses, herein, to change or if three years has passed.*

Original Submittal Date: Oct 30, 2006

Previous/Temporary Project No.(if any): 310-xxx

(●) From the time the original ER recommendation was issued, changes made in the project scope and/or conditions (e.g., project or slope limits, taking lines, other) are as follows:
The platform length in previous ER was stated as 365 feet. Project No. 310-26 as completed in 2005 only built a 200 foot long platform on the south side of the tracks and a 40 foot north platform. This expansion project will increase the length of the north platform to 200 feet on the New Haven bound track 2 side.

(●) Supplemental data, as requested by the Office of Environmental Planning in the original ER Recommendation dated : is as follows:

FM approval May 16, 2000 and CAM approval August 15, 2000 attached

4. Project Facts:

The proposed project is at the following stage :

○ concept ○ less than 30% PD ◉ 30% PD or greater

○ other: _____

Yes	No	Unknown	
○	◉	○	Project is located in multiple towns.
○	◉	○	May cause public controversy relative to political, social, economic, environmental, and/or cultural factors or resources to the extent the project scope and/or conditions may require modification

Yes	No	Unknown	**Cultural Resources**
○	◉	○	Abuts or is within the immediate environs of a town green
○	◉	○	Is within the ROW of, abuts, or is within the immediate environs or viewshed of the Merritt Parkway
○	◉	○	Abuts or is within the immediate environs of a park/recreation area
○	◉	○	Abuts or is within the immediate environs of a cemetery
○	◉	○	Requires a change in grade of earth or a paved surface
◉	○	○	Requires excavation, boring, or augering
○	◉	○	Requires removal of footings, drainage structures, utilities, other underground features
○	◉	○	Requires removal of tree stumps or stone walls
○	◉	○	Requires removal/relocation of a structure

Yes	No	Unknown	**Air and Noise**
○	◉	○	Requires rock ledge removal and/or slope flattening adjacent to residential areas.
○	◉	○	Requires interchange and/or ramp reconfiguration to include but not limited to location or number of lanes.
○	◉	○	Requires lengthening of exit and/or entrance ramp to include but not limited to speed change lanes.
○	◉	○	Requires significant removal of mature vegetation adjacent to residential areas.

Wetlands

○	●	○	Does the project involve a culvert or bridge?
○	●	○	If yes, is the tributary watershed to that structure ≥ 1 square mile? (640 acres)
○	●	○	Will the project involve full depth reconstruction / replacement of drainage systems?
●	○	○	Has there been any previous coordination with NDDB? If so, attach copy of correspondence.
○	●	○	Has there been any coordination with DEP Fisheries? If so, attach copy of correspondence.
○	●	○	Will the project involve stream bank stabilization or alteration ≥ 200 feet in length?

5. Funding: ☑ All State Funds ○ Federal/State Funds ○ Federal/Local Funds
○ Other : _____

6. Final Design Plan Date: Mar 30, 2011 Advertising Date Jun 8, 2011

7. Project included in Transportation Improvement Program (TIP):

○ Yes ● No ○ Pending: _____

8. Coordination with the Connecticut State Historic Preservation Officer has been initiated:

● Yes ○ No, because: See attached letter dated 11-17-06

9. Railroad ROW to be acquired: Existing AMTRAK lease area will be extended to include lengthened platform

● Yes (detailed in Project Description, Preliminary Design (PD) Plans, and below) ○ No

10. Highway ROW to be acquired:

○ Yes (see Project Description, PD Plans, and below)
○ Yes (actual type and number to be determined; estimates are shown below)
● No
○ Unknown at this time

	Total Takings	Partial Takings	Easement (slope or drainage)	Describe
No. of residential parcels				
(# of dwelling units)				
No. of business parcels				
(# of individual businesses				
Park and recreation land*				
Cemetery*				
Other		1		AMTRAK lease update needed

Name* : _____

◯ Public Agency : _____

◯ Private Entity : _____

Additional ROW to be used on a temporary basis, e.g., construction, utility, or slope easement, maintenance and protection of traffic:

◉ No ◯ Unknown ◯ Yes, as follows

Project-related ROW acquired to date:

◉ None ◯ As Follows :

11. Coordination with the Office of Environmental Compliance has been initiated via customary notification:

◉ Yes ◯ No ◯ Other : _____

Parcels with current or past land uses associated with hazardous and/or toxic materials will be affected by the project:

◉ No ◯ Unknown ◯ Yes, as follows :

12. Bridge:

Name / Number :

Owned By : ◯ Department ◯ Other

Crosses : Define :

Steel surface preparation will be required: ◯ Yes ◉ No

◯ See attached list of multiple bridge maintenance projects

13. Public Outreach has begun:

○ No, because :

◉ Yes, as follows:

The project has been presented and/or made available to the following :

	YES	NO	DATE
Town / City Officials	✓	○	Sep 30, 2010
General Public	✓	○	Aug 28, 2008
CTDEP	✓	○	Aug 15, 2000

Other Date :May 16, 2000

cc: Scott A. Hill - Theodore H. Nezames
Mark D. Neri - Jayantha Mather - Yure Kuljis

Reset Form | Print Form | Send via E-mail

STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION
FRANKLIN WILDLIFE MANAGEMENT AREA
391 ROUTE 32
NORTH FRANKLIN, CT 06254
TELEPHONE: (860) 642-7239

Bureau of Natural Resources

Memorandum **WILDLIFE DIVISION**

To : Scott A. Hill, Transportation Engineer
DOT-Bureau of Engineering & Highway Operations
2800 Berlin Turnpike, Newington, CT 06131

From : Julie Victoria, Wildlife Biologist
DEP Wildlife, Franklin Swamp WMA, 391 Route 32, N. Franklin, CT 06254

Date : March 20, 2007

Subject: State Project 310-XXX proposed platform extension Guilford Station, Guilford

---

Pertinent to State Project 310-XXX proposed platform extension Guilford Station in Guilford: your request was forwarded to me on 3/16/07 from Dawn McKay of the Department of Environmental Protection's (DEP) Natural Diversity Data Base. They have records of a state species of special concern, Eastern Box Turtle (*Terrapene carolina*) and three historic state listed bird species in the vicinity of your project.

Since the project is occurring at an active railroad station the Department of Environmental Protection's (DEP) Wildlife Division does not believe that Eastern box turtle habitat will be impacted.

However, the Wildlife Division recommends that the construction crew be apprised of the species description and possible presence and that the area be searched each day prior to construction. And also, any turtles encountered during construction be moved out of the way.

Thank you for the opportunity to comment.

cc: NDDB – 15112

FROM THE DESK OF
SCOTT A. HILL

MAR 23 2007

J. ANDREWS			
K. HALL			
[illegible]			
[illegible]			
[illegible]			

An Equal Opportunity Employer

STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION

MEMO

To: Mr. Scott A. Hill, Transportation Engineer
DOT-Bureau of Aviation and Ports
2800 Berlin Turnpike
P.O. Box 317546
Newington, CT 06131-7546

From: Dawn M. McKay, Biologist/Environmental Analyst 3
DEP- Bureau of Natural Resources
Wildlife Division/Natural Diversity Data Base
79 Elm Street, 6th Floor
Hartford, CT 06106

Subject: State Project 310-XXX, Platform Extension at the Guilford Shoreline East Railroad Station in Guilford, Connecticut

Date: March 14, 2007

This memo is a follow up to a "potential endangered species conflict" identified through a DOT screening/review using the State and Federal Listed Species and Natural Community Maps.

I have reviewed Natural Diversity Data Base maps and files regarding the area delineated on the map you provided for the proposed platform extension at the Guilford Shoreline East Railroad Station in Guilford, Connecticut. According to our information there are current records of *Terrapene carolina carolina* (eastern box turtle) from this area of Guilford. There are also historic records for three bird species from this area as well. The historic state-listed bird species include: northern harrier (Endangered), black rail (Endangered) and least tern (Threatened). I have sent your memo to Julie Victoria (DEP-Wildlife; 860-642-7239) for further review. Ms. Victoria will write to you directly with her comments.

Natural Diversity Data Base information includes all information regarding critical biological resources available to us at the time of the request. This information is a compilation of data collected over the years by the Natural Resources Center's Geological and Natural History Survey and cooperating units of DEP, private conservation groups and the scientific community. This information is not necessarily the result of comprehensive or site-specific field investigations. Consultations with the Data Base should not be substitutes for on-site surveys required for environmental assessments. Current research projects and new contributors continue to identify additional populations of species and locations of habitats of concern, as well as, enhance existing data. Such new information is incorporated into the Data Base as it becomes available.

Please contact me if you have further questions at 424-3584. Thank you for consulting the Natural Diversity Data Base.

cc: Mark Alexander
Julie Victoria, NDDB# 15112

FROM THE DESK OF
SCOTT A. HILL

MAR 16 2007

	F.Y.I.	PLS. DO	PLS. SEE ME
J. ANDREWS			
K. HALL			
R. MESSINA			
T. NEZAMES			
J. WALESZCZYK			

KAH: Seen Sam

Connecticut Commission on Culture & Tourism

Historic Preservation & Museum Division

59 South Prospect Street
Hartford, Connecticut
06106

(v) 860.566.3005
(f) 860.566.5078

November 17, 2006

Mr. Scott A. Hill
Bureau of Engineering and Highway Operations
ConnDOT
2800 Berlin Turnpike
Newington, CT

Subject: Platform Extension
Shore Line East Railroad Station
Guilford, CT
ConnDOT #310-xxx

Dear Mr. Hill:

The State Historic Preservation Office has reviewed the above-named project. This office expects that the proposed undertaking will have no effect on historic, architectural, or archaeological resources listed on or eligible for the National Register of Historic Places.

This office appreciates the opportunity to have reviewed and commented upon the proposed undertaking.

This comment is provided in accordance with the National Historic Preservation Act and the Connecticut Environmental Policy Act.

For further information please contact Dr. David A. Poirier, Staff Archaeologist.

Sincerely,

J. Paul Loether
Division Director and Deputy
State Historic Preservation Officer

cc: Ms. Cynthia Holden/ConnDOT

FROM THE DESK OF
SCOTT A. HILL

NOV 22 2006

	F.Y.I.	PLS. DO	PLS. SEE ME
J. ANDREWS			
K. HALL			
R. MEGRAW			
J. WALESZCZYK			

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Equal Opportunity Employer

DEP -
Office of Long Island Sound Programs

Memo

To: Mr. Edgar T. Hurle

From: Margaret L. Welch Margaret L Welch

CC: Keith A. Hall, Project Manager

Date: August 15, 2000

Re: State Project No. 310-0007B
Guilford Railroad Station
Shore Line East Railroad

Thank you for the opportunity to review and comment on the coastal consistency worksheet for the project noted above. We have evaluated the worksheet and analyzed the plans previously provided to the Inland Wetlands Resources Division of the Water Management Bureau of this Department. Based on our review, it appears that the project has been reasonably designed to minimize adverse impacts to coastal resources, particularly through proper stormwater management to reduce potential discharges and renovate discharged stormwater with vegetated swales. Accordingly, we find the project consistent with the applicable standards and policies of the Connecticut Coastal Management Act [Connecticut General Statutes sections 22a-90 through 22a-112]. Should you have any questions regarding this memo, or any other coastal management issues, please do not hesitate to contact me at 860-424-3034. Thank you.

KAH

79

INTERDEPARTMENTAL **STATE OF CONNECTICUT**
MESSAGE

To	NAME, TITLE Ms. Margaret Welch, Office of Long Island Sound Program	DATE 8/7/00
	AGENCY, ADDRESS Dept. of Environmental Protection, 79 Elm Street, Hartford	
From	NAME, TITLE Edgar T. Hurle, Director of Environmental Planning	TELEPHONE 594-2920
	AGENCY, ADDRESS Department of Transportation, 2800 Berlin Turnpike, Newington, CT 06131	

Subject: State Project No. 310-0007B
Guilford Railroad Station
Shore Line East Railroad

Attached are one (1) original and one (1) copy of a Coastal Consistency Review Form for the referenced project.

This project is scheduled for advertising on January 10, 2001, but is contingent upon receipt of the permit.

Technical questions pertaining to the design of the project should be addressed to Mr. Keith A. Hall, Project Manager, at (860) 594-3301.

Attachments

John E. Bernick/crj
bcc: Walter H. Coughlin
Judith S. Cantwell - Steven T. Ladd
Bradley J. Smith - Cynthia S. Holden
David S. Chase - Robert L. Scotti
Robert C. Messina - Lisa M. Hudson

KAH

FROM THE DESK OF
BRADLEY J. SMITH
CSH
AUG - 9 2000

	FYI	PLS CO	PLS SEE ME
HIGHWAYS			
FACILITIES			
BRIDGES			

78

Coastal Consistency Review Form

DEP USE ONLY
Application No. _____ Analyst Assigned: _____

Please complete this form in accordance with the instructions (DEP-INST-004). Print or type unless otherwise noted.

Note: Fill out this form only if your project is in the Coastal Area as defined in CGS Section 22a-94(a).

Part I: Project Information

1. Name and phone number of the applicant exactly as it appears on the *Permit Application Transmittal Form* (DEP-APP-001).

   Applicant: Connecticut Department of Transportation
   Title (Mr., Mrs., Ms., Dr., etc.) Last Name First Name Middle Initial Suffix (Jr., P.E., Ph.D.)

   Phone: (800) 594-3304

2. Name of Preparer: Tad Ornstein, Baker Engineering NY, Inc. Sr. Transportation Engineer
   Title (if applicable)

3. Street Address or Description of Location of the Project Site:
   Guilford Railroad Station, Whitfield Street and AMTRAK Railroad

   City or Town: Guilford

4. Brief Project Description:
   This project will construct a new railroad station in compliance with the Americans with Disabilities Act (ADA) Accessibility Guidelines, replacing the existing station. The project will include eastbound and westbound elevated platforms, an overpass and elevators connecting the two platforms, repave the existing railroad station parking lot and direct drainage through a grassed swale before conducting it offsite.

5. Is the project located within the coastal boundary as defined in CGS Section 22a-94(b)?

   X Yes No

   If you answered **Yes** to this question, complete the entire form.

   If you answered **No** to this question, skip Parts II through V and complete Parts VI, VII and VIII.

Part II: Identification of Applicable Coastal Use and Activity Policies and Standards

Identify all statutory goals and policies in or referenced by Section 22a-92 of the Coastal Management Act applicable to the proposed activities.

X General Development* - CGS Sections 22a-92(a)(1), 22a-92(a)(2), 22a-92(a)(9), 22a-92(a)(9)

Water-Dependent Uses - CGS Sections 22a-92(a)(3), 22a-92(b)(1)(A)

Ports and Harbors - CGS Section 22a-92(b)(1)(C)

Coastal Structures and Filling - CGS Section 22a-92(b)(1)(D)

Dredging and Navigation - CGS Sections 22a-92(c)(1)(C), 22a-92(c)(1)(D)

Boating - CGS Section 22a-92(b)(1)(G)

Fisheries - CGS Section 22a-92(c)(1)(I)

Coastal Recreation And Access - CGS Sections 22a-92(a)(6), 22a-92(C)(1)(j), 22a-92(c)(1)(K)

Sewer and Water Lines - CGS Section 22a-92(b)(1)(B)

Fuel, Chemicals And Hazardous Materials - CGS Sections 22a-92(b)(1)(C), 22a-92(b)(1)(E), 22a-92(c)(1)(A)

X Transportation - CGS Sections 22a-92(b)(10)(F), 22a-92(c)(1)(F), 22a-92(c)(1)(G), 22a-92(c)(1)(H)

Solid Waste - CGS Section 22a-92(a)(2)

Dams, Dikes and Reservoirs - CGS Section 22a-92(a)(2)

Cultural Resources - CGS Section 22a-92(b)(1)(J)

Open Space and Agricultural Lands - CGS Section 22a-92(a)(2)

* applicable to all proposed activities

Part III: Consistency With Applicable Statutory Coastal Use and Activity Goals and Policies

Explain how the proposed activity is consistent with the applicable coastal activities goals and policies identified in Part II and describe any mitigation necessary to offset adverse impacts:

By upgrading the existing station for ADA compliance the project allows the station to remain in operation and thereby is consistent with sound economic growth, without jeopardizing the coastal environment.

This project makes use of an existing transportation facility as a means of meeting transportation needs in the area and is therefore consistent with CGS Section 22a-92(b)(10)(F).

This project will have no effect on tidal circulation or coastal access and recreation.

Drainage run-off from the repaved parking lot will be mitigated by routing the runoff off site via a grassed drainage swale.

Part IV: Identification of Applicable Coastal Resources and Coastal Resource Policies

Identify the coastal resources and associated statutory policies that apply to your project by placing a check mark in the appropriate space(s) in the following table.

Coastal Resources	on-site	adjacent to work site	off-site but potentially affected by the project
General Resources* - CGS Sections 22a-93(7), 22a-92(a)(2)	X	X	X
Beaches & Dunes - CGS Sections 22a-93(7)(C), 22a-92-(b)(2)(C), 22a-92(c)(1)(K)			
Bluffs & Escarpments - CGS Sections 22a-93(7)(A), 22a-92(b)(2)(A)			
Coastal Hazard Area - CGS Sections 22a-93(7)(H), 22a-92(a)(2), 22a-92(b)(2)(F), 22a-92(b)(2)(J), 22a-92(c)(2)(B), 22a-92(a)(5)	X	X	
Coastal Waters & Estuarine Embayments - CGS Sections 22a-93(5), 22a-93(7)(K), 22a-93(7)(L), 22a-93(7)(G), 22a-92(a)(2), 22a-92(c)(2)(A)			
Developed Shorefront - CGS Sections 22a-93(7)(I), 22a-92(b)(2)(G)			
Freshwater Wetlands and Watercourses - CGS Sections 22a-93(7)(F), 22a-92(a)(2)		X	X
Intertidal Flats - CGS Sections 22a-93(7)(D), 22a-92(b)(2)(D), 22a-92(c)(1)(K)			
Islands - CGS Sections 22a-93(7)(J), 22a-92(b)(2)(H)			
Rocky Shorefront - CGS Sections 22a-93(7)(B), 22a-92(b)(2)(B)			
Shellfish Concentration Areas - CGS Sections 22a-93(7)(N), 22a-92(c)(1)(I)			
Shorelands - CGS Sections 22a-93(7)(M), 22a-92(b)(2)(I)	X	X	X
Tidal Wetlands - CGS Sections 22a-93(7)(E), 22a-92(a)(2), 22a-92(b)(2)(E), 22a-92(c)(1)(B)			

* applicable to all proposed activities

Part V: Consistency with Applicable Statutory Coastal Resource Goals and Policies

Explain how the proposed activity is consistent with the applicable statutory coastal resource goals and policies identified in Part IV and describe any mitigation necessary to offset adverse impacts:

General Resources:
As an upgrade to an existing rail corridor, this project does not alter or restrict access to any coastal resources.

Freshwater Wetlands and Watercourses, Shorelands:
This project will minimize the effects on off site resources by routing the stormwater runoff through a grassed drainage swale to reduce peak flows rather than directly discharging it.

Part V: Consistency with Applicable Statutory Coastal Resource Goals and Policies (Cont.)

The coastal resources will be protected from damage during construction by careful erosion and sedimentation control established at the beginning of the project and maintained until the completion of all permanent features and establishment of stable vegetation on all areas affected by the project. The work will be done in accordance with Conn DOT Guidelines for Soil Erosion and Sediment Control and Conn DOT Best Management Practices.

Coastal Hazard Area:

This project has been reviewed by the Inland Water Resources Division of the Department of Environmental Protection and has been found to be in compliance with the requirements of Section 13a-94 and Section 25-68b-h of the Connecticut General Statutes (CGS) and Seciton 25-68h-1 through 25-68h-3 of the Regulations of Connecticut State Agencies (RCSA). (See letter regarding FM-2000-105 attached)

Part VI: Identification of Potential Adverse Impacts

Identify the adverse impact categories that apply to the proposed activity. The "applicable" space must be checked if the proposed activity has the potential to generate any adverse impacts defined in the Coastal Management Act and referred to in the following table. If the category is applicable to the proposed activity, you may describe in Part VII project design features which may eliminate or minimize the potential for identified adverse impacts.

Potential Resource Impacts	Applicable	Not Applicable
Characteristics & Functions of Resources - CGS Section 22a-93(15)(H)		X
Coastal Flooding - CGS Section 22a-93(15)(E)		X
Coastal Waters Circulation Patterns - CGS Section 22a-93(15)(B)		X
Drainage Patterns - CGS Section 22a-93(15)(D)	X	
Patterns of Shoreline Erosion and Accretion - CGS Section 22a-93(15)(C)		X
Visual Quality - CGS Section 22a-93(15)(F)	X	
Water Quality - CGS Section 22a-93(15)(A)	X	
Wildlife, Finfish, Shellfish Habitat - CGS Section 22a-93(15)(G)		X

Potential Impacts on Water Dependent Uses	Applicable	Not Applicable
Locating a non-water-dependent use on a site suited to or planned for a water-dependent use - CGS Section 22a-93(17)		X
Replacing an existing water-dependent use with a non-water-dependent use - CGS Section 22a-93(17)		X
Siting a non-water-dependent use which reduces or eliminates public access to marine or tidal waters - CGS Section 22a-93(17)		X

Part VII: Consistency with Statutory Adverse Impact Policies

Explain how all potential adverse impacts identified, as applicable, in Part VI have been avoided, eliminated or minimized.

Drainage Patterns: Potential impacts from increased run-off will be minimized by directing flows through a grassed swale in order to promote absorption of the run-off before the flows move off site.

Visual Quality: Because of the height of the catenary power cable over the rail tracks that must be cleared by the overpass that connects the eastbound and westbound platforms, the overpass structure will be visible from a distance. The overpass will be designed to be visually pleasing and consistent with the surrounding community.

Water Quality: Erosion and Sedimentation control will be established and maintained throughout the construction phase and will not be removed until the establishment of stable growth on all disturbed areas.

Part VIII: Remaining Adverse Impacts

Identify any adverse impacts which remain after incorporating all measures to eliminate or minimize such adverse impacts, and explain why no feasible and prudent alternatives exist that would further avoid or reduce such impacts.

None.

STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER MANAGEMENT

May 16, 2000

Department of Transportation
2800 Berlin Turnpike
Newington, CT 06131

RE: FM –2000-105
DOT Project # 310-007B
Shore Line East Railroad
Guilford

Dear Mr. Hurle:

The Inland Water Resources Division of the Department of Environmental Protection has reviewed the flood management certification application package dated February 7, 2000, prepared by the Department of Transportation. The certification document states that the proposed activity has been designed in compliance with the requirements of Section 13a-94 and Section 25-68b-h of the Connecticut General Statutes (CGS) and Section 25-68h-1 through 25-68h-3 of the Regulations of Connecticut State Agencies (RCSA).

The project consists of upgrading the Guilford Railroad Station as shown on plans entitled "Guilford Railroad Station, Guilford, Project No: 310-007", dated January 21, 2000. The upgrade will include construction of platforms and pedestrian bridge with elevators, stairs and ramps on both sides of the tracks. In addition to the platform structure the parking lot will be reconstructed.

The drainage system on the site has been properly designed. There are no adverse flooding impacts caused by the railroad improvements. Therefore, the certification submitted on February 25, 2000 inclusive of all revisions and the latest submittal on May 9, 2000 is approved.

No revisions or alterations to the approved plans including the approved water-handling plan are allowed without first obtaining written approval from this Division of such alterations. If there are any questions, contact Sharon Yurasevecz of the Inland Water Resources Division at 424-3019.

Sincerely,

Charles E. Berger, Jr.
Director
Inland Water Resources Division

KAH

cc: Michael Masayda, Hydraulics and Drainage Unit, DOT
Keith Hall, State Design, DOT

FROM THE DESK OF
CYNTHIA S HOLDEN
MAY 30 2000

67

General Permit Registration Form for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities

Please complete this form in accordance with the general permit (DEP-PED-GP-015) in order to ensure the proper handling of your registration. Print or type unless otherwise noted. You must submit the *Permit Application Transmittal Form* (DEP-APP-001) and the registration fee along with this form.

DEP USE ONLY

Application No. _____

Permit No. _____

Facility I.D. _____

Part I: Registration Type

Enter a check mark in the appropriate box identifying the registration type.

This registration is for (check one):	Please identify any existing permit number in the space provided:
☒ A *new* general permit registration ☐ A *modification* of an existing general permit	Existing permit number: ***GSN***

Part II: Fee Information

☒ ***Registration only***	A registration fee of $625.00 is to be submitted with *each* registration that you are submitting at least 30 days before the initiation of construction activities.
☐ ***Registration and Plan Review***	All construction projects that result in the disturbance of ten or more acres require the submittal of a Stormwater Pollution Control Plan and a $625.00 plan review fee. The plan and the fee must be submitted 30 days prior to initiation of the construction activity. $625.00 registration fee + $625.00 review fee = $1,250.00 total fee

For municipalities, a 50% discount applies. The registration will not be processed without the fee. The fee shall be non-refundable and shall be paid by certified check or money order payable to the Department of Environmental Protection.

Part III: Registrant Information

1. Fill in the name of the registrant(s) as indicated on the *Permit Application Transmittal Form* (DEP-APP-001):

   Registrant: **Connecticut Department of Transportation**

   Phone: **860-823-3204** ext. Fax:

   ☐ Check here if there are co-registrants. If so, label and attach additional sheet(s) with the required information as supplied above.

Part III: Registrant Information (cont.)

2. List primary contact for departmental correspondence and inquiries, if different than the registrant.

   Name: **Connecticut Department of Transportation**

   Mailing Address: **District II Administratioin Office, 171 Salem Turnpike**

   City/Town: **Norwich** State: **CT** Zip Code: **06360**

   Business Phone: **860-823-3204** ext. Fax:

   Site Phone: Emergency Phone:

   Contact Person: **Carl E. Nelson** Title: **District Engineer**

   Association (e.g. developer, general or site contractor, etc.): **Office of Construction**

3. List owner of the property on which the activity will take place, if different from registrant:

   Name:

   Mailing Address:

   City/Town: State: Zip Code:

   Business Phone: ext. Fax:

   Contact Person: Title:

4. List developer, if different from registrant or primary contact:

   Name:

   Mailing Address:

   City/Town: State: Zip Code:

   Business Phone: ext. Fax:

   Contact Person: Title:

5. Name and address of general contractor:

   Name:

   Mailing Address:

   City/Town: State: Zip Code:

   Business Phone: ext. Fax:

   Site Phone: Off-hours Phone:

   Contact Person: Title:

6. List any engineer(s) or other consultant(s) employed or retained to assist in preparing the registration and Stormwater Pollution Plan.

   ☐ Check here if additional sheets are necessary, and label and attach them to this sheet.

   Name: **Michael Baker Engineering, Inc.**

   Mailing Address: **500 Enterprise Drive, Suite 2B**

   City/Town: **Rocky Hill** State: **CT** Zip Code: **06067**

   Business Phone: **860-563-3044** ext. Fax: **860-529-6627**

   Contact Person: **David B. Tudryn, AIA** Title: **Project Manager**

   Service Provided: **Planning, Engineering and Architectural Design Services**

Part IV: Site Information

1. Site or Project Name (if any): **Guilford Railroad Station expansion**

   Street Address or Description of Location: **Old Whitfield Street**

   City/Town: **Guilford** State: **CT** Zip Code: **06437**

2. Brief description of construction activity: **Train Platform extension with sidewalk and site improvements.**

3. Start Date: **10/3/2011** Anticipated Completion Date: **3/15/2013**

4. Estimated total number of acres to be disturbed: **0.50**

Part V: Stormwater Discharge Information

1. Where does stormwater discharge to:

   ☐ Municipal Separate Storm System? ☐ Yes ☒ No (Name):

   ☐ Surface water body or wetlands? ☐ Yes ☒ No (Name):

2. Is the discharge located less than 500 feet from a tidal wetland, which is not a fresh-tidal wetland?

   ☒ Yes ☐ No

3. Name of the watershed where the site is located OR nearest waterbody to which it discharges:

   West River

4. Is construction in accordance with the Guidelines established under Section 22a-329 of the Soil Erosion and Sedimentation Act? ☒ Yes ☐ No

5. Is construction in accordance with local soil erosion and sediment ordinances? ☒ Yes ☐ No

   Note: A copy of this registration and the Stormwater Pollution Control Plan must be available to the town wetlands enforcement officials, wetlands commission, or their equivalent.

6. Will the construction project disturb over ten acres? ☐ Yes ☒ No

   If yes, enclose a copy of the Stormwater Pollution Control Plan and plan review fee.

7. Has the construction project been reviewed for compliance with the following DEP programs?

   a. Coastal Management Act (Section 22a-92 of the Connecticut General Statutes) ☒ Yes ☐ No

   b. Endangered and Threatened Species (Section 26-306 of the Connecticut General Statutes) ☒ Yes ☐ No

   c. State and Federal Historic Preservation statutes? ☒ Yes ☐ No

Part VI: Supporting Documents

Check the box by the attachments being submitted as verification that *all* applicable attachments have been submitted with this registration form. 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 registrant's name as indicated on the *Permit Application Transmittal Form.*

☒	Attachment A:	An 8 1/2" x 11" copy of the relevant portion or a full-sized original of a USGS Quadrangle Map indicating the exact location of the facility or site. Indicate the quadrangle name on the map. (To obtain a copy of the relevant USGS Quadrangle Map, call your town hall or DEP Maps and Publications Sales at 860-424-3555.)
☐	Attachment B:	A copy of the Stormwater Pollution Control Plan and plan review fee of $500.00, if the construction project disturbs over 10 acres

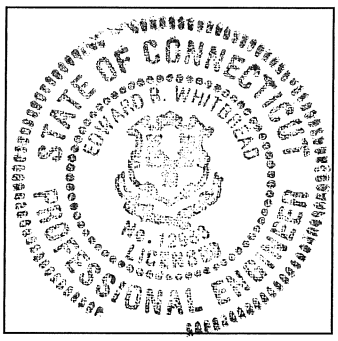
Part VII: Environmental Professional Certification

The following certification must be signed by a professional engineer, licensed to practice in Connecticut.

"I certify that I have thoroughly and completely reviewed the Stormwater Pollution Control Plan for the site. I further certify, based on such review and in my professional judgment, that the Stormwater Pollution Control Plan has been prepared in accordance with the Connecticut Guidelines for Soil Erosion and Sediment Control, as amended, and the conditions for the General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities and the controls required for such Plan are appropriate for the site. I am aware that there are significant penalties for false statements in this certification, including the possibility of fine and imprisonment for knowingly making false statements."

Signature of Professional Engineer	**4/14/2011** Date
E.R. Whitbread Name of Professional Engineer (print or type)	**12963** P. E. Number (if applicable)

Affix P. E. Stamp Here



Part VIII: Registrant Certification

The registrant *and* the individual(s) responsible for actually preparing the registration must sign this part. A registration will be considered incomplete unless all required signatures are provided.

"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 those 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 registration is on complete and accurate forms as prescribed by the commissioner without alteration of the text. I understand that a false statement made in the submitted information may be punishable as a criminal offense, in accordance with section 22a-6 of the Connecticut General Statutes, pursuant to section 53a-157b of the Connecticut General Statutes, and in accordance with any other applicable statute.

I also certify under penalty of law that I have read and understand all conditions of the General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities, that all conditions for eligibility for authorization under the general permit are met, all terms and conditions of the general permit are being met for all discharges which have been initiated and are the subject of this registration, and that a system is in place to ensure that all terms and conditions of this general permit will continue to be met for all discharges authorized by this general permit at the site. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowingly making false statements."

Signature of Registrant	Date
Carl E. Nelson	**District Engineer**
Name of Registrant (print or type)	Title (if applicable)
	4/14/2011
Signature of Preparer (if different than above)	Date
David B. Tudryn, AIA	**Project Manager**
Name of Preparer (print or type)	Title (if applicable)

☐ Check here if additional signatures are necessary.
If so, please reproduce this sheet and attach signed copies to this sheet.

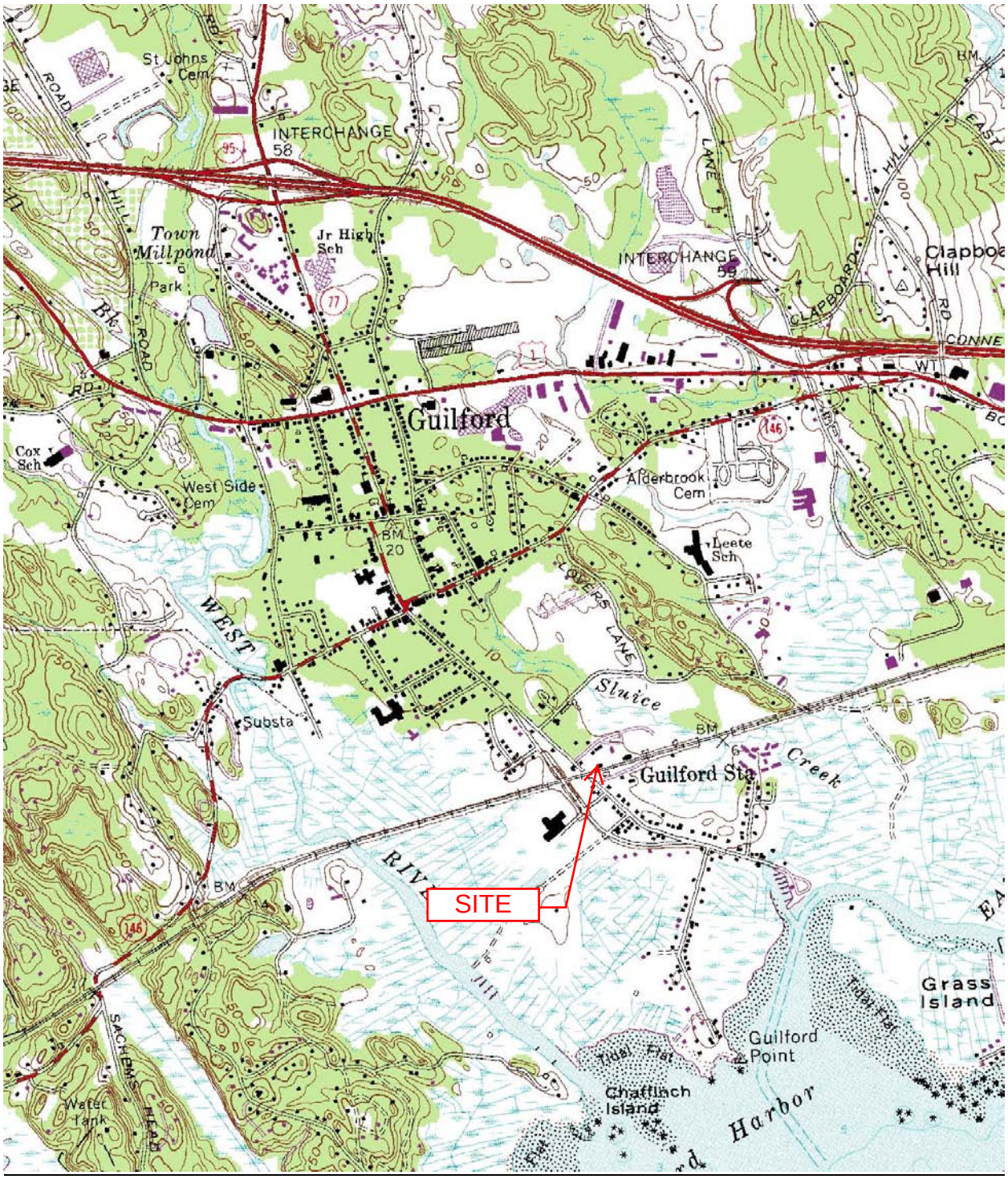
Note: Please submit the *Permit Application Transmittal Form*, the Registration Form, Fee(s), and all Supporting Documents to:

CENTRAL PERMIT PROCESSING UNIT
DEPARTMENT OF ENVIRONMENTAL PROTECTION
79 ELM STREET
HARTFORD, CT 06106-5127

Note: If discharging to municipal separate storm sewer, send a copy of this completed registration form to the owner or operator of that system.

If discharging to a public drinking water supply watershed or aquifer area, send a copy of this completed registration form to the appropriate water company.

ATTACHMENT A



Location Map

USGS 7.5 Minute Quadrangle Topographic Map

General Permit Registration Form for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities

Please complete this form in accordance with the general permit (DEP-PED-GP-015) in order to ensure the proper handling of your registration. Print or type unless otherwise noted. You must submit the *Permit Application Transmittal Form* (DEP-APP-001) and the registration fee along with this form.

DEP USE ONLY

Application No. _____

Permit No. _____

Facility I.D. _____

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This registration is for (check one):	Please identify any existing permit number in the space provided:
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   Site Phone: Emergency Phone:

   Contact Person: **Carl E. Nelson** Title: **District Engineer**

   Association (e.g. developer, general or site contractor, etc.): **Office of Construction**

3. List owner of the property on which the activity will take place, if different from registrant:

   Name:

   Mailing Address:

   City/Town: State: Zip Code:

   Business Phone: ext. Fax:

   Contact Person: Title:

4. List developer, if different from registrant or primary contact:

   Name:

   Mailing Address:

   City/Town: State: Zip Code:

   Business Phone: ext. Fax:

   Contact Person: Title:

5. Name and address of general contractor:

   Name:

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   Service Provided: **Planning, Engineering and Architectural Design Services**

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   ☐ Surface water body or wetlands? ☐ Yes ☒ No (Name):

2. Is the discharge located less than 500 feet from a tidal wetland, which is not a fresh-tidal wetland?

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3. Name of the watershed where the site is located OR nearest waterbody to which it discharges:

   West River

4. Is construction in accordance with the Guidelines established under Section 22a-329 of the Soil Erosion and Sedimentation Act? ☒ Yes ☐ No

5. Is construction in accordance with local soil erosion and sediment ordinances? ☒ Yes ☐ No

   Note: A copy of this registration and the Stormwater Pollution Control Plan must be available to the town wetlands enforcement officials, wetlands commission, or their equivalent.

6. Will the construction project disturb over ten acres? ☐ Yes ☒ No

   If yes, enclose a copy of the Stormwater Pollution Control Plan and plan review fee.

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   a. Coastal Management Act (Section 22a-92 of the Connecticut General Statutes) ☒ Yes ☐ No

   b. Endangered and Threatened Species (Section 26-306 of the Connecticut General Statutes) ☒ Yes ☐ No

   c. State and Federal Historic Preservation statutes? ☒ Yes ☐ No

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☐	Attachment B:	A copy of the Stormwater Pollution Control Plan and plan review fee of $500.00, if the construction project disturbs over 10 acres

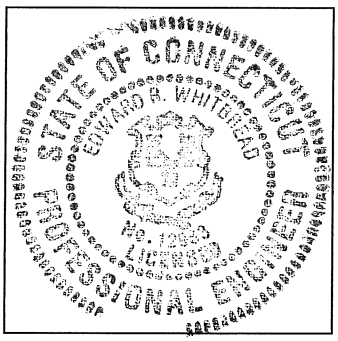
Part VII: Environmental Professional Certification

The following certification must be signed by a professional engineer, licensed to practice in Connecticut.

"I certify that I have thoroughly and completely reviewed the Stormwater Pollution Control Plan for the site. I further certify, based on such review and in my professional judgment, that the Stormwater Pollution Control Plan has been prepared in accordance with the Connecticut Guidelines for Soil Erosion and Sediment Control, as amended, and the conditions for the General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities and the controls required for such Plan are appropriate for the site. I am aware that there are significant penalties for false statements in this certification, including the possibility of fine and imprisonment for knowingly making false statements."

Signature of Professional Engineer	**4/14/2011** Date
E.R. Whitbread Name of Professional Engineer (print or type)	**12963** P. E. Number (if applicable)

Affix P. E. Stamp Here



Part VIII: Registrant Certification

The registrant *and* the individual(s) responsible for actually preparing the registration must sign this part. A registration will be considered incomplete unless all required signatures are provided.

"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 those 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 registration is on complete and accurate forms as prescribed by the commissioner without alteration of the text. I understand that a false statement made in the submitted information may be punishable as a criminal offense, in accordance with section 22a-6 of the Connecticut General Statutes, pursuant to section 53a-157b of the Connecticut General Statutes, and in accordance with any other applicable statute.

I also certify under penalty of law that I have read and understand all conditions of the General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities, that all conditions for eligibility for authorization under the general permit are met, all terms and conditions of the general permit are being met for all discharges which have been initiated and are the subject of this registration, and that a system is in place to ensure that all terms and conditions of this general permit will continue to be met for all discharges authorized by this general permit at the site. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowingly making false statements."

Signature of Registrant	Date
Carl E. Nelson	**District Engineer**
Name of Registrant (print or type)	Title (if applicable)
	4/14/2011
Signature of Preparer (if different than above)	Date
David B. Tudryn, AIA	**Project Manager**
Name of Preparer (print or type)	Title (if applicable)

☐ Check here if additional signatures are necessary.
If so, please reproduce this sheet and attach signed copies to this sheet.

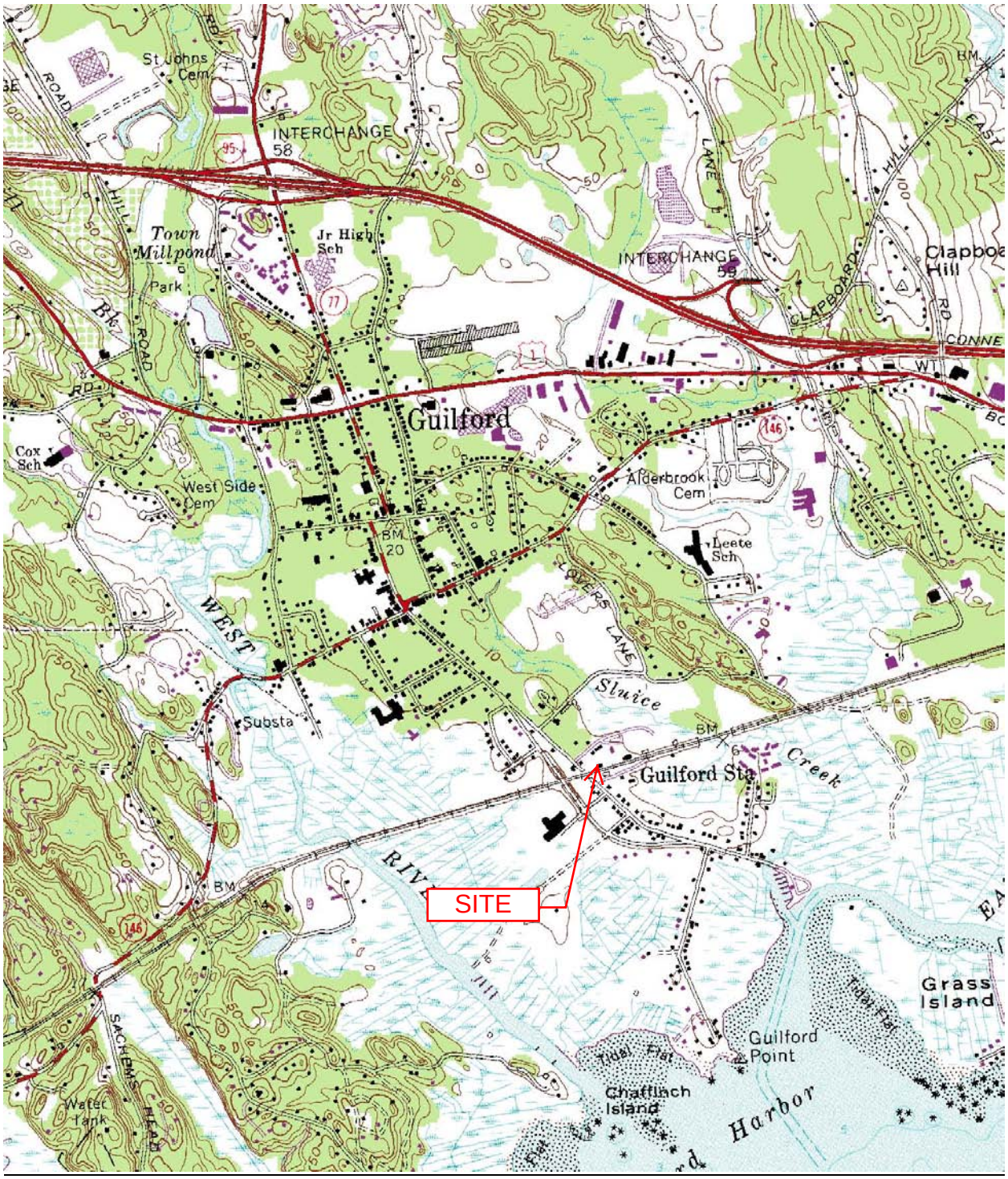
Note: Please submit the *Permit Application Transmittal Form*, the Registration Form, Fee(s), and all Supporting Documents to:

CENTRAL PERMIT PROCESSING UNIT
DEPARTMENT OF ENVIRONMENTAL PROTECTION
79 ELM STREET
HARTFORD, CT 06106-5127

Note: If discharging to municipal separate storm sewer, send a copy of this completed registration form to the owner or operator of that system.

If discharging to a public drinking water supply watershed or aquifer area, send a copy of this completed registration form to the appropriate water company.

ATTACHMENT A



Location Map

USGS 7.5 Minute Quadrangle Topographic Map

State of Connecticut

Department of Transportation

SUPPLEMENTAL SPECIFICATIONS

TO

THE STANDARD SPECIFICATIONS

FOR

ROADS, BRIDGES AND INCIDENTAL CONSTRUCTION

FORM 816

2004

JULY 2010

July 2010

DIVISION I
GENERAL REQUIREMENTS AND COVENANTS

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2.05	Trench Excavation	205
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9.49	Furnishing, Planting and Mulching Trees, Shrubs, Vines and Ground Cover Plants	949
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10.01	Trenching and Backfilling	1001
10.10	Concrete Handhole	1010
11.13	Control Cable	1113
12.10	Epoxy Resin Pavement Markings, Symbols and Legends	1210

July 2010

DIVISION III
MATERIALS SECTION

SECTION		SPECIFICATION NUMBER
M.06	Metals	M06
M.13	Roadside Development	M13
M.16	Traffic Control Signals	M16
M.17	Elastomeric Materials	M17
M.18	Signing	M18

July 2010
STANDARD SPECIFICATIONS
FOR
ROADS, BRIDGES AND INCIDENTAL CONSTRUCTION
FORM 816

ERRATA

PG.	ARTICLE OR SUBARTICLE	LINE NO.	CORRECTION
iv	Table of Contents	11	Change “Guild” to “Guide”
4	1.01.01	8	After the end of the definition for “Plans,” insert as a subset, “A. Standard Sheets – Standardized plans containing details approved by the Department and the FHWA, for construction of a given type on any project, included in contracts on an as-needed basis.”
6	1.01.02	41	Change “Aluminum Association” to “Aluminum Association, Inc. (The)”
6	1.01.02	42	Delete “AAA – Aluminum Alloy Association”
7	1.01.02	1	Insert “AABC – Associated Air Balance Council”
7	1.01.02	1	Insert “AAMA – American Architectural Manufacturers Association”
7	1.01.02	12	Insert “ABMA – American Bearing Manufacturers Association”
7	1.01.02	12	Insert “ACGIH – American Council of Government Industrial Hygienists”
7	1.01.02	12	Change “American Concrete Institute” to “ACI International (American Concrete Institute)”
7	1.01.02	14	Insert “ADAAG – Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities”
7	1.01.02	16	Change “Associated General Contractors of America” to “Associated General Contractors of America (The)”
7	1.01.02	19	Insert “AI – Asphalt Institute”
7	1.01.02	19	Change “American Institute of Architects” to “American Institute of Architects (The)”
7	1.01.02	20	Delete “AIEE – American Institute of Electrical Engineers “
7	1.01.02	24	Delete “ALI – Associated Laboratories, Inc.”
7	1.01.02	26	Change “American Lumber Standard Committee” to “American Lumber Standards Committee, Incorporated”
7	1.01.02	27	Change “Air Movement and Control Association” to “Air Movement and Control Association International, Inc.”
7	1.01.02	31	Delete “AOEC – Area of Environmental Concern”
7	1.01.02	33	Change “The Engineered Wood Association” to “APA-The Engineered Wood Association”
7	1.01.02	37	Change “Air Conditioning” to “Air-Conditioning”
8	1.01.02	7	Change “Air Conditioning” to “Air-Conditioning”
8	1.01.02	8	Change “American Society of Mechanical Engineers” to “ASME International (The American Society of Mechanical Engineers International)”
8	1.01.02	18	Delete “ATA – American Transit Association”
8	1.01.02	20	Delete “AWG – American Wire Gauge”
8	1.01.02	22	Change “Wood-Preservers” to “Wood-Preservers’ “
8	1.01.02	33	Delete “AZI – American Zinc Institute”
8	1.01.02	35	Change “Building Officials and Code Administrators International” to “BOCA International, Inc.”

PG.	ARTICLE OR SUBARTICLE	LINE NO.	CORRECTION
8	1.01.02	38	Change “Library” to “Laboratory”
9	1.01.02	2	Change “CONNDOT” to “ConnDOT”
9	1.01.02	6	Delete “CPI – Clay Pipe Institute”
9	1.01.02	9	Delete “CS – Commercial Standard”
9	1.01.02	10	Change “Construction Specifications Institute” to “Construction Specifications Institute (The)”
9	1.01.02	12	Change “Tower” to ”Technology”
9	1.01.02	17	Delete “DFPA – Douglas Fir Plywood Association”
9	1.01.02	19	Change “Department of Defense” to “Department of Defense Military Specifications and Standards”
9	1.01.02	21	Change “Association” to “Alliance”
9	1.01.02	23	Delete “U.S. Department of Transportation”
9	1.01.02	28	Delete “U.S. Department of Transportation”
9	1.01.02	30	Insert “FMG – FM Global”
9	1.01.02	31	Delete “U.S. Department of Transportation”
10	1.01.02	2	Delete “HASP – Health and Safety Plan”
10	1.01.02	3	Delete “HMA – Hot Mix Asphalt or Bituminous Concrete”
10	1.01.02	4	Delete “HPMA – Hardwood Plywood Manufacturers Association”
10	1.01.02	5	Insert “HPVA – Hardwood Plywood & Veneer Association”
10	1.01.02	9	Insert “ICC – International Code Council”
10	1.01.02	9	Change “Insulated Cable Engineers Association” to “Insulated Cable Engineers Association, Inc.”
10	1.01.02	10	Change “Institute of Electrical and Electronics Engineers” to “Institute of Electrical and Electronics Engineers, Inc. (The)”
10	1.01.02	21	Change “Military Standardization Documents, U.S. Department of Defense” to “(MILSPEC) Military Specification and Standards”
10	1.01.02	24	Delete “MS – Military Specifications”
10	1.01.02	26	Change “Manufacturers Standardization Society of the Valve and Fittings Industry Inc.” to “Manufacturers Standardization Society of The Valve and Fittings the Valve Industry Inc.”
10	1.01.02	29	Change “National Association of Architectural Metal Manufacturers (The)” to “National Association of Architectural Metal Manufacturers”
10	1.01.02	31	Insert “NADCA – National Air Duct Cleaners Association”
10	1.01.02	34	Delete “NBS – National Bureau of Standards”
10	1.01.02	35	Delete “NC – National Course”
11	1.01.02	3	Delete “NCPRC – National Clay Pipe Research Corporation”
11	1.01.02	10	Change “International Electrical Testing Association” to “InterNational Testing Association”
11	1.01.02	12	Delete “NFS – NFS International”
11	1.01.02	13	Insert “NHLA – National Hardwood Lumber Association”
11	1.01.02	18	Insert “NLGA – National Lumber Grades Authority”
11	1.01.02	18	Delete “NLMA – National Lumber Manufacturers Association”
11	1.01.02	21	Insert “NSF – NSF International”
11	1.01.02	21	Change “National Terrazzo and Mosaic Association (The)” to “National Terrazzo and Mosaic Association, Inc.”
11	1.01.02	26	Delete “PCC – Portland Cement Concrete”
11	1.01.02	28	Delete “PLP – Plastic Laminate Producers”
11	1.01.02	29	Delete “PS – Product Standard of NBS, U.S. Department of Commerce”
11	1.01.02	32	Delete “RLMI – Reflector and Lamp Manufacturers’ Institute”

PG.	ARTICLE OR SUBARTICLE	LINE NO.	CORRECTION
11	1.01.02	35	Delete “SAWP – Society of American Wood Preservers”
11	1.01.02	36	Insert “SDI – Steel Deck Institute”
11	1.01.02	36	Insert “S.D.I. – Steel Door Institute”
11	1.01.02	37	Insert “SJI – Steel Joist Institute”
11	1.01.02	37	Insert “SMACNA – Sheet Metal and Air Conditioning Contractors’ National Association”
11	1.01.02	37	Change “Southern Pine Inspection Bureau” to “Southern Pine Inspection Bureau (The)”
12	1.01.02	9	Change “Tile Council of America“ to “Tile Council of America, Inc.”
12	1.01.02	10	Insert “TIA – Telecommunications Industry Association”
12	1.01.02	10	Insert “TPI – Truss Plate Institute, Inc.”
12	1.01.02	10	Delete “UBC – Uniform Building Code”
12	1.01.02	11	Change “Underwriters Laboratories, Inc.” to “Underwriters Laboratories Inc.”
12	1.01.02	12	Delete “UMTA – Urban Mass Transportation Administration, U.S. Department of Transportation”
12	1.01.02	14	Delete “UPC – Uniform Plumbing Code”
12	1.01.02	15	Insert “USGBC – U.S. Green Building Council”
12	1.01.02	16	Delete “USS – United States Standard”
12	1.01.02	17	Delete “VOC – Volatile Synthetic Organic Chemicals”
12	1.01.02	19	Delete “WCLA – West Coast Lumberman’s Association”
12	1.01.02	20	Insert “WCSC – Window Covering Safety Council”
12	1.01.02	20	Delete “WSA – Temporary Waste Stockpile Area”
12	1.01.03	31	Insert “AOEC – Area of Environmental Concern”
12	1.01.03	31	Insert “AWG – American Wire Gauge”
13	1.01.03	16	Insert “HASP – Health and Safety Plan”
13	1.01.03	29	Insert “PCC – Portland Cement Concrete”
14	1.01.03	25	Insert “VOC – Volatile Organic Compound”
14	1.01.03	26	Insert “WSA – Temporary Waste Stockpile Area”
22	1.03.07	23	Change “**$1,000,000**” to “**$2,000,000**”
32	1.05.01	38	Change “Connecticut General Statutes” to “CGS”
45	1.05.15	29	Change “Department of Public Utility Control” to “DPUC”
105	1.20	29	Change “Workmen and Equipment” to “Personnel and Equipment”
105	1.20	31	Delete “Completion of Construction Work and”
107	1.20-1.02.13	15	Change “Americans with Disabilities Act Accessibility Guidelines” to “ADAAG”
108	1.20-1.04.01	26	Change “othewise” to “otherwise”
119	1.20-1.05.25	4	Change “Certificate of Compliance” to “C.O.C.”
122	1.20-1.06.08	3	Change “Certificate of Compliance” to “C.O.C.”
131	1.20-1.08.05	34	Change “Workmen and Equipment” to “Personnel and Equipment”
132	1.20-1.08.11	12	Change “Certificate of Compliance” to “C.O.C.”
133	1.20-1.08.13	7	Delete “Completion of Construction Work and”
133	1.20-1.08.13	9	Change “Certificate of Compliance” to “C.O.C.”
133	1.20-1.08.11	15	Change “Certificate of Compliance” to “C.O.C.”
133	1.20-1.08.11	20	Change “Certificate of Compliance” to “C.O.C.”
143	2.02.01	28	Insert “, swales” after “channels”
245	4.06.04	11	Change “**Over weight (mass) Adjustments -**” and replace with indented “Over weight (mass) Adjustments -” as a subsection of “**1. Bituminous Concrete Class ( )**”.

PG.	ARTICLE OR SUBARTICLE	LINE NO.	CORRECTION
259	5.03.03	24	Change “Such requirements of Article 5.02.03 as are pertinent shall apply equally to this construction.” To “All such plans prepared by the Contractor shall be considered working drawings and shall be submitted with engineering calculations to the Engineer for review in accordance with the requirements of Article 1.05.02."
270	5.08.02	4	Change “M.06.02-12” to “M.06.02-4 Welded Stud Shear Connectors”
271	5.09.02	39	Change “M.06.02-12” to “M.06.02-4 Welded Stud Shear Connectors”
284	5.14.03-12	12	Change “Article M.06.02-13” to “Subarticle 6.03.03 (a) Shop Fabrication Notice”
351	6.03.03	8	Change “MS MIL-C-11796B” to “MIL-C-11796B”
434	9.04.02	14	Change “Subarticle M.06.02-1” to “Article 6.03.02”
434	9.04.02	15	Change “M.06.02-9(d) for metal bridge rail (cast post—aluminum).” to “Malleable castings shall conform to the requirements of the specifications for malleable iron castings, ASTM A 47, Grade No. 32510 (22010). Ductile iron castings shall conform to the Specifications for Ductile Iron Castings, ASTM A 536, Grade 60-40-18 (414-276-18) unless otherwise specified. In addition to the specified test coupons, test specimens from parts integral with the castings, such as risers, shall be tested for castings having a weight (mass) of more than 1000 pounds (455 kilograms) to determine that the required quality is obtained in the castings in the finished condition.”
452	9.14.02	2	Change “Subarticle M.06.02-8” to “ASTM A 53, Type E or S, Grade A, Schedule 40 Black Finish.”
452	9.14.02	4	Change “Subarticle M.06.02-9(d) except that the grade shall be 32510” to “the specifications for malleable iron castings, ASTM A 47, Grade No. 32510 (22010). Ductile iron castings shall conform to the Specifications for Ductile Iron Castings, ASTM A 536, Grade 60-40-18 (414-276-18) unless otherwise specified. In addition to the specified test coupons, test specimens from parts integral with the castings, such as risers, shall be tested for castings having a weight (mass) of more than 1000 pounds (455 kilograms) to determine that the required quality is obtained in the castings in the finished condition.”
496	9.70.01	37	Change “CDOT” to “ConnDOT”
577	12.01.03	7	Change “6.03.03-19” to “6.03.03-4 (f) High Strength Bolted Connections”
577	12.01.03	23	Change “Article 6.03.03-15” to “Subarticle 6.03.03-4(c) Bearings”
577	12.01.03	27	Change “Article 6.03.03-19 (c)(3)” to “Subarticle 6.03.03-4 (f) High Strength Bolted Connections Turn-of-Nut Installation Method”
604	18.00.02	7	Change “National Cooperative Highway Research Program (NCHRP)” to “NCHRP”
623	M.03.01	9	Change “Cement and Concrete Reference Laboratory” to “CCRL”
623	M.03.01	13	Change “Cement and Concrete Reference Laboratory” to “CCRL”
626	M.03.01	2	Change “Cement and Concrete Reference Laboratory” to “CCRL”
626	M.03.01	3	Change “NBS” to “NIST”
632	M.03.01	18	Change “Cement and Concrete Reference Laboratory” to “CCRL”
638	M.04.02	37	Change “Asphalt Institute’s” to “AI’s”

PG.	ARTICLE OR SUBARTICLE	LINE NO.	CORRECTION
711	M.10.02-1	17	Change “Subarticle M.06.02-1(b)” to “Article M.06.02”
720	M.10.08-3	2	Change “Subarticle M.06.02-1(b)” to “Article M.06.02”
735	M.13.03	22	Change “AOAC International” to “AOAC”
760	M.15.15	21	Change “non-fusible” to “fused”
780	M.16.08	41	Change “Americans With Disabilities Act (ADA)” to “ADA”
790	M.16.10	24	Change “Underwriter’s Laboratory” to “UL”
800	M.17.01	19	Change “AAA 6061-T6” to “AA 6061-T6”
845	Index	6	Add page 133 to “Acceptance of Project”
846	Index	13	Add page 107 to “Bids: Consideration of”
847	Index	28	Add page 132 to “Cleaning Up, Final”
849	Index	25	Add page 107 to “Consideration of Bids”
849	Index	39	Add page 108 to “Contract: Intent of”
850	Index	3	Add page 133 to “Contractor’s: Responsibility, Termination of the”
850	Index	13	Add page 114 to “Cooperation by Contractor”
850	Index	15	Add page 114 to “Coordination of Special Provisions, Plans, Supplemental Specifications and Standard Specifications and Other Contract Requirements”
850	Index	40	Add page 128 to “Cutting and Patching:”
852	Index	16	Add page 106 to “Examination of Plans, Specifications, Special Provisions and Site of Work”
852	Index	38	Insert “Facilities, Temporary…126”
853	Index	7	Add page 132 to “Final: Cleaning Up”
854	Index	35	Add page 115 to “Inspection”
855	Index	11	Add page 108 to “Intent of Contract”
855	Index	22	Add page 106 to “Knowledge of Applicable Laws”
855	Index	25	Add page 106 to “Laws: Knowledge of Applicable”
856	Index	27	Add page 120 to “Materials: Source of Supply and Quality”
856	Index	28	Add page 121 to “Materials: Storage of”
857	Index	33	Add page 133 to “Operation and Maintenance Manuals:”
857	Index	34	Change page 133 to 136 for “Equipment and Systems Maintenance Manual”
859	Index	2	Add page 131 to “Personnel and Equipment”
860	Index	6	Add page 114 to “Plans: Coordination of Special Provisions, Supplemental Specifications and Standard Specifications and Other Contract Requirements”
860	Index	7	Add page 106 to “Plans: Examination of”
860	Index	30	Change page 108 to 112 for “Product Data”
860	Index	31	Change page 108 to 112 for “Product Samples “
860	Index	32	Add page 124 to “Product Selection:”
861	Index	12	Add page 126 to “Prosecution of Work”
861	Index	38	Change page 115 to 135 for “Record Drawings”
863	Index	3	Add page 125 to “Sanitary Provisions”
863	Index	18	Insert “Services, Temporary…126”
863	Index	23	Add page 111 to “Shop Drawings”
864	Index	4	Add page 106 to “Site of Work, Examination of”
864	Index	12	Add page 120 to “Source of Supply and Quality”
864	Index	19	Add page 114 to “Special Provisions: Coordination of Plans, Supplemental Specifications and Standard Specifications and Other Contract Requirements”
864	Index	20	Add page 106 to “Special Provisions: Examination of”

PG.	ARTICLE OR SUBARTICLE	LINE NO.	CORRECTION
864	Index	26	Add page 114 to “Specifications: Coordination of Plans, Special Provisions and Other Contract Requirements”
864	Index	27	Add page 106 to “Specifications: Examination of”
864	Index	43	Add page 121 to “Storage”
865	Index	27	Delete page 108 from “Submittals: Shop Drawings”
865	Index	45	Insert “Temporary Utilities, Services, and Facilities…126”
866	Index	2	Add page 133 to “Termination of Contractor’s Responsibility”
866	Index	23	Insert “Training…137”
866	Index	45	Add page 133 to “Utility Services”
867	Index	8	Insert “Warranties…121”
867	Index	24	Add page 126 to “Work: Prosecution of”

CONNECTICUT
SUPPLEMENTAL SPECIFICATION
SECTION 1.01
DEFINITIONS OF TERMS AND PERMISSIBLE ABBREVIATIONS

1.01.01 — Definitions:

Add the following definition:

SUBSTANTIAL COMPLETION: The date at which the performance of all work on the Project has
been completed except minor or incidental items, final cleanup, work required under a warranty, and repair
of unacceptable work, and provided the Engineer has determined that:

A. The Project is safe and convenient for use by the public, and

B. All traffic lanes including all safety appurtenances are in their final configuration, and

C. Failure to complete the work and repairs excepted above does not result in the deterioration of other completed work; and provided further, that the value of work remaining to be performed, repairs, and cleanup is less than one percent (1%) of the estimated final Contract amount, and

D. If applicable a Certificate of Compliance has been issued.

1.01.02 — Abbreviations, Publications, and Standards:

Delete the like-named abbreviations and replace it with the following abbreviations:

"AA – Aluminum Association, Inc. (The)
ALSC – American Lumber Standard Committee, Incorporated
AMCA – Air Movement and Control Association International, Inc.
AOSA – Association of Official Seed Analysts, Inc.
ASME – ASME International (The American Society of Mechanical Engineers International)
CTI – Cooling Technology Institute
EIA – Electronic Industries Alliance
ICEA – Insulated Cable Engineers Association, Inc.
IEEE – Institute of Electrical and Electronics Engineers, Inc. (The)
NTMA – National Terrazzo & Mosaic Association, Inc. (The)
TCA – Tile Council of America, Inc."

Delete the Following abbreviations:

"ADA – Americans with Disabilities Act
AFPA – American Forest and Paper Association

BOCA – Building Officials and Code Administrators International
FM – Factory Mutual System
ICBO – International Conference of Building Officials
MIL – Military Standardization Documents, U.S Department of Defense
MS – Military Specifications
NWWDA – National Wood Window and Door Association
NFS – NFS International"

Add the following abbreviations:

"ADAAG – Americans with Disabilities Act (ADA)
AABC – Associated Air Balance Council
AAMA – American Architectural Manufacturers Association
ABMA – American Bearing Manufacturers Association
AF&PA – American Forest & Paper Association
AI – Asphalt Institute
BIA – Brick Industry Association (The)
CDA – Copper Development Association Inc.
CGA – Compressed Gas Association
FMG – FM Global
HI – Hydraulic Institute
HPVA – Hardwood Plywood & Veneer Association
ICC – International Code Council
ICC-ES – ICC Evaluation Service, Inc.
IEC – International Electrotechnical Commission
IGMA – Insulating Glass Manufacturers Alliance
ISO – International Organization for Standardization
MILSPEC – Military Specification and Standards
NADCA –National Air Duct Cleaners Association
NFRC – National Fenestration Rating Council
NHLA – National Hardwood Lumber Association
NSF – NSF International (National Sanitation Foundation International)
PDI – Plumbing & Drainage Institute
SDI – Steel Deck Institute *or*
- Steel Door Institute
SJI – Steel Joist Institute
SMACNA – Sheet Metal and Air Conditioning Contractors' National Association
SPRI – Single Ply Roofing Industry
SWRI – Sealant, Waterproofing, & Restoration Institute
TIA/EIA – Telecommunications Industry Association/Electronic Industries Alliance
TRB – Transportation Research Board
UFAS – Uniform Federal Accessibility Standards
USGBC – U.S. Green Building Council
WDMA – Window & Door Manufacturers Association"

CONNECTICUT
SUPPLEMENTAL SPECIFICATION
SECTION 1.05
CONTROL OF THE WORK

Replace Article 1.05.08 – Vacant with the following:

1.05.08—SCHEDULES AND REPORTS:

When a project coordinator is not required by the Contract the following shall apply:

Baseline Bar Chart Construction Schedule: Within 20 calendar days after contract award the Contractor shall develop a comprehensive bar chart as a baseline schedule for the project. The bar chart schedule shall be submitted to the Engineer for approval and shall be based on the following guidelines:
1. The bar chart schedule shall contain a list of activities that represents the major activities of the project. At a minimum, this list should include a breakdown by individual structure or stage, including major components of each. The bar chart schedule shall contain sufficient detail to describe the progression of the work in a comprehensive manner. As a guide, 10 to 15 bar chart activities should be provided for each $1 million of contract value. The following list is provided as an example only and is not meant to be all-inclusive or all-applicable:

General Activities Applicable to all projects

Project Constraints
- -Winter shutdowns
- -Environmental permits/application time of year restrictions
- -Milestones
- -Third Party approvals
- -Long lead time items (procurement and fabrication of major elements)
- -Adjacent Projects or work by others

Award
Notice to Proceed
Signing (Construction, temporary, permanent by location)
Mobilization
Permits as required
Field Office
Utility Relocations
Submittals/shop drawings/working drawings/product data
Construction of Waste Stock pile area
Clearing and Grubbing
Earthwork (Borrow, earth ex, rock ex etc.)
Traffic control items (including illumination and signalization)
Pavement markings
Roadway Construction (Breakdown into components)
Drainage (Breakdown into components)

Culverts
Plantings (including turf establishment)
Semi-final inspection
Final Cleanup

As required the following may supplement the activities listed above for the specific project types indicated:

a. For bridges and other structures, include major components such as abutments, wingwalls, piers, decks and retaining walls; further breakdown by footings, wall sections, parapets etc.

Temporary Earth Retention Systems
Cofferdam and Dewatering
Structure Excavation
Piles/test piles
Temporary Structures
Removal of Superstructure
Bearing Pads
Structural Steel (Breakdown by fabrication, delivery, installation, painting etc.)
Bridge deck

b. Multiple location projects such as traffic signal, incident management, lighting, planting and guiderail projects will be broken down first by location and then by operation. Other major activities of these types of projects should include, but are not limited to:

Installation of anchors
Driving posts
Foundations
Trenching and Backfilling
Installation of Span poles/mast arms
Installation of luminaries
Installation of cameras
Installation of VMS
Hanging heads
Sawcut loops
Energizing equipment

c. Facility Projects – Facilities construction shall reflect the same breakdown of the project as the schedule of values:

Division 2 – Existing Conditions
Division 3 – Concrete
Division 4 – Masonry
Division 5 – Metals

Division 6 – Wood, Plastic, and Composites
Division 7 – Thermal and Moisture Protection
Division 8 – Openings
Division 9 – Finishes
Division 10 – Specialties
Division 11 – Equipment
Division 12 - Furnishings
Division 13 – Special Construction
Division 14 – Conveying Equipment
Division 21 – Fire Suppression
Division 22 – Plumbing
Division 23 – Heating, Ventilating, and Air Conditioning
Division 26 – Electrical
Division 27 – Communications
Division 28 – Electronic Safety and Security
Division 31 – Earthwork
Division 32 – Exterior Improvements
Division 33 - Utilities

2. If the Engineer determines that additional detail is necessary, the Contractor shall provide it.
3. Each activity shall have a separate schedule bar. The schedule timeline shall be broken into weekly time periods with a vertical line to identify the first working day of each week.
4. The bar chart schedule shall show relationships among activities. The critical path for the Project shall be clearly defined on the schedule. The schedule shall show milestones for major elements of work, and shall be prepared on a sheet, or series of sheets of sufficient width to show data for the entire construction period.
5. If scheduling software is used to create the bar chart schedule, related reports such as a predecessor and successor report, a sort by total float, and a sort by early start shall also be submitted.

6. Project activities shall be scheduled to demonstrate that the construction completion date for the Project will occur prior to expiration of the Contract time. In addition, the schedule shall demonstrate conformance with any other dates stipulated in the Contract.
7. The Contractor is responsible to inform its subcontractor(s) and supplier(s) of the project schedule and any relevant updates.
8. There will be no direct payment for furnishing schedules, the cost thereof shall be considered as included in the general cost of the work.
9. For projects without a Mobilization item, 5% of the contract value will be withheld until such time as the Baseline Schedule is approved.

Monthly Updates: No later than the 10th day of each month, unless directed otherwise by the Engineer, the Contractor shall deliver to the Engineer three copies of the schedule to show the work actually accomplished during the preceding month, the actual time spent on each activity, and the estimated time needed to complete any

activity which has been started but not completed. Each time bar shall indicate, in 10% increments, the estimated percentage of that activity which remains to be completed. As the Project progresses, the Contractor shall place a contrasting mark in each bar to indicate the actual percentage of the activity that has been completed.

The monthly update shall include revisions of the schedule necessitated by revisions to the Project directed by the Engineer (including, but not limited to extra work), during the month preceding the update. Similarly, any changes of the schedule required due to changes in the Contractor's planning or progress shall also be included. The Engineer reserves the right to reject any such revisions. If the schedule revisions extend the contract completion date, due to extra or added work or delays beyond the control of the Contractor, the Contractor shall submit a request in writing for an extension of time in accordance with Article 1.08.08. This request shall be supported by an analysis of the schedules submitted previously.

Any schedule revisions shall be identified and explained in a cover letter accompanying the monthly update. The letter shall also describe in general terms the progress of the Project since the last schedule update and shall identify any items of special interest.

If the Contractor fails to provide monthly schedule updates, the Engineer has the right to hold 10% of the monthly estimated payment, or $5,000, whichever is less, until such time as an update has been provided in accordance with this provision.

Biweekly Schedules: Each week, the Contractor shall submit to the Engineer a two week look-ahead schedule. This short-term schedule may be handwritten but shall clearly indicate all work planned for the following two week period.

Recovery Schedules: If the updated schedule indicates that the Project has fallen behind schedule, the Contractor shall either submit a time extension request in accordance with 1.08.08 or immediately institute steps acceptable to the Engineer to improve its progress of the Project. In such a case, the Contractor shall submit a recovery plan, as may be deemed necessary by the Engineer, to demonstrate the manner in which an acceptable rate of progress will be regained.

Add the following Article:

1.05.17 - WELDING

The Contractor shall ensure that all welding of materials permanently incorporated into the work, and welding of materials used temporarily during construction of the work is performed in accordance with the following codes:

- American Welding Society (AWS) Structural Welding Code – Steel – ANSI/AWS D1.1: Miscellaneous steel items that are statically loaded including but not limited to columns, and floor beams in buildings, railings, sign supports, cofferdams, tubular items, and modifications to existing statically loaded structures.
- AWS Structural Welding Code – Aluminum – AWS D1.2/D1.2M: Any aluminum structure or member including but not limited to brackets, light standards, and poles.

- AWS Structural Welding Code – Sheet Steel – AWS D1.3/D1.3M: Sheet steel and cold-formed members 0.18 in.(4.6 mm) or less in thickness used as, but not limited, to decking and stay-in-place forms.
- AWS Structural Welding Code – Reinforcing Steel – AWS D1.4/D1.4M: Steel material used in the reinforcement of cast-in-place or pre-cast Portland cement concrete elements including but not limited to bridge decks, catch basin components, walls, beams, deck units, and girders.
- AASHTO/AWS – Bridge Welding Code, AASHTO/AWS D1.5/D1.5M: Steel highway bridges and other dynamically loaded steel structures. Also includes sign supports, and any other fracture critical structure.

The edition governing the work shall be in effect on the date the Contract was advertised for solicitation of bids.

The Contractor is responsible to provide a Certified Welding Inspector in accordance with the above noted codes. The cost for this service is included in the general cost of the work.

All welders shall be certified by the Engineer in accordance with Section 6.03.

CONNECTICUT
SUPPLEMENTAL SPECIFICATION
SECTION 1.08
PROSECUTION AND PROGRESS

Article 1.08.01 – Transfer of Work or Contract:

Replace the last paragraph with the following:

The Contractor shall not sublet, sell, transfer, assign, or otherwise dispose of the Contract or any portion thereof, or of the work provided for therein, or of its right, title, or interest therein, to any individual or entity without the written consent of the Commissioner. No payment will be made for such work until written consent is provided by the Commissioner.

Article 1.08.07 – Determination of Contract Time:

Replace the fifth paragraph with the following:

The total elapsed time in calendar days, computed as described above, from the commencement date specified in the Engineer's "Notice to Proceed" to the “Substantial Completion” date specified in the Engineer's "Notice of Substantial Completion" shall be considered as the time used in the performance of the Contract work.

Article 1.08.09 – Failure to Complete Work on Time:

Replace the second paragraph with the following:

If the last day of the initial Contract time or the initial Contract date determined for Substantial Completion is before December 1 in the given year, liquidated damages as specified in the Contract shall be assessed against the Contractor per calendar day (including any days during a winter shutdown period) from that day until the date on which the Project is substantially completed.

1.08.12—Final Inspection:

Replace the first paragraph with the following:

If the Engineer determines that the work may be substantially complete, a Semi Final Inspection will be held as soon as practical. After the Semi Final Inspection is held and the Engineer determines that the requirements for Substantial Completion have been satisfied the Engineer will prepare a “Notice of Substantial Completion”.

When the Contractor has completed all work listed in the “Notice of Substantial Completion” the Contractor shall prepare a written notice requesting a Final Inspection and a “Certificate of Acceptance of Work”. The Engineer will hold an Inspection of the Project as soon as practical after the Engineer determines that the Project may be completed. If the Engineer deems the Project complete, said inspection shall constitute the Final Inspection, and the Engineer will notify the Contractor in writing that the Final Inspection has been performed.

CONNECTICUT
SUPPLEMENTAL SPECIFICATION
SECTION 1.09
MEASUREMENT AND PAYMENT

Article 1.09.04 – Extra and Cost-Plus Work

Delete the word "bonding" *under section* ***(a) Labor****, (3).*

Delete existing section (e) and replace with the following:

(e) Administrative Expense: When extra work on a cost-plus basis is performed by an authorized subcontractor, the Department will pay the Contractor an additional 7.5% for that work; such payment will be in addition to the percentage payments described in (a), (b), (c) and (d) above, as a reimbursement for the Contractor's administrative expense in connection with such work. Approval of such additional payments will be given only after the Contractor provides to the Engineer receipted invoices for all relevant costs.

Change Section designation for Miscellaneous from:

(f) Miscellaneous to: **(g) Miscellaneous**

Add the following as ***(f)****:*

(f) Bonding Costs: For bonding on the total cost of the cost-plus work including administrative expenses as outlined in (e) above, the Contractor shall receive its actual cost. The Contractor shall provide to the Engineer documentation, satisfactory to the Engineer in form and substance, of all such costs.

CONNECTICUT
SUPPLEMENTAL SPECIFICATION
SECTION 1.10
ENVIRONMENTAL COMPLIANCE

Add the following Article:

1.10.08 – VEHICLE EMISSIONS

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

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

Idling of delivery trucks, dump trucks, and other equipment shall not be permitted in excess of 3 minutes during periods of non-activity except as allowed by the Regulations of Connecticut State Agencies Section 22a-174-18(b)(3)(c):

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

(i) When a mobile source is forced to remain motionless because of traffic conditions or mechanical difficulties over which the operator has no control,

(ii) When it is necessary to operate defrosting, heating or cooling equipment to ensure the safety or health of the driver or passengers,

(iii) When it is necessary to operate auxiliary equipment that is located in or on the mobile source to accomplish the intended use of the mobile source,

(iv) To bring the mobile source to the manufacturer's recommended operating temperature,

(v) When the outdoor temperature is below twenty degrees Fahrenheit (20 degrees F) [negative seven degrees Celsius (-7 degrees C)],

(vi) When the mobile source is undergoing maintenance that requires such mobile source be operated for more than three (3) consecutive minutes, or

(vii) When a mobile source is in queue to be inspected by U.S. military personnel prior to gaining access to a U.S. military installation."

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

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

Any costs associated with this “Vehicle Emissions” article 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”.

CONNECTICUT
SUPPLEMENTAL SPECIFICATION
SECTION 1.11
CLAIMS

Add the following Section:

1.11.01 – General: When filing a formal claim under Section 4-61 (referred to as "Section 4-61" below) of the C.G.S. (as revised), either as a lawsuit in the Superior Court or as a demand for arbitration, the Contractor must follow the procedures and comply with the requirements set forth in this Section of the Specifications. This Section does not, unless so specified, govern informal claims for additional compensation which the Contractor may bring before the Department. The Contractor should understand, however, that the Department may need, before the Department can resolve such a claim, the same kinds of documentation and other substantiation that it requires under this Section. It is the intent of the Department to compensate the Contractor for actual increased costs caused by or arising from acts or omissions on the part of the Department that violate legal or contractual duties owed to the Contractor by the Department.

1.11.02 – Notice of Claim: Whenever the Contractor intends to file a formal claim against the Department under Section 4-61, seeking compensation for additional costs, the Contractor shall notify the Commissioner in writing (in strict compliance with Section 4-61) of the details of said claim. Such written notice shall contain all pertinent information described in Article 1.11.05 below.

Once formal notice of a claim under C.G.S. Section 4-61 (b) (as revised) has been given to the Commissioner, the claimant may not change the claim in any way, in either concept or monetary amount, (1) without filing a new notice of claim and demand for arbitration to reflect any such change and (2) without the minimum period of six months after filing of the new demand commencing again and running before any hearing on the merits of the claim may be held. The only exception to this limitation will be for damages that continue to accrue after submission of the notice, in ways described and anticipated in the notice.

1.11.03 – Record Keeping: The Contractor shall keep daily records of all costs incurred in connection with its construction-related activities on behalf of the Department. These daily records shall identify each aspect of the Project affected by matters related to any claim for additional compensation that the Contractor has filed, intends to file, or has reason to believe that it may file against the Department; the specific Project locations where Project work has been so affected; the number of people working on the affected aspects of the Project at the pertinent time(s); and the types and number of pieces of equipment on the Project site at the pertinent time(s). If possible, any potential or anticipated effect on the Project's progress or schedule which may result in a claim by the Contractor should also be noted contemporaneously with the cause of the effect, or as soon thereafter as possible.

1.11.04 – Claim Compensation: The payment of any claim, or any portion thereof, that is deemed valid by the Engineer shall be made in accordance with the following provisions of this Article:

(a) Compensable Items: The liability of the Department for claims will be limited to the following specifically-identified items of cost, insofar as they have not otherwise been paid for by the Department, and insofar as they were caused solely by the actions or omissions of the Department or its agents (except that with regard to payment for extra work, the Department will pay to the Contractor the mark-ups provided for in Article 1.04.05.):

(1) Additional Project-site labor expenses.
(2) Additional costs for materials.
(3) Additional, unabsorbed Project-site overhead (**e.g.**, for mobilization and demobilization).
(4) Additional costs for active equipment.
(5) For each day of Project delay or suspension caused solely by actions or omissions of the Department, either

(i) an additional ten percent (10%) of the total amount of the costs identified in Subarticles (1) through (4) above; except that if the delay or suspension period prevented the Contractor from incurring enough Project costs under Subarticles (1) through (4) during that period to require a payment by the Department that would be greater than the payment described in subparagraph (ii) below, then the payment for affected home office overhead and profit shall instead be made in the following *per diem* amount:

(ii) six percent (6%) of the original total Contract amount divided by the original number of days of Contract time.

Payment under either (i) or (ii) hereof shall be deemed to be complete and mutually-satisfactory compensation for any unabsorbed home office overhead and any profit related to the period of delay or suspension.

(6) Additional equipment costs. Only actual equipment costs shall be used in the calculation of any compensation to be made in response to claims for additional Project compensation. Actual equipment costs shall be based upon records kept in the normal course of business and in accordance with generally-accepted accounting principles. Under no circumstances shall Blue Book or other guide or rental rates be used for this purpose (unless the Contractor had to rent the equipment from an unrelated party, in which case the actual rental charges paid by the Contractor, so long as they are reasonable, shall be used). Idle equipment, for instance, shall be paid for based only on its actual cost to the Contractor.
(7) Subcontractor costs limited to, and determined in accordance with, Subarticles (1), (2), (3), (4), and (5) above and applicable statutory and case law. Such subcontractor costs may be paid for by the Department only (a) in the context of an informal claims settlement or (b) if the Contractor has itself paid or legally-assumed, present unconditional liability for those subcontractor costs.

(b) Non-Compensable Items: The Department will have no liability for the following specifically-identified non-compensable items:

(1) Profit, in excess of that provided for herein.
(2) Loss of anticipated profit.
(3) Loss of bidding opportunities.
(4) Reduction of bidding capacity.
(5) Home office overhead in excess of that provided for in Article 1.11.04(a)(5) hereof.
(6) Attorneys fees, claims preparation expenses, or other costs of claims proceedings or resolution.
(7) Any other consequential or indirect expenses or costs, such as tort damages, or any other form of expense or damages not provided for in these Specifications or elsewhere in the Contract.

1.11.05 – Required Claim Documentation: All claims shall be submitted in writing to the Commissioner, and shall be sufficient in detail to enable the Engineer to ascertain the basis and the amount of each claim, and to investigate and evaluate each claim in detail. As a minimum, the Contractor must provide the following information for each and every claim and sub-claim asserted:

(a) A detailed factual statement of the claim, with all dates, locations and items of work pertinent to the claim.
(b) A statement of whether each requested additional amount of compensation or extension of time is based on provisions of the Contract or on an alleged breach of the Contract. Each supporting or breached Contract provision and a statement of the reasons why each such provision supports the claim, must be specifically identified or explained.
(c) Excerpts from manuals or other texts which are standard in the industry, if available, that support the Contractor's claim.
(d) The details of the circumstances that gave rise to the claim.
(e) The date(s) on which any and all events resulting in the claim occurred, and the date(s) on which conditions resulting in the claim first became evident to the Contractor.
(f) Specific identification of any pertinent document, and detailed description of the substance of any material oral communication, relating to the substance of such claim.
(g) If an extension of time is sought, the specific dates and number of days for which it is sought, and the basis or bases for the extension sought. A critical path method, bar chart, or other type of graphical schedule that supports the extension must be submitted.

(h) When submitting any claim over $50,000, the Contractor shall certify in writing, under oath and in accordance with the formalities required by the contract, as to the following:
    (1) That supporting data is accurate and complete to the Contractors best knowledge and belief;
    (2) That the amount of the dispute and the dispute itself accurately reflects what the Contractor in good faith believes to be the Departments liability;
    (3) The certification shall be executed by:
        a. If the Contractor is an individual, the certification shall be executed by that individual.
        b. If the Contractor is not an individual, the certification shall be executed by a senior company official in charge at the Contractor's plant or location involved or an officer or general partner of the Contractor having overall responsibility for the conduct of the Contractors affairs.

1.11.06 – Auditing of Claims: All claims filed against the Department shall be subject to audit by the Department or its agents at any time following the filing of such claim. The Contractor and its subcontractors and suppliers shall cooperate fully with the Department's auditors. Failure of the Contractor**,** its subcontractors, or its suppliers to maintain and retain sufficient records to allow the Department or its agents to fully evaluate the claim shall constitute a waiver of any portion of such claim that cannot be verified by specific, adequate, contemporaneous records, and shall bar recovery on any claim or any portion of a claim for which such verification is not produced. Without limiting the foregoing requirements, and as a minimum, the Contractor shall make available to the Department and its agents the following documents in connection with any claim that the Contractor submits:

(1) Daily time sheets and foreman's daily reports.
(2) Union agreements, if any.
(3) Insurance, welfare, and benefits records.
(4) Payroll register.
(5) Earnings records.
(6) Payroll tax returns.
(7) Records of property tax payments.
(8) Material invoices, purchase orders, and all material and supply acquisition contracts.
(9) Materials cost distribution worksheets.
(10) Equipment records (list of company equipment, rates, etc.).
(11) Vendor rental agreements
(12) Subcontractor invoices to the Contractor, and the Contractor's certificates of payments to subcontractors.
(13) Subcontractor payment certificates.
(14) Canceled checks (payroll and vendors).
(15) Job cost reports.
(16) Job payroll ledger.

(17) General ledger, general journal (if used), and all subsidiary ledgers and journals**,** together with all supporting documentation pertinent to entries made in these ledgers and journals.
(18) Cash disbursements journals.
(19) Financial statements for all years reflecting the operations on the Project.
(20) Income tax returns for all years reflecting the operations on the Project.
(21) Depreciation records on all company equipment**,** whether such records are maintained by the company involved, its accountant, or others.
(22) If a source other than depreciation records is used to develop costs for the Contractor's internal purposes in establishing the actual cost of owning and operating equipment, all such other source documents.
(23) All documents which reflect the Contractor's actual profit and overhead during the years that the Project was being performed**,** and for each of the five years prior to the commencement of the Project.
(24) All documents related to the preparation of the Contractor's bid**,** including the final calculations on which the bid was based.
(25) All documents which relate to the claim or to any sub-claim, together with all documents that support the amount of damages as to each claim or sub-claim.
(26) Worksheets used to prepare the claim, which indicate the cost components of each item of the claim, including but not limited to the pertinent costs of labor, benefits and insurance, materials, equipment, and subcontractors' damages, as well as all documents which establish the relevant time periods, individuals involved, and the Project hours and the rates for the individuals.
(27) The name, function, and pertinent activity of each Contractor's or subcontractor's official, or employee involved in or knowledgeable about events that give rise to, or facts that relate to, the claim.
(28) The amount(s) of additional compensation sought and a break-down of the amount(s) into the categories specified as payable under Article 1.11.04 above.
(29) The name, function, and pertinent activity of each Department official, employee or agent involved in or knowledgeable about events that give rise to, or facts that relate to, the claim.

CONNECTICUT
SUPPLEMENTAL SPECIFICATION
SECTION 1.20
GENERAL CLAUSES FOR FACILITIES CONSTRUCTION

1.20-1.00 – General:

Delete the last sentence of the first paragraph and replace with the following:

"Facilities Construction is defined as the type of construction that requires the issuance of a Certificate of Compliance (C.O.C.) by the State Building Inspector or his authorized representative at the completion of a project, and includes site work considered ancillary to this type of construction."

Add the following article:

1.20-1.01.01—Definitions:

OWNER: Where used herein, it is synonymous with Department or State.

1.20-1.02.04 – Examination of Plans, Specifications, Special Provisions and Site of Work:

Delete the first sentence of the first paragraph and replace with the following:

"CSI-formatted specifications are organized into Divisions and Sections based on the CSI's "MasterFormat" numbering system."

1.20-1.02.13 – Knowledge of Applicable Laws:

Delete Items 1 through 9 in their entirety and replace with the following:

1. "The 2003 International Building Code with the State Building Code, including latest Connecticut Supplement and Amendments.
2. The 2003 International Plumbing Code.
3. The 2003 International Mechanical Code.
4. The 2003 International Existing Building Code.
5. The 2006 International Energy Conservation Code.
6. The 2005 NFPA 70 National Electrical Code.
7. The 2003 ICC/ANSI A117.1.

8. The Fire Safety Code, including latest Connecticut Supplement and Amendments.
9. The 2003 International Fire Code.
10. The 2003 NFPA 1 Uniform Fire Code.
11. The 2003 NFPA 101 Life Safety Code."

Add the following as the new last paragraph:

"All work to be performed by the Contractor shall comply with the "Americans with Disabilities Act Accessibility Guidelines."

1.20-1.03.01 – Consideration of Bids:

Delete the entire article and replace with the following:

"The apparent low bidder shall submit to the Manager of Contracts a Schedule of Values within 14 days after bid opening. Any other Contractor that the Department may subsequently designate as the apparent lowest bidder shall make the aforesaid submission within 14 days from the date on which the Department notifies said Contractor that it has become the apparent lowest bidder. If, however, the Department deems it necessary for such a subsequently designated Contractor to make said submission within a shorter period of time, the Contractor shall make the submission within the time designated by the Department.

The total in the Schedule of Values shall equal the bid dollar amount for the Major Lump Sum Item (MLSI).

The Schedule of Values shall be divided into "Line Items" listed separately for each CSI Section of the Special Provisions. An additional line item for "Mobilization" may be incorporated into the Schedule of Values; however, this item may not exceed 10% of the value of the MLSI. The "Mobilization" line item will also include costs associated with "General Conditions" and "Insurance/Bonding." Where requested by the Department, the Contractor shall break down the line items further into more specific line items.

In the event that this Contract is terminated or a portion of this Contract is deleted for any reason or in any way allowable by law under this Contract after the apparent low bidder has been awarded the Contract, the Schedule of Values will <u>not</u> be used for estimating payment due the Contractor for work completed prior to such termination of the Contract or deletion of work thereunder. In the case of Contract termination, payment shall be made in accordance with Article 1.05.14."

1.20-1.05.02--Shop Drawings, Product Data, Product Samples and Quality Assurance Submittals

Delete the last sentence of the first paragraph and replace with the following:

"All facsimiles or other electronic documents from the Contractor shall be followed by an official transmittal."

Delete the third paragraph and replace with the following:

"The Contractor shall number each submittal consecutively: When resubmitting a "Revise and Resubmit" or "Rejected" submittal, the Contractor shall label the transmittal with the original submittal number followed by a letter to designate the additional submission. All submittals shall be numbered conforming to the following examples:"

In column B of line 001, line 001a, and line 001b of the table in subsection 1, replace "07511" with "075110."

Add the following to the end of the first paragraph of subsection 2:

"The Department reserves the right to return partial submittals unreviewed to the Contractor."

Revise the third paragraph of subsection 2 to read:

"The Contractor shall allow at least 60 calendar days for review of any submittal requiring approval by FAA, FTA, any railroad, DEP, U.S. Coast Guard, Army Corps of Engineers, or any other outside agency."

Delete the third and fourth paragraphs of subsection 3 and replace with the following:

"The Designer will not review submittals and the Engineer will not process payment estimates until the initial submittal schedule has been provided. Any delays in construction due to the Contractor's failure to provide a submittal schedule shall be the responsibility of the Contractor.

The Contractor must update its submittal schedule at least once a month, and distribute and post each updated schedule in the manner described above. The Engineer reserves the right not to process payment estimates without a recently updated submittal schedule on file."

Replace the first sentence of the first paragraph of subsection 4 with the following:

"Shop Drawings consist of fabrication and installation drawings, roughing-in and setting drawings, schedules, patterns, templates and similar drawings, and wiring diagrams showing field-installed wiring, including power, signal, and control wiring."

Replace the second paragraph of subsection 4 with the following:

"Shop drawings shall include the following information: Contract number, Project description, number and title of the drawing, date of drawing, revision number, name of Contractor and subcontractor submitting drawings, dimensions, identification of products, shopwork manufacturing instructions, design calculations, statement of compliance with Contractual standards, notation of dimensions established by field measurement, relationship to adjoining construction clearly indicated, seal and signature of a professional engineer if specified, and any other information required by individual Contract provisions."

Replace the first sentence of the first paragraph of subsection 5 with the following:

"Product data consist of printed information such as manufacturer's product specifications, manufacturer's installation instructions, manufacturer's catalog cuts, standard color charts, wiring diagrams showing factory-installed wiring, printed performance curves, operational range diagrams, and mill reports."

Replace the first sentence of the first paragraph of subsection 7 with the following:

"Quality assurance submittals consist of qualification data, design data, certifications, manufacturer's instructions, manufacturer's field reports, test reports, Material Safety Data Sheets (MSDSs), and other quality assurance information required by individual Contract provisions."

1.20-1.05.04—Coordination of Special Provisions, Plans, Supplemental Specifications and Standard Specifications and Other Contract Requirements:

Delete the first and second paragraphs and replace with the following:

"Industry Standards: Each entity engaged in construction of the Contract shall be familiar with industry standards applicable to that entity's construction activities. If printed standards have been established by organizations referenced in Article 1.01.02 or in the Contract, the Contractor shall obtain copies of said standards directly from the publication source.

Unless the Special Provisions include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Special Provisions to the extent referenced. Such standards are made a part of the Contract by reference."

Add the following article:

1.20-1.05.08—Schedules and Reports:

Daily Construction Reports: The Contractor 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.

Add the following article:

1.20-1.05.23—Requests for Information (RFIs):

The Contractor shall forward all RFIs to the Engineer in writing (facsimile or other electronic document) for review. The Engineer will forward the RFI to the Designer for review. Upon receipt of an RFI, the Designer will attempt to determine if additional information is required from the Contractor to respond to the RFI, and request said information from the Engineer.

All other RFIs will be responded to within 10 calendar days of receipt by the Designer.

1.20-1.05.24--Project Meetings:

Delete the third paragraph under subsection 1.

Delete the second paragraph under subsection 2 and replace with the following:

"The meeting participants shall review progress of other construction activities and preparations for the particular activity under consideration, including requirements of Contract documents, related requests for interpretations, related construction orders, purchases, deliveries, submittals, review of mockups, possible conflicts, compatibility problems, time schedules, weather limitations, manufacturer's written recommendations, warranty requirements, compatibility of materials, acceptability of substrates, temporary facilities and controls, space and access limitations, regulations of authorities having jurisdiction, testing and inspecting requirements, installation procedures coordination with other work, required performance results, protection of adjacent work, and protection of construction and personnel."

Delete the second, third and fourth paragraph under subsection 3 and replace with the following:

"The Contractor shall provide the Engineer with a detailed agenda for the proposed

meeting, specifying what topics will be covered. In addition to representatives of the Engineer, each subcontractor, supplier or other entity concerned with current progress or involved in planning, coordination or performance of future activities shall attend these meetings. All participants at the meeting shall be familiar with the Project and authorized to conclude matters relating to the Project.

At each progress meeting, the participants shall (1) review items of significance that could affect progress; (2) discuss topics appropriate to the current status of the Project; (3) review progress since the last meeting; (4) determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to the Contractor's Construction Schedule; (5) determine how to expedite any Project work that may be behind schedule; (6) discuss whether or not schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract time; and (7) review the present and future needs of each entity represented at the meeting, including such items as interface requirements, time, sequences, deliveries, off-site fabrication problems, access, site utilization, temporary facilities and controls, hours of work, hazards and risks, housekeeping, quality and work standards, status of correction of deficient items, field observations, requests for interpretations, status of proposal requests, pending changes, status of construction orders, and documentation of information for payment requests. The Engineer will distribute copies of minutes of the meeting to the Designer and the Contractor. The Contractor shall distribute copies to parties who were or should have been at the meeting."

*Delete article **1.20-1.05.25—Schedules and Reports** in its entirety*

1.20-1.06.08 - Warranties:

Delete the eighth and ninth paragraph and replace with the following:

"The Contractor shall:

(a) Bind warranties in heavy-duty, commercial-quality, durable 3-ring vinyl-covered loose-leaf binders, thick enough to accommodate the contents, and sized to receive 8 1/2-inch x 11-inch paper (216-millimeter x 279-millimeter) paper.

(b) Identify the binder's contents on the binder's front and spine with the typed or printed title "WARRANTIES," the Project title or name, and the name of the Contractor.

(c) Provide a heavy paper divider with a tab for each separate warranty.

(d) Mark the tab to identify the related product or installation.

(e) Provide a typed description of the product or installation, including the name of the product, and the name, address and telephone number of the Contractor or pertinent subcontractor.

(f) Furnish to the Department a written warranty for all Project work accompanied by a cover letter with the following contents:

[Addressed to:]

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

Project Title and Number

[We] hereby warrant all materials and workmanship for all work performed under this Contract for a period of one (1) year from [date of issuance of C.O.C.] against failures of workmanship and materials in accordance with the Contract. Furthermore, as a condition of this warranty, [we] agree to have in place all insurance coverage identified in the Contract for the performance of any warranty work.

[Signature:] [Name of authorized signatory]
[Title]

(g) Submit to the Engineer, upon completion of installation of materials or assemblies that are required to have either a flame-rating or a fire-endurance hourly rating, a detailed letter certifying that the required rating has been attained.

Upon determination by the Engineer that Project work covered by a warranty has failed, the Contractor shall replace or rebuild the work to an acceptable condition complying with Contract requirements. The Contractor is responsible for the cost of replacing or rebuilding defective construction or components and those which may have needed to be damaged or removed in order to cure the defective work including costs of material, equipment, labor, and material disposal, regardless of whether or not the State has benefited from use of the work through a portion of its anticipated useful service life. The Contractor shall respond to the Project Site when Project work covered by a warranty has failed within 3 calendar days, unless in the Engineer's opinion said failure is deemed to be an emergency, in which case the Contractor shall respond to the Project Site as directed by the Engineer."

1.20-1.08.03—Prosecution of Work:

Under subsection '3. Cutting and Patching,' delete the heading 'B. Protection of Structural Elements' and replace with the following:

"**B. Protection:**"

Move the existing first and second paragraphs to under the following subparagraph:

"1. Structural Elements:"

Add the following after the first paragraph under B:

"2. Operational Elements: The Contractor shall not cut and patch operating elements and related components in a manner that results in their reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.

3. Miscellaneous Elements: The Contractor shall not cut and patch miscellaneous elements or related components in a manner that could change their load-carrying capacity, that results reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety."

Add the following after subsection 3:

"4. Selective Demolition:

A. Definitions:

Remove: The Contractor shall detach materials from existing construction and legally dispose or recycle them off-site, unless indicated to be removed and salvaged or removed and reinstalled. Except for materials indicated to be reused, salvaged,

reinstalled, or otherwise indicated to remain Engineer's property, demolished materials shall become Contractor's property and shall be removed from the Project Site.

Remove and Salvage: The Contractor shall detach materials from existing construction and deliver them to Engineer. The Engineer reserves the right to identify other materials for salvage during the course of demolition.

Remove and Reinstall: The Contractor shall detach materials from existing construction, prepare them for reuse, and reinstall them where indicated.

Existing to Remain: Existing materials of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

B. Approval Process:

The Contractor shall submit pre-demolition photographs to the Engineer prior to the commencement of Project work to show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by selective demolition operations.

Well in advance of performing any selective demolition on the Project, the Contractor shall submit to the Engineer a proposal describing the procedures that the Contractor intends to use for same.

The Contractor shall include the following information, as applicable, in its proposal: (1) detailed sequence of selective demolition and removal work with starting and ending dates for each activity while ensuring that the Engineer's on-site operations are not disrupted; (2) interruption of utility services; (3) coordination for shutoff, capping, and continuation of utility services; (4) use of elevators and stairs; (5) locations of temporary partitions and means of egress; (6) coordination of Engineer's continuing occupancy of

portions of existing building and of Engineer's partial occupancy of completed Project work; and (7) means of protection for items to remain and items in path of waste removal from building.

The Contractor shall comply with (1) governing EPA notification regulations before beginning selective demolition; (2) hauling and disposal regulations of authorities having jurisdiction; (3) ANSI A10.6; and (4) NFPA 241.

The Engineer will conduct a Pre-Demolition Meeting at the Project site in accordance with Article 1.20-1.05.24. Said meeting will review the methods and procedures related to selective demolition including, but not limited to, the following: (1) an inspection and discussion of the condition of construction to be selectively demolished; (2) a review of the structural load limitations of the existing structure; (3) a review and finalization of the

selective demolition schedule and a verification of the availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays; (4) a review of requirements of Project work performed by other trades that rely on substrates exposed by selective demolition operations; and (5) a review of areas where existing construction is to remain and requires protection.

C. Repair Materials:

The Contractor shall comply with Article 1.20-1.08.03 subsection 3E for repair materials and shall comply with material and installation requirements specified in other Contract provisions.

D. Examination:

The Contractor shall (1) verify that utilities have been disconnected and capped; (2) survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required; (3) inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged; (4) investigate and measure the nature and extent of unanticipated mechanical, electrical, or structural elements that conflict with intended function or design and submit a written report to

Engineer; and (5) perform surveys as the Project work progresses to detect hazards resulting from selective demolition activities.

E. Utility Services:

The Contractor shall (1) maintain existing utility services indicated to remain and protect them against damage during selective demolition operations; (2) not interrupt existing utilities serving occupied or operating facilities unless authorized in writing by the Engineer; (3) provide temporary services during interruptions to existing utilities, as acceptable to Engineer; (4) provide at least 3 calendar days notice to the Engineer if shutdown of service is required during changeover; and (5) locate, identify, disconnect,

and seal or cap off indicated utilities serving areas to be selectively demolished. The Contractor shall arrange to shut off indicated utilities with utility companies. If utility services are required to be removed, relocated, or abandoned, before proceeding with selective demolition the Contractor shall provide temporary utilities that bypass area of selective demolition and that maintain continuity of service to other parts of building. The Contractor shall cut off pipe or conduit in walls or partitions
to be removed and shall cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.

The Contractor shall refer to other Contract provisions for shutting off, disconnecting, removing, and sealing or capping utilities. The Contractor shall not start selective demolition work until utility disconnecting and sealing have been completed and verified by the Engineer in writing.

F. Preparation:

The Contractor shall conduct selective demolition and debris-removal operations to ensure minimum interference with adjacent occupied and used facilities on the Project site. The Contractor shall not disrupt the Owner's operations without the Engineer's permission. The Contractor shall protect existing site improvements, appurtenances, and landscaping to remain.

The Contractor shall provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain. The Contractor shall provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas. The Contractor shall protect walls, ceilings, floors, and other existing finish work that are to remain or that are
exposed during selective demolition operations. The Contractor shall cover and protect furniture, furnishings, and equipment that have not been removed.

The Contractor shall provide temporary enclosures for protection of existing building

and construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. The Contractor shall provide temporary weathertight enclosure for building exterior. Where heating is needed and permanent enclosure is not complete, the Contractor shall provide insulated temporary enclosures and shall coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.

The Contractor shall erect and maintain dustproof partitions and temporary enclosures to limit dust and dirt migration and to separate areas from fumes and noise.

The Contractor shall provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent movement, settlement, or collapse of construction to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished. The Contractor shall strengthen or add new supports when required during progress of selective demolition.

G. Pollution Controls:

The Contractor shall comply with governing regulations pertaining to environmental protection.

The Contractor shall not use water when it may create a hazardous or objectionable condition such as ice, flooding, or pollution.

The Contractor shall remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas. The Contractor shall remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

The Contractor shall clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. The Contractor shall return adjacent areas to condition existing before selective demolition operations began.

H. Performance:

The Contractor shall not use explosives for demolition purposes.

The Contractor shall demolish and remove existing construction only to the extent required by new construction and as indicated. The Contractor shall (1) proceed with selective demolition systematically; (2) neatly cut openings and holes plumb, square, and true to dimensions required; (3) use cutting methods least likely to damage

remaining or adjoining construction; (4) use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces; (5) temporarily cover openings to remain; (6) cut or drill from the

exposed or finished side into concealed surfaces to avoid marring existing finished surfaces; (7) not use cutting torches until work area is cleared of flammable materials; (8) verify condition and contents of concealed spaces such as duct and pipe interiors before starting flame-cutting operations; (9) maintain fire watch and portable fire-suppression devices during flame-cutting operations; (10) maintain adequate ventilation when using cutting torches; (11) remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site; (12) remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation; (13) locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing; and (14) dispose of demolished items and materials promptly.

The Contractor shall comply with the Engineer's requirements for using and protecting walkways, building entries, and other building facilities during selective demolition operations.

The Contractor shall demolish and remove foundations and other below grade structures completely unless otherwise indicated on the plans. The Contractor shall fill below grade areas and voids resulting from demolition of structures with granular fill materials. Prior to placement of fill materials, the Contractor shall ensure that the areas to be filled are free of standing water, frost, frozen material, trash, and debris. After fill placement and compaction, grade surface to meet adjacent contours and provide flow

to surface drainage structures. Backfilling and grading related to demolition is included in the Major Lump Sum Item (MLSI) for the Project. There will be no separate payment for this backfilling and grading.

The Contractor shall (1) demolish concrete in sections; (2) cut concrete at junctures with construction to remain to the depth shown on the Contract plans and at regular intervals using power-driven saw; and (3) remove concrete between saw cuts.

The Contractor shall (1) demolish masonry in small sections; (2) cut masonry at junctures with construction to remain using power-driven saw; and (3) remove masonry between saw cuts.

The Contractor shall (1) saw-cut perimeter of concrete slabs-on-grade to be demolished as shown on the Contract plans; and (2) break up and remove concrete slabs-on-grade.

The Contractor shall (1) remove floor coverings and adhesive according to recommendations in RFCI-WP and its Addendum; and (2) remove residual adhesive and prepare substrate for new floor coverings by one of the methods recommended by RFCI.

The Contractor shall (1) only remove existing roofing in one day to the extent that it can

be covered by new roofing; and (2) refer to other Contract provisions for new roofing requirements.

The Contractor shall remove air conditioning equipment without releasing refrigerants.

I. Reuse of Building Elements:

The Contractor shall not demolish building elements beyond what is indicated on the plans without the Engineer's approval.

J. Removed and Salvaged Materials:

Unless otherwise directed by the Engineer, the Contractor shall (1) store materials in a secure area until delivery to the owner; (2) transport materials to the owner's storage area off-site; and (3) protect materials from damage during transport and storage.

K. Removed and Reinstalled Materials:

Unless otherwise directed by the Engineer, the Contractor shall (1) clean and repair materials to functional condition adequate for intended reuse; (2) paint equipment to match the color of new equipment; (3) protect materials from damage during transport and storage; and (4) reinstall items in locations indicated complying with installation requirements for new materials and equipment and providing connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

L. Existing Materials to Remain:

The Contractor shall protect construction indicated to remain against damage and soiling during selective demolition.

The Contractor shall drain piping and cap or plug piping with the same or a compatible piping material for piping to be abandoned in place.

The Contractor shall cap or plug ducts with the same or a compatible ductwork material for ducts to be abandoned in place.

The Contractor shall cut and remove concealed conduits and wiring to be abandoned in place 2-inches (50-mm) below the surface of the adjacent construction, cap the conduit end, and patch the surface to match the existing finish. The Contractor shall cut existing conduits installed in concrete slabs to be abandoned in place flush with the top of the slab and fill conduit end with a minimum of 4-inches (100-mm) of concrete.

M. Patching and Repairing:

The Contractor shall comply with Article 1.20-1.08.03 subsection 3H for patching and

repairing damage to adjacent construction caused by selective demolition operations.

N. Disposal of Demolished Materials:

The Contractor shall (1) not allow demolished materials to accumulate or be sold on the Project Site; (2) not burn demolished materials on the Project Site; and (3) promptly and legally dispose or recycle demolished materials off the Project Site."

1.20-1.08.05--Personnel and Equipment:

Replace "FM with "FMG" in subsection (a)

Add the following article:

"**1.20-1.08.12--Semi-Final and Final Inspections:**

1. Semi-Final Inspection: Before requesting the Semi-Final Inspection, the Contractor shall show 100% completion for all Project work claimed as complete. The Contractor shall submit final test/adjust/balance records including the final air and water balance report. For all incomplete Project work, the Contractor shall prepare its own "Punch List" of the incomplete items and reasons the work is not complete. The Contractor shall submit final test/adjust/balance records including the final air and water balance report.

On receipt of a Contractor request for inspection, the Engineer will proceed with inspection or notify the Contractor of unfulfilled requirements. The Engineer will prepare a "Punch List" of unfilled, substandard, or incomplete items. During this inspection, the Contractor shall have all technicians necessary to demonstrate the complete operation of all systems on-site. Examples of such systems include, but are not limited to, the following: boiler, HVAC, fire alarm, and building automation. The Engineer will advise the Contractor of the construction that must be completed or corrected before the issuance of the C.O.C. Results of the completed inspection will form the basis of requirements for the Final Inspection. The Engineer reserves the right to issue the C.O.C. after the Semi-Final Inspection if there are no Building Code or Fire Code compliance issues or any major "Punch List" items.

2. Final Inspection: Before requesting Final Inspection for issuance of the C.O.C., the Contractor shall: (1) submit specific warranties, maintenance service agreements, final certifications and similar documents; (2) submit Record Drawings, Record Specifications, operations and maintenance manuals, final project photographs, property surveys, and similar final record information; (3) deliver spare parts; (4) make final changeover of permanent locks and deliver the keys to the Engineer; (5) complete start-up testing of systems; (6) train the owner's operation and maintenance personnel; (7) discontinue or change over and remove temporary facilities from the Project Site, along with construction tools, mock-ups, and similar elements; (8) complete final

cleaning requirements, including touch-up painting; (9) touch-up and otherwise repair and restore marred exposed finishes to eliminate visual defects; (10) submit a certified copy of the Engineer's “Punch List” of items to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance, and the list has been endorsed and dated by the Engineer; (11) submit final meter readings for utilities, a measured record of stored fuel, and similar data as of the date of Final Inspection, or when the Engineer took possession of and responsibility for corresponding elements of the Project work; and (12) install permanent electrical service. The Contractor shall

install permanent electrical service prior to Semi-Final Inspection if requested by the Engineer, or if necessary for the Engineer or Contractor to perform testing of building and other related systems and equipment to certify acceptance and completion of Project work. The Contractor shall submit all outstanding items or unacceptable submissions from the Semi-Final Inspection, or other outstanding items required for submittal, prior to the Final Inspection.

On receipt of a Contractor request for inspection, the Engineer will proceed with inspection and notify the Contractor of unfulfilled requirements.”

1.20 – 1.08.13 – Termination of the Contractor’s Responsibility:

Add subsection 3 as follows:

“**3. Insurance Coverage:** The Contractor shall have in place all insurance coverage identified in Article 1.03.07 for the performance of any warranty work.”

1.20-1.08.14--Acceptance of Project:

Add the following to subsection 2 under the heading “Equipment and Systems Maintenance Manual:”

“(j) Copies of maintenance agreements with service agent name and telephone number.”

Add the following paragraph in subsection 3 after the second paragraph:

“The Contractor shall provide a syllabus prior to the training to ensure that the appropriate owner’s operation and maintenance personnel are in attendance.”

Delete the last paragraph and replace with the following:

The Contractor shall submit to the Engineer for approval, a qualified commercial videographer to videotape the training sessions. The videographer shall be a firm or an individual of established reputation that has been regularly engaged as a professional videographer for not less than 3 years.

The Contractor shall video record each training session and provide said video in DVD format to the Engineer for the owner's future use."

Add the following section:

"1.20-1.09.06—Partial Payments:

With each payment request under the MLSI, the Contractor shall submit AIA Form G702 (Application and Certificate of Payment) and Form G703 (Continuation Sheet). The Contractor is not required to obtain the Architect's signature on Form G702. Once approved by the Engineer, the Forms G702 and G703 become the basis of payment under the MLSI."

Add the following section:

"1.20-9.75.04—Method of Measurement:

Mobilization as defined in Article 1.20-1.03.01 will be paid in the manner described hereinafter; however, the determination of the total contract price earned shall not include the amount of mobilization earned during the period covered by the current monthly estimate – but shall include amounts previously earned and certified for payment:

1. When the first payment estimate is made, 25 percent of the "Mobilization" line item will be certified for payment.

2. When the Baseline Schedule, as specified under Section 1.05.08, is accepted, 50 percent of the "Mobilization" line item, minus any previous payments, will be certified for payment.

3. When 10 percent of the total original contract price is earned and the Baseline Schedule, as specified under Section 1.05.08, is accepted, 75 percent of the "Mobilization" line item, minus any previous payments, will be certified for payment.

4. When 30 percent of the total original contract price is earned and the Baseline Schedule, as specified under Section 1.05.08, is accepted, 100 percent of the "Mobilization" line item, minus any previous payments, will be certified for payment."

CONNECTICUT
SUPPLEMENTAL SPECIFICATION
SECTION 2.02
ROADWAY EXCAVATION, FORMATION OF EMBANKMENT AND DISPOSAL OF SURPLUS MATERIAL

2.02.04 – Method of Measurement:

Second to last Paragraph - replace the last sentence with the following:

"Bituminous parking areas are considered as bituminous concrete pavement."

CONNECTICUT
SUPPLEMENTAL SPECIFICATION
SECTION 2.05
TRENCH EXCAVATION

Delete the entire Section and replace with the following:

2.05.01--Description:

Paragraph 2 - Delete the only sentence and replace with the following:

2) The removal of stormwater drainage structures, stormwater pipes and appurtenances beyond the limits of the roadway and structure excavation.

Sub article 2 - Rock in Trench - Delete the only sentence and replace with the following:

(2) Rock, insofar as it applies to trench excavation, shall be defined as rock in definite ledge formation, boulders, or portions of boulders, cement masonry structures, concrete structures, reinforced concrete pipe, Portland cement concrete pavement or base, of 1/2 cubic yard (0.5 cubic meters) or more in volume, removed as indicated or directed from within the payment lines for trench excavation.

2.05.05 -Basis of Payment

Paragraph 13 - Delete the entire sentence “There will be no direct payment for the plugging of existing pipes....." and replace with the following:

There will be no direct Payment for the plugging of existing pipes, removal and disposal of metal or plastic pipes or for the breaking up of floors in drainage structures being abandoned. The cost shall be included in the contract unit prices of the drainage and excavation items.

CONNECTICUT
SUPPLEMENTAL SPECIFICATION
SECTION 3.04
PROCESSED AGGREGATE BASE

Delete the entire Section and replace with the following:

3.04.01--Description: The base shall consist of a foundation constructed on the prepared subbase or subgrade in accordance with these specifications and in conformity with the lines, grades, compacted thickness and typical cross-section as shown on the plans.

3.04.02--Materials: All materials for this work shall conform to the requirements of Article M.05.01.

3.04.03--Construction Methods: Only one type of coarse aggregate shall be used on a project unless otherwise permitted by the Engineer.

Prior to placing the processed aggregate base, the prepared subbase or subgrade shall be maintained true to line and grade, for a minimum distance of 200 feet (60 meters) in advance of the work. None of the aggregate courses shall be placed more than 500 feet (150 meters) ahead of the compaction and binding operation on that particular course.

The processed aggregate base shall be spread uniformly by a method approved by the Engineer. The thickness of each course shall not be more than 4 inches (100 millimeters) after compaction, unless otherwise ordered.

After the aggregate is spread, it shall be thoroughly compacted and bound by use of equipment specifically manufactured for that purpose. Rollers shall deliver a ground pressure of not less than 300 pounds per lineal inch (52.5 newtons/millimeter) of contact width and shall have a weight (mass) not less than 10 tons (9100 kilograms). Vibratory units shall have a static weight (mass) of not less than 4 tons (3650 kilograms). Water may be used during the compaction and binding operation and shall be applied from an approved watering device. The compacting and binding operation shall begin at the outside edges, overlapping the shoulders for a distance of not less than 6 inches (150 millimeters) and progress towards the middle, parallel with the centerline of the pavement. The work shall cover the entire surface of the course with uniform overlapping of each preceding track or pass. Areas of super-elevation and special cross slope shall be compacted by beginning at the lowest edge and proceeding towards the higher edge, unless otherwise directed by the Engineer. The compacting and binding operation shall be continued until the voids in the aggregates have been reduced to provide a firm and uniform surface satisfactory to the Engineer. The amount of compactive effort shall in no case shall be less than four (4) complete passes of the compacting and binding operations. All aggregate shall be completely compacted and bound at the end of each day's work or when traffic is to be permitted to operate on the

road. The dry density of each layer of processed aggregate base after compaction shall not be less than 95 percent of the dry density for that material when tested in accordance with AASHTO T180, Method D.

Should the subbase or subgrade material become churned up or mixed with the processed aggregate base at any time, the Contractor shall, without additional compensation remove the mixture. The Contractor shall add new subbase material, if required, and reshape and recompact the subbase in accordance with the requirements of Article 2.12.03. New aggregate material shall be added, compacted and bound, as hereinbefore specified, to match the surrounding surface.

Any surface irregularities which develop during, or after work on each course, shall be corrected by loosening material already in place and removing or adding aggregate as required. The entire area, including the surrounding surface, shall be re-compacted and rebound until it is brought to a firm and uniform surface satisfactory to the Engineer.

3.04.04--Method of Measurement: Processed Aggregate Base will be measured horizontally in–place after final grading and compaction. Materials placed beyond the horizontal limits indicated on the plans will not be measured for payment.

The total thickness shall be as indicated on the plans, or as ordered by the Engineer and within a tolerance of minus three-fourths of an inch (-$^{3}/_{4}$") to plus one-half inch (+ $^{1}/_{2}$") (-19 millimeters to +13 millimeters).

Measurements to determine the thickness will be taken by the Engineer at intervals of 500 feet (150 meters) or less, along lanes, and shall be considered representative of the lane. For the purpose of these measurements, a shoulder will be considered a lane.

If a thickness measurement is taken and found deficient, the Engineer will take such additional measurements as he considers necessary to determine the longitudinal limits of the deficiency. Areas not within allowable tolerances shall be corrected, as ordered by the Engineer, without additional compensation to the Contractor.

3.04.05--Basis of Payment: This work will be paid for at the contract unit price per cubic yard for "Processed Aggregate Base", complete in place, which price shall include all materials, tools, equipment and work incidental thereto.

Pay Item	Pay Unit
Processed Aggregate Base	c.y. (cu. m)

CONNECTICUT
SUPPLEMENTAL SPECIFICATION
SECTION 4.01
CONCRETE PAVEMENT

Article 4.01.03-A. Composition:

Add the following new paragraph before the last paragraph:

"The temperature of the concrete at the time of placement shall not be less than 60˚ F (15.5˚ C) or greater than 90˚ F (32˚ C). For pumped concrete, the temperature shall be determined at the placement end of the pump line. The temperature of the concrete shall be determined in accordance with ASTM C1064."

CONNECTICUT
SUPPLEMENTAL SPECIFICATION
SECTION 5.14
PRESTRESSED CONCRETE MEMBERS

Article 5.14.03 – Construction Methods:

Change the last sentence of 5.14.03-16 – Methods and Equipment to read:

"The results of this investigation, including computations, shall be submitted to the Engineer."

CONNECTICUT
SUPPLEMENTAL SPECIFICATION
SECTION 6.01
CONCRETE FOR STRUCTURES

Article 6.01.02 – Materials:

Add the following:

Material for stay-in-place metal forms shall be made of zinc-coated (galvanized) steel sheet conforming to ASTM Specification A653, Structural Steel (SS) Grade 33 through 80 (ASTM Specification A653M, Structural Steel (SS) Grade 250 through 550). The minimum gage thickness shall be 20 gage. Coating weight shall conform to ASTM A924, Class G235 (ASTM A924M, Class Z700) 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 on the contract drawings.

Material for the form supports shall be fabricated from the same material and conform to the same material requirements as the forms themselves or they shall be fabricated from structural steel conforming to the requirements of ASTM A36 (ASTM A36M) which shall be hot-dip galvanized in accordance with ASTM A123 (ASTM A123M).

Lightweight filler material shall be as recommended by the form's manufacturer.

Subarticle 6.01.03 – 3, Forms:

Add the following:

Stay-in-Place Metal Form System:

Stay-in-place metal forms shall have a minimum depth of form valley equal to two inches (50 millimeters). The forms shall have closed tapered ends. Lightweight filler material shall be used in the form valleys.

The metal forms shall be designed on the basis of dead load of the form, reinforcement and the plastic concrete, including the additional weight of concrete due to the deflection of the metal forms, plus 50 pounds per square foot (2.40 kilopascals) 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 (250 megapascal). The span for design and deflection shall be the clear distance between edges of the beams or girders less two inches (50 millimeters) and shall be measured parallel to the form flutes. Maximum deflection of the forms under the weight of the plastic concrete, reinforcement, and forms shall not exceed 1/180 of the form span or 0.5 inches (13 millimeters), whichever is less. 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.

Form support angles shall be designed as a cantilever. The horizontal leg of the form's support angle shall not be greater than 3 inches (75 millimeters).

Before fabricating any material, the Contractor shall submit working drawings to the Engineer for review in accordance with Article 1.05.02-2, Working Drawings. These drawings shall include the proposed method of form construction, erection plans including 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.

Form supports shall be used and no stay-in-place metal forms shall be placed over or be directly supported by the top flanges of beams or girders. The form supports may be supported by or be attached to the top flanges. Stay-in-place metal forms shall not be used in bays where longitudinal slab construction joints are located. Stay-in-place metal forms shall not be used under cantilevered slabs such as the overhang outside of fascia members.

Welding to the top flanges of steel beams and girders is not allowed 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 prestressed concrete beams or the use of power-actuated tools on the prestressed concrete beams for fastening of the form supports to the prestressed concrete beams will not be permitted. No welding will be permitted on the reinforcing steel in the prestressed units.

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, and handled in such a manner as to preclude damage to the forms. Damaged material shall be replaced at no additional cost. Any exposed form or form support metal where the galvanized coating has been damaged, shall be thoroughly cleaned, wire brushed, then coated with two coats of a zinc dust-zinc oxide primer, FS No. TT-P-641d, Type II, as directed by the Engineer.

All fabricated stay-in-place metal forms shall be stored at the project site at least four inches (100 millimeters) above the ground on platforms, skids or other suitable supports and shall be protected against corrosion and damage.

Forms shall be installed from the topside in accordance with the manufacturer's placing plans, recommended details, and printed instructions. Forms shall be constructed to the lines, grades, shapes, and dimensions shown on the plans, unless otherwise directed by the Engineer. Form supports shall ensure that 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.

Field cutting of form sheet metal shall be made by a steel cutting saw. Supports, closures and cut-outs shall be cut with shears or saw. No flame cutting will be permitted.

All welding shall be accomplished by Connecticut certified welders in accordance with Subarticle 6.03.03 – 6, Welding.

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. Forms shall be securely fastened to form supports with self-drilling fasteners and shall have a minimum bearing length of one inch (25 millimeters) 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 eighteen inches (450 millimeters). The ends of the form sheets shall be securely attached to the support angles with fasteners at a maximum spacing of eighteen inches (450 millimeters) or two corrugation widths, whichever is less. Welding of forms to supports is not allowed.

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 one inch (25 millimeters) unless noted otherwise on the plans.

The completed stay-in-place metal form system shall be sufficiently tight to prevent leakage of mortar or concrete.

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 construction work. The cost of such corrective work shall be at the sole expense of the Contractor.

There will be no direct payment for the cost of the forms and form supports, or any material, tools, equipment, or labor incidental thereto, but the cost shall be considered included in the contract unit price per cubic yard (cu. m) for “Class ‘F’ Concrete”.

<u>Article 6.01.03-8. Placing Concrete:</u>

Add the following new paragraph after the first paragraph:

“The temperature of the concrete at the time of placement shall not be less than 60˚ F (15.5˚ C) or greater than 90˚ F (32˚ C). For pumped concrete, the temperature shall be determined at the placement end of the pump line. The temperature of the concrete shall be determined in accordance with ASTM C1064.”

Subarticle 6.01.03 – 9, Concrete for Bridge Decks:

Add the following:

Screed and runway supports shall not be located on any stay-in-place metal form sheets, form supports or reinforcing steel.

Concrete shall not be placed on the forms to a depth greater than twelve inches (300 millimeters) above the top of the forms. Concrete shall not be dropped more than three feet (1 meter) above the top of the forms, beams or girders.

CONNECTICUT
SUPPLEMENTAL SPECIFICATION
SECTION 6.03
STRUCTURAL STEEL

Delete the entire section and replace it with the following:

SECTION 6.03
STRUCTURAL STEEL

Description: Work under this item shall consist of furnishing, fabricating, transporting, storing, handling and erecting of structural steel of the type and size designated, as shown on the plans, as directed by the Engineer and in accordance with these specifications.

All work except as stated in the following paragraph shall conform to the requirements of the AASHTO LRFD Bridge Construction Specifications and the ANSI/AASHTO/AWS D1.5 – Bridge Welding Code.

All work subject to railroad loading shall conform to AREMA and the ANSI/AASHTO/AWS D1.5 – Bridge Welding Code.

Materials: The materials for this work shall conform to the requirements of Section M.06.

Materials for this work shall be stored off the ground before, during, and after fabrication. It shall be kept free from dirt, grease and other contaminants and shall be reasonably protected from corrosion. In addition, weathering steel shall be stored as to allow free drainage and promote the development of the oxide coating and a uniform appearance.

Construction Methods:

1. Pre-qualification:

(a) Fabricators producing material for Department projects under this item are required to have as a minimum, an active AISC Certification for Simple Steel Bridges. For fabrication of material for use on bridges other than un-spliced rolled beam bridges, AISC Major Steel Bridge Certification is required. If so noted on the plans, additional AISC endorsement for fabrication of fracture critical members is also required.

(b) Field Welders: Prior to working on material for Department projects under this specification, all field welders, field welding operators, and field tackers must posses a valid welder certification card issued by the Department's Division of Materials Testing. If such person has not been engaged in welding operations on a Department project or

project acceptable to the Department within a period of six months, or if he cannot produce an approved welding certificate dated within the previous twelve months from a welding agency acceptable to the Engineer, he shall be required to re-qualify through examination. The Engineer may require re-qualification of anyone whose quality of work he questions.

2. Submittals:

(a) Shop Drawings: Prior to any fabrication, the Contractor shall submit shop drawings in accordance with Article 1.05.02-3 to the Engineer for review and approval. Shop drawings shall include a cambering procedure and diagram. In the case of trusses, the Contractor is responsible for calculation of the camber (lengthening and shortening) of all truss members.

(b) Shop Schedule: The Contractor shall submit a detailed shop fabrication schedule to the Engineer for review within 30 days of the notice to proceed unless otherwise agreed to by the Engineer. At a minimum the schedule shall include the start date, milestone dates, and completion date. Any significant changes shall be brought to the attention of the Engineer immediately.

(c) Welding Procedures: Prior to start of fabrication, all weld procedures shall be submitted to the Engineer for review and approval.

(d) Working Drawings for Falsework and Erection of Structural Steel: Prior to erecting any steel fabricated under this specification, the Contractor shall submit drawings and supporting calculations, including erection stresses, in accordance with Article1.05.02-2 to the Engineer. The design of temporary supports and falsework shall conform to the *AASHTO Specifications,* the *AASHTO Guide Design Specifications for Bridge Temporary Works* or any other standard acceptable to the Engineer. 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. The submittal shall include at a minimum:

- Title block with contract number, project identification number (PIN), town, and structure number and name.
- Plan of the work area showing support structures, roads, railroad tracks, Federal and State regulated areas as depicted on the plans, utilities or any other information relative to erection.
- A detailed narrative describing the erection sequence for main members and secondary members (cross frames, diaphragms, lateral bracing, portals, etc.), noting use of holding cranes or temporary supports, falsework, or bents.
- Delivery location of each girder.
- Location of each crane for each pick.
- Capacity chart for each crane and boom length used in the work.
- The capacity of the crane and of all lifting and connecting devices shall be adequate for the total pick load including spreaders and other materials. In the area of railroads and navigable waterways, the capacity shall be as required by Amtrak, Metro North, U.S. Coast Guard or other regulatory authorities. No picks shall be

allowed over vehicular or pedestrian traffic unless otherwise noted on the plans or permitted by the Engineer.

- Pick point location(s) on each member.
- Lifting weight of each member (including clamps, spreader beams, etc.)
- Lift and setting radius for each pick (or maximum lift radius).
- Description of lifting devices or other connecting equipment.
- Girder tie-down details or other method of stabilizing erected girders.
- Bolting requirements, including the minimum number of bolts and erection pins required to stabilize members during the erection sequence.
- Blocking details for stabilizing members supported on expansion bearings and on bearings that do not limit movement in the transverse direction.
- The method and location for temporary supports for field spliced or curved girders, including shoring, false work, holding cranes, guys, etc. The Engineer will review, but not approve details of temporary supports. The design, erection, and stability of these supports shall be the sole responsibility of the Contractor.
- Offsets necessary to adjust expansion bearings during erection to provide for temperature variance and dead load rotation.

The following notes shall be placed on the Erection Drawings:

- Cranes shall be operated in accordance with the Connecticut Department of Public Safety regulations.
- The Contractor shall be responsible for verifying the weight of each lift and for insuring the stability of each member during all phases of erection.
- Members shall be subject to only light drifting to align holes. Any drifting that results in distortion of the member or damage to the holes will be cause for rejection of the member.
- Field reaming of holes shall not be performed unless required by the Contract Drawing or approved by the Engineer.

The Contractor shall submit these documents to the Engineer at least 60 calendar days in advance of their proposed use. If the proposed method of erection requires additional members or modifications to the existing members of the structure, such additions and modifications shall be made by the Contractor at no expense to the State.

3. Shop Fabrication: Unless otherwise shown on the plans or indicated in the Special Provisions, Structural Steel shall be fabricated in accordance with the AASHTO LRFD Bridge Construction Specifications, amended as follows:

(a) Notification: The Contractor shall submit written notification to both the Engineer and the Director of Research and Materials Testing not less than 30 calendar days prior to start of fabrication. No material shall be manufactured or worked in the shop before the Engineer has been so notified. The notification shall include 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 a Department Quality Assurance inspector.

(b) Camber: All members shall be cambered prior to heat curving and painting. Rolled beams shall be heat cambered by methods approved by the Engineer. Plate girders shall be cambered by cutting the web to the prescribed shape with allowances for shrinkage due to cutting, welding, and heat curving. The fabricator is responsible to determine what allowances should be made. Rolled, plate-rolled, or fabricated sections shall be cambered to the total amount shown on the plans and within the camber deviation tolerances permitted for welded beams and girders, as indicated in the ANSI/AASHTO/AWS D1.5 Bridge Welding Code. The Contractor must submit to the Engineer for approval, a plan for corrective action if the actual camber is not within tolerance.

(c) Welding: Unless otherwise indicated on the plans or specifications, all work shall be performed in accordance with ANSI/AASHTO/AWS D1.5 – Bridge Welding Code.

(d) Preassembly of Field Connections: Field connections of main members of continuous beams, plate girders, bents, towers, rigid frames, trusses and arches shall be preassembled prior to erection as necessary to verify the geometry of the completed structure or unit and to verify or prepare field splices. The Contractor shall propose an appropriate method of preassembly for review and comment by the Engineer. The method and details of preassembly shall be consistent with the erection procedures shown on the working drawings and camber diagrams. As a minimum, the preassembly procedure shall consist of assembling three contiguous panels accurately adjusted for line and camber. Successive assemblies shall consist of at least one section or panel of the previous assembly plus two or more sections or panels added at the advancing end. In the case of structures longer than 150 feet (45 meters), each assembly shall not be less than 150 feet (45 meters) long regardless of the length of individual continuous panels or section. All falsework, tools, machinery and appliances, including drift pins and bolts necessary for the expeditious handling of the work shall be provided by the Contractor at no cost to the State.

(e) Inspection: 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 Quality Assurance (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 structural steel shall be stamped or 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 stamp or 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 structural 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 stamped or 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.

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.

(f) Nondestructive Testing: All nondestructive testing of structural steel and welding shall be performed as designated on the plans and in the project specifications. Such testing shall be performed by personnel approved by the Engineer.

Personnel performing Radiographic, Ultrasonic or Magnetic Particle 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.

Nondestructive testing shall be performed in accordance with the procedures and standards set forth in the AASHTO/AWS D1.5, Bridge Welding Code. The Department reserves the right to perform additional testing as determined by the Engineer.

All nondestructive testing shall be witnessed by an authorized representative of the Department. Certified reports of all tests shall be submitted to the Materials Testing Division 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.

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 is defective. If the testing indicates the weld to be satisfactory, the actual cost of such inspection will be paid by the Department.

(g) Marking: Each member shall be identified with an erection mark corresponding with the member identification mark on the approved shop drawings. Identification marks shall be impressed into the member with a low stress stamp in a location in accordance with standard industry practice.

(h) Shipping, Handling, Storage and Receiving: The Contractor shall make all arrangements necessary to properly load, transport, unload, handle and store all material. The Contractor shall furnish to the Engineer copies of all shipping statements. The weight (mass) of the individual members shall be shown on the statements. Members having a weight (mass) of more than 3 tons (2700 kilograms) shall have the weight (mass) marked thereon. All material shall be unloaded promptly upon delivery. The Contractor shall be responsible for any demurrage charges. 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. Top lateral bracing should be installed in tub girders prior to shipping and erection of the field pieces. All costs associated with any corrective action will be borne by the Contractor.

4. Field Erection: A meeting shall be held on site prior to any erection of structural steel. The Contractor shall name the person responsible for the steel erection work and provide copies of all crane operator licenses. Proposed equipment, rigging, timetable and methods shall be proposed at this meeting.

(a) Falsework: Any temporary work shall be constructed in conformance with the working drawings. The Contractor shall verify that the quality of materials and work employed are consistent with their design.

All girders shall be stabilized with falsework, temporary braces, or holding cranes until a sufficient number of adjacent girders are erected with all diaphragms and cross frames connected to provide necessary lateral support as shown in the erecting diagrams.

Adjustment shall be provided in the falsework and other temporary supports so that the temporary elevation of the structural steel provided by the falsework is consistent with the deflections that will occur as the structure is completed. The elevation of falsework shall be such as to support the girders at the cambered no-load elevation. Unloading of temporary supports should be performed such that all temporary supports at each cross section are unloaded uniformly. Unless specifically permitted by the Engineer, welding of falsework support brackets to structural steel is not allowed.

Unless erected by the cantilever method, truss spans shall be erected on blocking. The blocking shall be left in place until the tension chord splices are fully bolted and all other truss connections pinned and bolted and the proper geometric shape is achieved.

(b) Anchorages: Anchor bolts and similar materials which are to be placed during the erection of the structural steel shall be carefully and accurately set to the requirements of Article 6.01.03.

(c) Bearings: Bearing plates shall have a full and uniform bearing upon the substructure masonry. Bearing plates shall be placed upon bearing areas which are finished according to the requirements of Article 6.01.03.

Prefabricated pads conforming to the requirements of Article M-12.01 shall be installed unless specifically noted otherwise on the contract plans.

Each piece shall be the same size as the bearing plate it is to support and the holes to accommodate the anchor bolts shall be clearly and accurately punched before setting the pad in place.

In placing expansion bearings, due consideration shall be given to the temperature at the time of erection and stage construction requirements. The nuts of anchor bolts at expansion bearings shall be adjusted to permit the free movement of the span.

(d) Field Assembly: Members and components shall be accurately assembled as shown on the plans and any match marks shall be followed. The material shall be carefully handled so that no components will be bent, broken or otherwise damaged.

Hammering which will injure or distort the members is not permitted. Bearing surfaces and surfaces to be in permanent contact shall be cleaned before the members are assembled.

Cylindrical erection pins shall be 1/32 inch (0.8 mm) larger than the nominal diameter of the holes.

Splices and field connections of main stress carrying members shall be made with a minimum of 50% of the holes filled and tightened with high strength bolts before the lifting system is released. The bolts shall be installed uniformly throughout the connection. Lateral stability must be maintained until the deck is placed.

The Contractor shall ensure that girders are stable throughout the erection process. The stage of completeness of the bolted connections shall be considered when evaluating the strength and stability of the steel during erection. For Closed Box and Tub Girders the Contractor shall ensure that the cross- section shape of each box is maintained during erection. Top lateral bracing should be installed in tub girders prior to shipping and erection of the field pieces.

(e) Welded Connections:

Unless otherwise shown on the plans or indicated by the special provisions, welding of structural steel shall be done in accordance with “ANSI/AASHTO/AWS D1.5 Bridge Welding Code.”

The Contractor’s welding and inspection procedures for each type of field weld and field tacking must be submitted to the Engineer on the form designated by the Department. All procedures must be approved by the Materials Testing Division prior to any work and must be adhered to at all times.

Quality control is the responsibility of the Contractor. The Contractor must provide an AWS Certified Welding Inspector (CWI) in accordance with AWS D1.5. The CWI must be qualified and certified in accordance with the provisions of AWS QC1, *Standard for Qualification and Certification of Welding Inspectors.*

The CWI shall make visual inspection of all welds. The Contractor will perform magnetic particle inspection, ultrasonic testing inspection, or radiographic testing inspection of field welds when required on the plans or special provisions. Each test may be witnessed by an authorized representative of the Engineer.

Welds or sections of welds containing imperfections determined to be unacceptable by either the CWI or the Engineer shall be removed and re-welded by the Contractor at their expense. Welds so removed and replaced shall be re-inspected by the CWI. All costs for re-inspection or testing of such welds shall be borne by the Contractor.

(f) High Strength Bolted Connections:

The assembly of structural connections using ASTM A 325/ A 325M or ASTM A 490/A 490M 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.

Bolts, nuts and washers from each rotational-capacity lot shall be shipped in the same container. If there is only one production lot number for each size of nut and washer, the nuts and washers may be shipped in separate containers. Each container shall be permanently marked with the rotational-capacity lot number such that identification will be possible at any stage prior to installation. Assemblies of bolts, nuts and washers shall be installed from the same rotational-capacity lot. Pins, small parts and packages of bolts, washers, and nuts shall be shipped in boxes, crates, kegs, or barrels. A list and description of the contained materials shall be plainly marked on the outside of each shipping container.

Bolted Parts: All material within the grip of the bolt shall be steel; there shall be no compressible material, such as gaskets or insulation, within the grip. Bolted steel shall fit solidly together after the bolts are tensioned. The length of the bolts shall be such that the end of the bolt will be flush with or outside of the face of the nut when properly installed.

Surface Conditions: At the time of assembly, all connection surfaces, including surfaces adjacent to the bolt head and nut, shall be free of scale, except tight mill scale, and shall be free of dirt or other foreign material. Burrs that would prevent solid seating of the connected parts in the snug tight condition shall be removed.

Paint is permitted on the faying surface, including slip critical connections, only when shown on the plans. The faying surfaces of slip-critical connections shall meet the requirements of the following paragraphs, as applicable:

- Connections specified to have un-coated faying surfaces: any paint, including any inadvertent over spray, shall be excluded from areas closer than one bolt diameter, but not less than 1.0 in. (25 mm), from the edge of any hole and all areas within the bolt pattern.

- Connections specified to have painted faying surfaces: shall be blast cleaned and coated in accordance with Section 6.04, and shall not be assembled until the coating system has been properly cured.

- Connections specified to have galvanized faying surfaces: shall be hot-dip galvanized in accordance with ASTM A 123/A 123M, and shall subsequently be roughened by means of hand wire brushing. Power wire brushing is not permitted.

Installation: At the pre-erection meeting, the Contractor shall inform the Engineer of their planned method of tensioning high strength bolts. Acceptable methods are: Turn-of-Nut, Calibrated Wrench or Direct Tension Indicator.

Fastener Assemblies:

A "fastener assembly" is defined as a bolt, a nut, and a washer. Only complete fastener assemblies of appropriately assigned lot numbers shall be installed.

Fastener assemblies shall be stored in an area protected from dirt and moisture. Only as many fastener assemblies as are anticipated to be installed and tensioned during a work shift shall be taken from protected storage. Fastener assemblies not used shall be returned to protected storage at the end of the shift. Prior to installation, fastener assemblies shall not be cleaned of lubricant. Fastener assemblies which accumulate rust or dirt resulting from site conditions shall be cleaned, relubricated and tested for rotational-capacity prior to installation. All galvanized nuts shall be lubricated with a lubricant containing a visible dye. Plain bolts must be oily to the touch when delivered and installed. Lubricant shall be removed prior to painting.

All bolts shall have a hardened washer under the turned element (nut or bolt head). All hardened washers shall conform to the requirements of ASTM F 436/F 436M.

Where necessary, washers may be clipped on one side to a point not closer than 7/8 of the bolt diameter from the center of the washer. Circular and beveled washers, when used adjacent to direct tension indicator washers shall not be clipped. Direct tension indicator washers shall not be clipped.

Bolt Tension Measuring Device: The Contractor shall provide a calibrated bolt tension measuring device (a Skidmore-Wilhelm calibrator (Skidmore) or other acceptable bolt tension indicating device) at all times when, and at all locations where high-strength fasteners are being installed and tensioned. The tension measuring device (Skidmore) shall be calibrated by an approved testing agency at least annually. The Skidmore shall be used to perform the rotational-capacity test of the fastener assemblies. The Skidmore will also be used to substantiate (1) the suitability of the fastener assembly to satisfy the requirements of Table A, including lubrication as required, (2) calibration of the installation wrenches, if applicable, and (3) the understanding and proper use by the contractor of the selected method of tensioning to be used.

Complete fastener assemblies shall be installed in properly aligned holes and then tensioned by the Turn-of-Nut, Calibrated Wrench or Direct Tension Indicator method to the minimum tension specified in Table A. Tensioning may be done by turning the bolt while the nut is prevented from rotating when it is impractical to turn the nut. Impact wrenches, if

used, shall be of adequate capacity and sufficiently supplied with air to perform the required tensioning of each bolt in approximately 10 seconds.

Bolts shall be installed in all holes of the connection and the connection brought to a snug condition. Snug is defined as having all the plies of the connection in firm contact. Snugging shall progress systematically from the most rigid part of the connection to the free edges. The bolts of the connection shall then be tightened in a similar manner as necessary until the connection is properly tensioned.

Nuts shall be located, whenever practical, on the side of the connection which will not be visible from the traveled way.

Unless otherwise approved by the Engineer fastener assemblies shall be brought to full tension immediately following snugging.

Fully tensioned fastener assemblies shall not be reused. Retightening previously tensioned bolts which may have been loosened by the tensioning of adjacent bolts shall not be considered as reuse.

Rotational-Capacity Tests: In addition to the certified test reports, on site Rotational-capacity tests may be required by the Engineer. This test shall be performed by the Contractor at the location where the fasteners are installed and tensioned. When performed in the field, the procedure shall conform to the requirements of ASTM A 325/ A 325M Appendix A-1.

Turn-of-Nut Installation Method:

At the start of the work, the Contractor shall demonstrate that the procedure used by the bolting crew to develop a snug condition and to control the turns from a snug condition develops the tension required in Table A. To verify their procedure, the Contractor shall test a representative sample of not less than three complete fastener assemblies of each diameter, length and grade to be used in the work. This shall be performed at the start of work using a Skidmore. Periodic retesting shall be performed when ordered by the Engineer.

After snugging the connection, the applicable amount of rotation specified in Table B shall be achieved. During the tensioning operation there shall be no rotation of the part not turned by the wrench. Tensioning shall progress systematically from the most rigid part of the connection to its free edges.

Calibrated Wrench Installation Method:

Calibrated wrench method may be used only when the installation wrenches are properly calibrated daily, or as determined by the Engineer. Standard torques determined from tables or from formulas which are assumed to relate torque to tension **shall not** be acceptable.

The Contractor shall demonstrate to the Engineer periodically that all equipment and wrenches are providing a torque which has been calibrated to produce the minimum tension specified in Table A. The installation procedures shall be verified periodically, as determined by the Engineer, for each bolt diameter, length and grade using the fastener assemblies that are being installed in the work. This verification testing shall be accomplished in a Skidmore by tensioning three complete fastener assemblies of each diameter, length and grade from those being installed with a hardened washer under the element turned.

When significant difference is noted in the surface condition of the bolts, threads, nuts or washers, as determined by the Engineer, wrenches shall be recalibrated. The Contractor shall verify during the installation of the assembled steel work that the wrench adjustment selected by the calibration does not produce a nut or bolt head rotation from snug greater than that permitted in Table B. If manual torque wrenches are used, nuts shall be turned in the tensioning direction when torque is measured.

When calibrated wrenches are used to install and tension bolts in a connection, bolts shall be installed with hardened washers under the element turned to tension the bolts. Once the connection has been snugged, the bolts shall be tensioned using the calibrated wrench. Tensioning shall progress systematically from the most rigid part of the connection to its free edges. A calibrated torque wrench shall be used to "touch up" previously tensioned bolts which may have been relaxed as a result of the subsequent tensioning of adjacent bolts until all bolts are tensioned to the prescribed amount.

Direct Tension Indicator Installation Method:

When Direct Tension Indicators (DTIs) meeting the requirements of Section M.06 are used with high-strength bolts to indicate bolt tension, they shall be subjected to the verification testing described below and installed in accordance with the method specified below. Unless otherwise approved by the Engineer, the DTIs shall be installed under the head of the bolt and the nut turned to tension the bolt. The Manufacturer’s recommendations shall be followed for the proper orientation of the DTI and additional washers, if any, required for the correct use of the DTI. Installation of a DTI under the turned element may be permitted if a washer is used to separate the turned element from the DTI.

Verification: Verification testing shall be performed in a Skidmore. A special flat insert shall be used in place of the normal bolt head holding insert. Three verification tests shall be required for each combination of fastener assembly rotational-capacity lot, DTI lot, and DTI position relative to the turned element (bolt head or nut) to be used on the project. The fastener assembly shall be installed in the tension-measuring device with the DTI located in the same position as in the work. The element intended to be stationary (bolt or nut) shall be restrained from rotation.

The verification tests shall be conducted in two stages. The bolt nut and DTI assembly shall be installed in a manner so that at least three and preferably not more than five threads are located between the bearing face of the nut and the bolt head. The bolt shall be tensioned first to the load equal to that listed in Table C

under Verification Tension for the grade and diameter of the bolt. If an impact wrench is used, the tension developed using the impact wrench shall be no more than two-thirds of the required tension. Subsequently, a manual wrench shall be used to attain the required tension. The number of refusals of the 0.005-in. (0.125-mm) tapered feeler gage in the spaces between the protrusions shall be recorded. The number of refusals for uncoated DTIs under the stationary or turned element, or coated DTIs under the stationary element, shall not exceed the number listed under Maximum Verification Refusals in Table C for the grade and diameter of bolt used. The maximum number of verification refusals for coated DTIs (galvanized, painted, or epoxy-coated), when used under the turned element, shall be no more than the number of spaces on the DTI less one. The DTI lot shall be rejected if the number of refusals exceeds the values in the table or, for coated DTIs if the gage is refused in all spaces.

After the number of refusals is recorded at the verification load, the bolt shall be further tensioned until the 0.005-in (0.125-mm) feeler gage is refused at all the spaces and a visible gap exists in at least one space. The load at this condition shall be recorded and the bolt removed from the tension-measuring device. The nut shall be able to be run down by hand for the complete thread length of the bolt excluding thread run-out. If the nut cannot be run down for this thread length, the DTI lot shall be rejected unless the load recorded is less than 95 percent of the average load measured in the rotational capacity test of the fastener lot as specified previously in "Rotational-Capacity Tests."

If the bolt is too short to be tested in the calibration device, the DTI lot shall be verified on a long bolt in a calibrator to determine the number of refusals at the verification tension listed in Table C. The number of refusals shall not exceed the values listed under maximum verification refusals in Table C. Another DTI from the same lot shall then be verified with the short bolt in a convenient hole in the work. The bolt shall be tensioned until the 0.005-in. (0.125-mm) feeler gage is refused in all spaces and a visible gap exists in at least one space. The bolt shall then be removed from the tension-measuring device and the nut shall be able to be run down by hand for the complete thread length of the bolt excluding thread run-out. The DTI lot shall be rejected if the nut cannot be run down this thread length.

Installation: Installation of fastener assemblies using DTIs shall be performed in two stages. The stationary element shall be held against rotation during each stage of the installation. The connection shall be first snugged with bolts installed in all holes of the connection and tensioned sufficiently to bring all the plies of the connection into firm contact. The number of spaces in which a 0.005-in. (0.125-mm) feeler gage is refused in the DTI after snugging shall not exceed those listed under maximum verification refusals in Table C. If the number exceeds the values in the table, the fastener assembly shall be removed and another DTI installed and snugged.

For uncoated DTIs used under a stationary or turned element and for coated DTIs used under a stationary element, the bolts shall be further tensioned until the number of refusals of the 0.005-in. (0.125-mm) feeler gage shall be equal or greater than the number listed under Minimum Installation Refusals in Table C. If the bolt is

tensioned so that no visible gap in any space remains, the bolt and DTI shall be removed and replaced by a new properly tensioned bolt and DTI.

When coated DTIs (galvanized, painted or epoxy coated) are used under a turned element, the 0.005-in (0.125-mm) feeler gage shall be refused in all spaces.

Inspection:

The Contractor shall provide all the material, equipment, tools and labor necessary for the inspection of the bolted connections. Access to the bolted parts and fastener assemblies, both before and after the fasteners are installed and tensioned, shall be provided.

The Contractor is responsible for Quality Control (QC). The Contractor shall review this specification with its project personnel prior to performing the work. The Contractor shall verify the proper markings, surface conditions and storage of fastener assemblies. The Contractor shall inspect the faying surfaces of connections for compliance with the plans and specifications. The Contractor shall provide to the Engineer a copy of their written QC report for each shift of the calibration or verification testing specified. This report shall confirm that the selected procedure is properly used and that the fastener assemblies installed meet the tensions specified in Table A. The Contractor shall monitor the installation of fasteners in the work to assure that the selected procedure, as demonstrated in the initial testing to provide the specified tension, is routinely and properly applied.

The Contractor, in the presence of the Engineer, shall inspect the tensioned bolts using an inspection torque wrench, as defined below. If direct tension indicator devices are used, the appropriate feeler gauge will be used. Inspection tests shall be performed within 24 hours of bolt tensioning to prevent possible loss of lubrication or corrosion influence on tensioning torque.

The inspection torque wrench shall be calibrated as follows. Three bolts of the same grade, size, and condition as those under inspection shall be placed individually in a device calibrated to measure bolt tension. This calibration operation shall be done at least once each inspection day. There shall be a washer under the part turned in torquing each bolt. In the calibrated device, each bolt shall be tightened by any convenient means to the specified tension. The inspection wrench shall then be applied to the tensioned bolt to determine the torque required to turn the nut or head five degrees in the tightening direction. The average of the torque required for all three bolts shall be defined as the job-inspection torque.

Twenty-five percent, but a minimum of two, of the tensioned bolts shall be selected by the Engineer for inspection in each connection. (The Engineer may reduce the number of bolts tested at a connection to 10% based on the Contractor's past performance and splice location.) The job-inspection torque shall then be applied to each selected assembly with the inspection torque wrench turned in the tightening direction. If all inspected bolt heads or nuts do not turn, the bolts in the connection shall be considered to be properly tensioned. If the torque turns one or more bolt heads or nuts, the job-inspection torque shall then be applied to **all** bolts in the connection or to the satisfaction of the Engineer. Any bolt whose head or nut turns shall be re-tensioned and re-inspected. The Contractor

may, however, re-tension all the bolts in the connection with the inspection torque wrench and resubmit it for inspection, so long as the bolts are not over-tensioned or damaged by this action.

(g) Field Corrections and Misfits: Reaming of bolt holes during erection shall be permitted only with approval of the Engineer. No excessive forces shall be applied to any member to provide for proper alignment of the bolt holes.

The correction of minor misfits involving minor amounts of reaming, cutting, grinding and chipping shall be considered a legitimate part of the erection. However, any error in the shop fabrication or deformation resulting from handling and transportation may be cause for rejection. The Contractor shall be responsible for all misfits, errors and damage and shall make the necessary corrections and replacements.

TABLE A (Metric)
Minimum Bolt Tension in Kilonewtons*

Bolt Size	ASTM A 325M	ASTM A 490M
M16	91	114
M20	142	179
M22	176	221
M24	205	257
M27	267	334
M30	326	408
M36	475	595

*Equal to 70% of specified minimum tensile strength of bolts (as specified in ASTM Specifications for tests of full-size A 325M and A 490M bolts with metric coarse threads series ANSI B1.13M, loaded in axial tension) rounded to the nearest kilonewton.

Table A (English)
Minimum Bolt Tension in kips*

Bolt Size (Inches)	ASTM A 325	ASTM A 490
5/8	19	24
¾	28	35
7/8	39	49
1	51	64
11/8	56	80
1¼	71	102
13/8	85	121
1½	103	148

*Equal to 70% of specified minimum tensile strength of bolts (as specified in ASTM Specifications for tests of full-size A 325 and A 490 bolts with UNC threads, loaded in axial tension) rounded to the nearest kip.

TABLE B (English and Metric)
Nut Rotation from the Snug Condition
Geometry[a,b,c] of Outer Faces of Bolted Parts

Bolt Length (measured from underside of head to end of bolt)	Both Faces Normal to Bolt Axis	One Face Normal to Bolt Axis and Other Face Sloped Not More Than 1:20, Bevel Washer Not Used	Both Faces Sloped Not More Than 1:20 From Normal to Bolt Axis, Bevel Washer Not Used
Up to and including 4 diameters	1/3 turn	1/2 turn	2/3 turn
Over 4 diameters but not exceeding 8 diameters	1/2 turn	2/3 turn	5/6 turn
Over 8 diameters but not exceeding 12 diameters	2/3 turn	5/6 turn	1 turn

(a) Nut rotation, as used in Table B, shall be taken as relative to the bolt, regardless of the element (nut or bolt) being turned. For bolts installed by 1/2 turn and less, the tolerance should be plus or minus 30 degrees; for bolts installed by 2/3 turn and more, the tolerance should be plus or minus 45 degrees.

To determine the nut rotation for installation and inspection of the fasteners, the nut and the end of the bolt or the head of the bolt and the adjacent steel shall be match marked.

(b) The values, given in Table B, shall be applicable only to connections in which all material within grip of the bolt is steel.

(c) No research work has been performed by the Research Council Riveted and Bolted Structural Joints to establish the turn-of-nut procedure when bolt lengths exceed 12 diameters. For situations in which the bolt length, measured from the underside of the head to the end of the bolt, exceeds 12 diameters, the required rotation shall be determined by actual tests in a suitable tension device simulating the actual conditions.

TABLE C (Metric)

Bolt Dia. (in.)	Verification Tension		Maximum Verification Refusals		DTI Spaces		Minimum Installation Refusals	
	A325	A490	Type 8.8	Type 10.9	Type 8.8	Type 10.9	Type 8.8	Type 10.9
M16	96	120	1	1	4	4	2	2
M20	149	188	2	2	5	6	3	3
M22	185	232	2	2	5	6	3	3
M24	215	270	2	2	5	6	3	3
M27	280	351	2	3	6	7	3	4
M30	342	428	3	3	7	8	4	4
M36	499	625	3	4	8	9	4	5

TABLE C (English)

Bolt Dia. (in.)	Verification Tension		Maximum Verification Refusals		DTI Spaces		Minimum Installation Refusals	
	A325	A490	325	490	325	490	325	490
5/8	20	25	1	2	4	5	2	3
¾	29	37	2	2	5	6	3	3
7/8	41	51	2	2	5	6	3	3
1	54	67	2	3	6	7	3	4
1 1/8	59	84	2	3	6	7	3	4
1¼	75	107	3	3	7	8	4	4
1 3/8	89	127	3	3	7	8	4	4
1½	108	155	3	4	8	9	4	5

Method of Measurement: Payment under this item will be at the contract lump sum price per each complete bridge structure or shall be based on the net weight (mass) of metal in the fabricated structure, whichever method appears on the proposal form.

When payment is based on a lump sum basis, the work, including anchor bolts, steel bearings and plates will not be measured for payment. Bearing plates welded to the girder are included in the price of the structural steel and bearing plates bonded to the bearings are included in the price of the bearing.

When payment is based on the net weight (mass) of metal in the fabricated structure, it shall be computed as described below.

The weight (mass) of the metal works to be paid for under the item of structural steel shall be computed on the basis of the net finished dimensions of the parts as shown on the shop drawings, deducting for copes, cuts, clips and all open holes, except bolt holes, and on the following basis:

1. The weights (masses) of rolled shapes shall be computed on the basis of their nominal weights (masses) per foot (meter), as shown in the shop drawings or listed in handbooks.

The weight (mass) of plates shall be computed on the basis of the nominal weight (mass) for their width and thickness as shown on the shop drawings.

2. The weight (mass) of temporary erection bolts, shop and field paint, galvanization, boxes, crates and other containers used for shipping, and materials used for supporting members during transportation and erection, shall not be included.

3. The weight (mass) of all high strength bolts, nuts, and washers shall be included on the basis of the following weights (masses):

Weight per 100				
Nominal diameter of H.S. bolt (inch)	**Bolthead, nut, 1 washer and stickthrough (lbs)**		**Nominal diameter of H.S. bolt (mm)**	**Bolthead, nut, 1 washer and stickthrough (kg)**
1/2	22		16	17
5/8	33		20	26
3/4	55		22	39
7/8	84		24	50
1	120		27	60
1 1/8	169		30	73
1 1/4	216		36	122

4. The weight (mass) of weld metal shall be computed on the basis of the theoretical volume from plan dimensions of the welds.

Size of fillet in Inches (mm)		**Weight of weld in pounds per foot (kg per meter)**	
3/16	(5)	0.08	(0.119)
¼	(6)	0.14	(0.208)
5/16	(8)	0.22	(0.327)
3/8	(9.5)	0.30	(0.446)
½	(13)	0.55	(0.818)
5/8	(16)	0.80	(1.190)
¾	(19)	1.10	(1.636)
7/8	(22)	1.50	(2.231)
1	(25)	2.00	(2.974)

5. The weight (mass) of steel shims, filler plates and anchor bolts shall be measured for payment.

When the pay item “Materials for Structural Steel (Site No.)” is included in the Contract, payment for furnishing of the raw steel material for the plates and shape material only, excluding any markup, based on the net weight (mass) required, and the payment will be made under the estimated item “Materials for Structural Steel (Site No.)”. The overruns or wastage shall not exceed ten per cent for straight girders and fifteen per cent for curved girders. All other work specified in this section for the bridge will be deemed paid for under the lump sum price. In the absence of the pay item “Materials for Structural Steel (Site No.)”, the cost of the raw material is included in the Lump Sum payment for this item, “Structural Steel (Site No.)”.

Basis of Payment: The structural steel, incorporated in the completed and accepted structure, will be paid for at the contract lump sum price for "Structural Steel (Site No.)," or at the contract unit price per hundred weight (kilogram) for "Structural Steel," whichever is indicated in the contract documents.

Payment for either method shall be for structural steel, complete in place, which price shall include quality control, furnishing, fabricating, transporting, storing, erecting, welding, surface preparation and all materials including fastener assemblies, steel bearing assemblies and anchor bolts, equipment, tools and labor incidental thereto.

When the pay item “Materials for Structural Steel (Site No.)” is included in the Contract, payment for furnishing of the raw steel material for the plates and shape material only,

excluding any markup, based on the net weight (mass) required, and the payment will be made under the estimated item “Materials for Structural Steel (Site No.)”. All remaining work including, but not limited to, preparation of shop drawings, fabricating, transporting, storage and handling, erecting, surface preparation and all materials, equipment, tools and labor incidental thereto, will be paid for under “Structural Steel (Site No.)”.

In the absence of the pay item “Materials for Structural Steel (Site No.)”, the cost of the raw material is included in the Lump Sum payment for this item, “Structural Steel (Site No.)”. All remaining work including, but not limited to, preparation of shop drawings, fabricating, transporting, storage and handling, erecting, surface preparation and all materials, equipment, tools and labor incidental thereto, will be paid for under “Structural Steel (Site No.)”.

No direct payment will be made for setting anchor bolts, preparing bearing areas, furnishing and placing materials under bearings. No direct payment will be made for non destructive testing as shown on the plans.

Pay Item	Pay Unit
Structural Steel (Site No.)	l.s. (l.s.)
Structural Steel	cwt. (kg)

CONNECTICUT
SUPPLEMENTAL SPECIFICATION
SECTION 6.12
CONCRETE CYLINDER CURING BOX

Delete the entire section and replace with it the following:

6.12.01 –Description: This item shall consist of furnishing a box for curing concrete test cylinders. The box shall be commercially available and manufactured specifically for curing concrete test cylinders. The box will remain the property of the Contractor at the conclusion of the project. The box shall be delivered to a location on the project as directed by the Engineer.

6.12.02 – Materials: A catalog cut listing detailed specifications of the box and operating instructions from the manufacturer must be submitted to the Engineer. The box and its components shall be constructed of non-corroding materials and shall be capable of storing a minimum of 18 test cylinders, 6” X 12” (152 mm X 305 mm) stored vertically with the lid closed. The lid must be watertight when closed and hinged in the back with security latches on the front that can be padlocked. The box must be capable of holding water to a maximum level of one inch above test cylinders placed in the box vertically. A drain hole must be provided in a wall of the box to allow manual drainage of the water that exceeds this level. A drain hole must also be provided at the bottom of the box so that it can be manually emptied. The temperature of the water must be controlled by heating and cooling device capable of maintaining the temperature of the water within a range of 60 to 80º F, +/- 2 ºF (15.5 to 26.7 ºC, +/- 1 ºC) within an outside ambient air temperature range of -10 to 120 º F (-23.3 to 49 ºC). The heating and cooling device must be positioned to allow free circulation of air and water around the cylinders and be rated at 120 volts and 15 amps. A rack must be provided within the box to support the cylinders above the pool of temperature controlled water. The device must be thermostatically controlled with a digital readout that is capable of displaying the high/low water temperature within the box since the last reading was taken.

6.12.03 - Construction Methods: The Contractor shall maintain the curing box in working order and shall provide all necessary electrical service and water so that the curing box can be used properly during the entire course of the project. Any curing box that is not operating properly, as determined by the Engineer, shall be replaced within 24 hours by the Contractor at no expense to the State. The Engineer reserves the right to prohibit placement of fresh concrete on the project until a curing box acceptable to the Engineer is operational on the project site.

6.12.04 - Method of Measurement: The furnishing of the concrete test cylinder curing box will be measured for payment by the number of boxes delivered by the Contractor and accepted by the Engineer.

6.12.05 – Basis of Payment: This item will be paid for at the contract unit price each for "Concrete Cylinder Curing Box" ordered and accepted on the project, which price shall include all submittals, material, tools, equipment, and labor incidental thereto. The price shall also include all maintenance and operating costs related to the curing box for the duration of the project.

CONNECTICUT
SUPPLEMENTAL SPECIFICATION
SECTION 6.51
CULVERTS

6.51.02 – Materials:

In the 2nd paragraph replace "Gravel fill" with "Granular fill".

6.51.03 – Construction Methods:

In the 8th paragraph replace "gravel fill" with "granular fill".

Delete the 13th paragraph, "Bituminous fiber and … as the pipe."

6.51.04 – Methods of Measurement:

In the 7th paragraph replace "Gravel Fill" with "Granular Fill".

6.51.05 – Basis of Payment:

In the 8th paragraph replace "Gravel Fill" with "Granular Fill".

CONNECTICUT
SUPPLEMENTAL SPECIFICATION
SECTION 7.02
PILES

Article 7.02.05- Basis of Payment:

In the first sentence of the first paragraph of Section "2. Timber Piles" change "Furnishing Timber Piles Foot (Meter Length) and Furnishing Treated Timber Piles Foot (Meter Length)" to "Furnishing (Type) Timber Piles (Foot (Meter) Length)".

In the first sentence of the last paragraph of Section "2. Timber Piles" change "Driving Timber Piles" and "Driving Treated Timber Piles " to "Driving (Type) Timber Piles".

Under Pay Items:

Delete:

Pay Item	Pay Unit
Furnishing (Type) Piles (Lengths)	lb. (kg)

Add:

Pay Item	Pay Unit
Furnishing (Type) Timber Piles (Length)	ea. (ea)
Furnishing Steel Piles	lb. (kg)
Furnishing (Type) Prestressed Concrete Piles	l.f. (m)
Cast-in-Place Concrete Piles	l.f. (m)

CONNECTICUT
SUPPLEMENTAL SPECIFICATION
SECTION 8.22
TEMPORARY PRECAST CONCRETE BARRIER CURB

Article 8.22.04 – Method of Measurement:

Add the following sentence to the end of the second paragraph:

"Relocation of Temporary Precast Concrete Barrier Curb for access to the work area or for the convenience of the Contractor shall be considered incidental to Maintenance and Protection of Traffic and will not be measured for payment."

CONNECTICUT
SUPPLEMENTAL SPECIFICATION
SECTION 9.10
METAL BEAM RAIL

Article 9.10.04 – Method of Measurement

Subarticle 1 – Metal Beam Rail (Type)

Delete the only sentence and replace with the following:

The length of metal beam rail measured for payment will be the number of linear feet (meters) of accepted rail of the type or designation installed, including radius rail other than Curved Guide Rail Treatment, measured along the top of rail between centers of end posts in each continuous section.

CONNECTICUT
SUPPLEMENTAL SPECIFICATION
SECTION 9.18
THREE CABLE GUIDE RAILING
(I-BEAM POSTS) AND ANCHORAGES

9.18.03 – Construction Methods:

In the 10th paragraph, replace "MIL" with "MILSPEC."

CONNECTICUT
SUPPLEMENTAL SPECIFICATION
SECTION 9.22
BITUMINOUS CONCRETE SIDEWALK
BITUMINOUS CONCRETE DRIVEWAY

9.22.03 – Construction Methods:

Replace the first paragraph with the following:

"**1. Excavation:** Excavation, including saw cutting, removal of any existing sidewalk, or driveway, shall be made to the required depth below the finished grade, as shown on the plans or as directed by the Engineer. All soft and yielding material shall be removed and replaced with suitable material."

9.22.05 – Basis of Payment:

Replace the only paragraph with the following:

"This work will be paid for at the contract unit price per square yard (square meter) for "Bituminous Concrete Sidewalk" or "Bituminous Concrete Driveway," as the case may be, complete in place, which price shall include all saw cutting, excavation as specified above, backfill, disposal of surplus material, gravel or reclaimed miscellaneous aggregate base, and all equipment, tools, labor and materials incidental thereto."

CONNECTICUT
SUPPLEMENTAL SPECIFICATION
SECTION 9.44
TOPSOIL

Add the following paragraph to the beginning of article 9.44.03 – Construction Methods:

"The Contractor shall notify the Engineer of the location of the topsoil at least 15 calendar days prior to delivery. The topsoil and its source shall be inspected and approved by the Engineer before the material is delivered to the project. Any material delivered to the project, which does not meet specifications or which has become mixed with undue amounts of subsoil during any operation at the source or during placing and spreading, will be rejected and shall be replaced by the Contractor with acceptable material."

CONNECTICUT
SUPPLEMENTAL SPECIFICATION
SECTION 9.49
FURNISHING, PLANTING and MULCHING
TREES, SHRUBS, VINES and GROUND COVER PLANTS

9.49.03 – Construction Methods:

Replace subsection 5. Pits with the following:

"5. Pits: The pit diameters shall be twice the diameter of the root-spread or container diameters, and shall be 2- inches (50 millimeters) less than the height of the rootball measured from the bottom of the ball to the root collar. (i. e. A 12-inch (300 millimeters) measurement between the root collar and the bottom of the rootball will require a 10-inch (250 millimeters) deep pit). Any excavation in excess of that required shall be replaced with planting soil and compacted to the satisfaction of the Engineer."

Add the following sentence to subsection 6. Obstructions Below Ground:

"If removal of obstructions results in a deeper hole than needed for planting, backfill material shall be added and compacted to the satisfaction of the Engineer."

Replace subsection 7. Preparation of Backfill with the following:

"**7. Backfill:** Backfill shall conform to M.13.01-1 Planting Soil."

Replace subsection 8. Setting Plants with the following:

"**8. Setting Plants:** All plants shall be plumb and at a level that is 2-inches (50 millimeters) higher than the surrounding ground. Backfill material for all plants shall be thoroughly and properly settled by firming or tamping. Thorough watering shall accompany backfilling. Saucers capable of holding water shall be formed at individual plants (exclusive of plant beds) by placing ridges of planting soil around each, or as directed by the Engineer.

a. Balled and Burlapped plants: Plants shall be handled in such manner so that the soil will not be loosened from the roots inside of the ball. Carefully place the plant into the prepared pits and backfill with planting soil to one - half the depth of the pit, thoroughly tamp to the satisfaction of the Engineer around the ball. Fill the remaining area of the pit with water. Once water has completely drained, loosen the burlap and peel down the top one third. If wire baskets are used, cut and bend down the top third of the basket. Roots that have been wrapped around the ball within the burlap shall be straightened and the remainder of the pit filled with planting soil tamped to ensure that no air pockets remain.

b. Container Grown Plants: Carefully remove the plant from the container over the prepared pits. Gently loosen the soil and straighten all roots as naturally as possible. Place into the bottom of the pit. Backfill with planting soil to one - half the depth of the pit. Thoroughly tamp to the satisfaction of the Engineer. Fill remaining area of the pit with water. Once water has completely drained fill the remainder of the pit with planting soil tamped to ensure that no air pockets remain.

c. Bare-roots Plants: Carefully spread roots as naturally as possible and place into the bottom of the pit. All broken or frayed roots shall be cleanly cut off. Backfill with planting soil to one - half the depth of the pit. Thoroughly tamp to the satisfaction of the Engineer. Fill remaining area of the pit with water. Once water has completely drained fill the remainder of the pit with planting soil tamped to ensure that no air pockets remain."

Replace subsection 10. Watering with the following:

"**10. Watering:** All plants shall be watered upon setting and as many times thereafter as conditions warrant.

The following is a guide for minimum requirements:

Trees:
2 ½" Caliper and less – Fifteen (15) gallons each.
3" to 5" Caliper – Twenty (20) gallon each.
5 ½" Caliper and above – Twenty-five (25) gallon each.
Shrubs:
24" and less – Six (6) gallon each.
More than 24"- Ten (10) gallon each.
Vines, Perennials, and Ornamental Grasses – Three (3) gallons each.
Groundcovers and Bulbs – Two (2) gallons per square foot.

Water shall be applied at a controlled rate and in such a manner to ensure that the water reaches the root zone (saucer) of the plant or plant bed and does not run off to adjacent areas. Watering shall be applied in a manner that does not dislodge plants, erode soil or mulch, or cause damage to saucer.

The Contractor may use slow-release, drip irrigation bags for watering in accordance with manufacturer's instructions. The use of these portable/temporary irrigation bags will require the approval of the Engineer.

Overhead hydro-seeder spray nozzles shall not be used as watering devices."

Replace subsection 17. Establishment Period with the following:

"**17. One-Year Establishment Period:** All plant material shall be subject to a One-Year Establishment Period. During this time, the Contractor shall use currently accepted horticultural practices to keep all plant material installed in a healthy, vigorous growing condition at the date of final acceptance. The date of final

acceptance shall be one full calendar year following the satisfactory completion of the planting activities as confirmed by the Engineer.

An inspection will be held one year from the date of installation with the Contractor, Engineer, and Landscape Designer to determine the acceptability of the plant establishment. An inventory of losses and rejected materials will be made and corrective and necessary clean up measures will be determined at the plant inspection."

CONNECTICUT
SUPPLEMENTAL SPECIFICATION
SECTION 9.75
MOBILIZATION

9.75.04 – Method of Measurement:

Delete the entire section and replace with the following:

This work will be measured for payment in the manner described hereinafter; however, the determination of the total contract price earned shall not include the amount of mobilization earned during the period covered by the current monthly estimate- but shall include amounts previously earned and certified for payment:

1. When the first payment estimate is made, 25 percent of the lump sum bid price for this item or 2.5 percent of the total original contract price, whichever is less, shall be certified for payment.

2. When the Baseline Schedule, as specified under Section 1.05.08, is accepted, 50 percent of the lump sum bid price or 5 percent of the total original contract price, whichever is less, minus any previous payments, will be certified for payment.

3. When 10 percent of the total original contract price is earned and the Baseline Schedule, as specified under Section 1.05.08, is accepted, 75 percent of the lump sum price of this item or 7.5 percent of the total original contract price, whichever is less, minus any previous payments, will be certified for payment.

4. When 30 percent of the total original contract price is earned and the Baseline Schedule, as specified under Section 1.05.08, is accepted, 100 percent of the lump sum price of this item or 10 percent of the total original contract price, whichever is less, minus any previous payments, will be certified for payment.

Upon completion of all work on the project, payment of any amount bid for mobilization in excess of 10 percent of the original contract amount will be paid.

Nothing herein shall be construed to limit or preclude partial payments otherwise provided for by the contract.

CONNECTICUT
SUPPLEMENTAL SPECIFICATION
SECTION 10.01
TRENCHING AND BACKFILLING

Article 10.01.01- Description:

In the only sentence of the first paragraph after "…satisfactory…" *add the following:* "clean-up and".

In the only sentence of the second paragraph after "…reconstruction of…" *add the following:* "bituminous, concrete and granite curbing,".

Article 10.01.05- Basis of Payment:

In the only sentence of the second paragraph after "…mulching…" *add the following:* "clean-up and". *After* "…installing…" *add the word* "curbing,".

At the end of the third paragraph, add the following: "In the absence of a "Rock in Trench Excavation" item, the work will be compensated as extra work."

In the only sentence of the sixth paragraph, after …"…unit price for 'Concrete Sidewalk'…" *add the following:* "or as extra work, if no unit price has been established."

CONNECTICUT
SUPPLEMENTAL SPECIFICATION
SECTION 10.10
CONCRETE HANDHOLE

Article 10.10.05 – Basis of Payment

Remove the words “ground wire”.

At the end of the paragraph add the following sentence:

The ground wire (bonding wire) is included in the Contract unit price under Section 10.08 – Electrical Conduit.

Add the word “Cover” *to the end of the pay item* “Cast Iron Handhole”

CONNECTICUT
SUPPLEMENTAL SPECIFICATION
SECTION 11.13
CONTROL CABLE

11.13.03 – Construction Methods:

In the 1st paragraph of subsection 2 replace "MIL" with "MILSPEC."

CONNECTICUT
SUPPLEMENTAL SPECIFICATION
SECTION 12.10
EPOXY RESIN PAVEMENT MARKINGS, SYMBOLS AND LEGENDS

12.10.03 (2) – Procedures:

Insert the following after the sixth paragraph:

The epoxy shall be uniformly applied to the surface to be marked to ensure a wet film thickness of the applied epoxy, without glass beads, of 20 mils +/- 1 mil (500 um +/- 25 um).

CONNECTICUT
SUPPLEMENTAL SPECIFICATION
SECTION M.06
METALS

Article M.06.01 – Reinforcing Steel:

Subarticle 1. Bar Reinforcement:

Delete the third paragraph and replace it with:

"Epoxy coated bar reinforcement shall conform to the requirements of ASTM A 615/A 615M, Grade 60 (420) and shall be epoxy coated to the requirements of ASTM A 775/A 775M. All field repairs of the epoxy coating shall conform to the requirements of ASTM D 3963/D 3963M."

Article M.06.02—Structural Steel and Other Structural Materials:

Delete the entire article and replace it with the following:

Article M.06.02—Structural Steel: The materials for this work shall conform to the following requirements:

1. **Structural Steel:**
   Structural steel for bridges shall conform to the designation shown on the plans. Unless otherwise indicated in the plans or specifications, structural steel for non-bridge related members or components shall conform to ASTM A709/A709M, Grade 36 (250).

   All surfaces of steel plates and shapes used in the fabrication of bridge girders shall be blast cleaned and visually inspected by the Contractor prior to any fabrication or preparation for fabrication. Blast cleaning shall conform to the requirements of SSPC-SP-6-Commercial Blast.

   All steel plates and shapes used in the fabrication of bridge girders shall be substantially free from pitting and gouges, regardless of the cause. Substantially free is defined as:
   - The measured surface area of all pits and gouges regardless of depth represent less than 1% of the surface area of theplate or shape.
   - No pit or gouge greater than 1/32 (0.08mm) inch deep.
   - No pit or gouge closer than six inches (15.25 cm) from another.

Any repair of plates or shapes will be performed in accordance with ASTM A6/A 6M.

2. **Anchor Bolts:**
Unless otherwise designated on the plans, anchor bolts, including suitable nuts and washers, shall conform to the following requirements:

Anchor bolt assemblies shall conform to the requirements of ASTM F1554, Grade 36 (250). All components of the bolt assembly shall be galvanized in conformance with ASTM A 153/A 153M.

Certified Test Reports and Material Samples: The Contractor shall submit notarized copies of Certified Test Reports in conformance with Article 1.06.07. Prior to incorporation into the work, the Contractor shall submit samples of the anchor bolt assemblies to the Engineer for testing in accordance with the latest edition of the "Schedule of Minimum Requirements for Acceptance Testing". One sample shall be submitted for each diameter, material designation, grade or coating of anchor bolt assembly.

3. **High Strength Bolts:** High strength bolts, including suitable nuts and hardened washers, shall conform to the following requirements:

   a) High strength bolts shall conform to ASTM A325 or ASTM 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 A325 bolts shall conform to 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 or DH3. Where Type 3 high-strength bolts are used, the nuts shall be grade C3 or DH3.

   Nuts for ASTM A490 bolts shall conform to the requirements of ASTM A563, grades DH and DH3. 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 conform to 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 conform to ASTM F959. Where galvanized high-strength bolts are used, the washers shall be galvanized in accordance with ASTM B695, Class 50. Where Type 3 high-strength bolts are used, the washers shall be galvanized in accordance with ASTM B695, Class 50 and coated with epoxy.

b) **Identifying Marks:** ASTM 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. Head markings must identify the grade by the symbol "A325", the manufacturer and the type, if Type 2 or 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 "325". Other washer markings must identify the manufacturer and if Type 3, the type.

ASTM A490 for bolts and the specifications reference 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. Head markings must identify the grade by the symbol "A490", the manufacturer and the type, if Type 2 or 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 "490". Other washer markings must identify the manufacturer and if Type 3, the type.

c) **Dimensions:** Bolt and nuts dimensions shall conform to the requirements for Heavy Hexagon Structural Bolts and for Heavy Semi-Finished Hexagon Nuts given in ANSI Standard B18.2.1 and B18.2.2, respectively.

d) **Galvanized Bolts:** Galvanized bolts shall conform to ASTM A325, Type 1. The bolts shall be hot-dip galvanized in accordance with ASTM A153, Class C or mechanically galvanized in accordance with ASTM B695, Class 50. 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 A 490 bolts shall not be galvanized.

e) **Test Requirements:** The maximum hardness of A325 bolts 1" or less in diameter shall be 33 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 8.3 of ASTM A325. 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 job 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 conformance with Article 1.06.07 for fastener assemblies. In addition the Certified Test Reports and Materials Certificates shall include the following:

a. Mill test reports shall indicate the place where the material was melted and manufactured.

b. 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.

c. 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 "Schedule of Minimum Requirements for Acceptance Testing". Samples shall be submitted for each diameter, length, material designation, grade, coating and manufacturer of bolt assembly.

4. Welded Stud Shear Connectors:

a) Materials: Stud shear connectors shall conform to the requirements of ASTM A 108, cold-drawn bar, Grades 1015, 1018 or 1020, either semi- or fully-killed. If flux-retaining caps are used, the steel for the caps shall be of a low carbon grade suitable for welding and shall comply with ASTM A 109.

Stud shear connectors shall be of a design suitable for electrically end-welding to steel with automatically timed stud welding equipment. The studs shall be of the sizes and dimensions noted on the plans. Flux for welding shall be furnished with each stud, either attached to the end of the stud or combined with the arc shield for automatic application in the welding operation. Each stud shall be furnished with a disposable ferrule of sufficient strength to remain intact during the welding operation and not crumble or break; it shall not be detrimental to the weld or create excessive slag.

Tensile properties, as determined by tests of bar stock after drawing or of finished studs, shall conform to the following requirements in which the yield strength is as determined by the 0.2% offset method:

Tensile strength (min.)	60,000 psi (415 megapascals)
Yield strength (min.)	50,000 psi (345 megapascals)
Elongation (min.)	20% in 2 inches (50 millimeters)
Reduction of area (min.)	50%

b) Test Methods: Tensile properties shall be determined in accordance with the applicable sections of ASTM A 370. Tensile tests of finished studs shall be made on studs welded to test plates using a test fixture similar to that shown in Figure 7.2 of the current AASHTO/AWS D1.5 – Bridge Welding Code. If fracture occurs outside of the middle half of the gage length, the test shall be repeated.

c) Finish: Finished studs shall be of uniform quality and condition, free from injurious laps, fins, seams, cracks, twists, bends or other injurious defects. Finish shall be as produced by cold-drawing, cold-rolling or machining.

d) Certified Test Reports and Materials Certificates: The Contractor shall submit a certified copy of the in-plant quality control test report in conformance with Article 1.06.07. The Contractor shall submit a Materials Certificate in conformance with Article 1.06.07 for the welded studs.

e) Sample Materials for Testing: Prior to incorporation into the work, the Contractor shall submit samples of the stud shear connectors to the Engineer for testing in accordance with the latest edition of the "Schedule of Minimum Requirements for Acceptance Testing". One sample shall be submitted for each diameter and length of welded stud.

CONNECTICUT
SUPPLEMENTAL SPECIFICATION
SECTION M.13
ROADSIDE DEVELOPMENT

Delete article M.13.01 – Topsoil and replace it with the following:

"**Article M.13.01 – Topsoil:** The term topsoil used herein shall mean a soil meeting the soil textural classes established by the USDA Classification System based upon the proportion of sand, silt, and clay size particles after passing a No. 10 (2 millimeter) sieve and subjected to a particle size analysis. The topsoil shall contain 5% to 20% organic matter as determined by loss on ignition of oven-dried samples dried at 221° F (105° C). The pH range of the topsoil shall be 5.5 to 7.0.

The following textural classes shall be acceptable:

Loamy sand, including coarse, loamy fine, and loamy very fine sand, with not more than 80% sand
Sandy loam, including coarse, fine and very fine sandy loam
Loam
Clay loam, with not more than 30% clay
Silt loam, with not more than 60% silt
Sandy clay loam, with not more than 30% clay
All textural classes of topsoil with greater than 80% sand content will be rejected.

The topsoil furnished by the Contractor shall be a natural, workable soil that is screened and free of subsoil, refuse, stumps, roots, brush, weeds, rocks and stones over 1 1/4 inches (30 millimeters) in diameter, and any other foreign matter that would be detrimental to the proper development of plant growth.

The Contractor shall notify the Engineer of the location of the topsoil at least 15 calendar days prior to delivery. The topsoil and its source shall be inspected and approved by the Engineer before the material is delivered to the project. Any material delivered to the project, which does not meet specifications or which has become mixed with undue amounts of subsoil during any operation at the source or during placing and spreading, will be rejected and shall be replaced by the Contractor with acceptable material.

When topsoil is not furnished by the Contractor, it shall be material that is stripped in accordance with Section 2.02 or is furnished by the State, and will be tested as determined by the Engineer.

1. Planting Soil: Soil Material to be used for plant backfill shall be one of the following textural classes:

Loamy sand, with not more than 80% sand
Sandy loam
Loam
Clay loam, with not more than 30% clay
Silt loam, with not more than 60% silt
Sandy clay loam, with not more than 30% clay

Planting soil shall be premixed, consisting of approximately 50 % topsoil, 25 % compost or peat, and 25% native soil. Planting soil shall be loose, friable, and free from refuse, stumps, roots, brush, weeds, rocks and stones 2 inches (50 millimeters) in diameter. In addition, the material shall be free from any material that will prevent proper development and plant growth.

(a) For ericaceous plants and broad-leaved evergreens requiring an acid soil, planting soil shall have a true pH of 4.5 to 5.5. If it has not, it shall be amended by the Contractor at his own expense to the proper pH range by mixing with sulphur.

(b) Planting soil for general planting of nonacid-loving plants shall have a true pH value of 5.6 to 6.5. If it has not, it shall be amended by the Contractor at his own expense to the proper pH range by mixing with dolomitic limestone.

The amount of either sulphur or limestone required to adjust the planting soil to the proper pH range (above) shall be determined by the Engineer based on agronomic tests. The limestone shall conform to the requirements of Article M.13.02. The sulphur shall be commercial or flour sulphur, unadulterated, and shall be delivered in containers with the name of the manufacturer, material, analysis, and net weight (mass) appearing on each container.

The Engineer reserves the right to draw such samples and to perform such tests as he deems necessary to ensure that these specifications are met.”

CONNECTICUT
SUPPLEMENTAL SPECIFICATION
SECTION M.16
TRAFFIC CONTROL SIGNALS

Article M.16.04 – Poles:

Subarticle 1. Steel Poles:

(i) Wire Entrance Fitting:

In the second sentence, delete "required to accept the cables".

Article M.16.06 – Traffic Signals:

In the 1st paragraph of subsection 9 replace "MIL" with "MILSPEC".

Under the paragraph entitled Third Coat, replace the first two sentence with the following:

" Dark Green Enamel: Shall be Dark Green exterior baked enamel and shall comply with FS A-A 2962. The color shall be No. 14056, FS No. 595."

and in the third sentence replace "MIL" with "MILSPEC."

Article M.16.08 – Pedestrian Push Button

Subarticle – Painting

Delete the entire "Third Coat" paragraph and replace with the following:

Third Coat: Dark Green Enamel, shall be DARK GREEN exterior-baking enamel and shall comply with Federal Specifications A-A 2962. The color shall be No. 14056, Federal Standard No. 595.

CONNECTICUT
SUPPLEMENTAL SPECIFICATION
SECTION M.17
ELASTOMERIC MATERIALS

M.17.01 – Elastomeric Bearing Pads:

In the 2nd paragraph of subsection 4(b), replace "MS MIL" with "MILSPEC."

CONNECTICUT
SUPPLEMENTAL SPECIFICATION
SECTION M.18
SIGNING

M.18.10 – Demountable Copy:

In the chart under subsection 3H, replace "MS MIL" with "MILSPEC."

Construction Contracts - Required Contract Provisions
(State Funded Only Contracts)

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1. Title VI of the Civil Rights Act of 1964 / Nondiscrimination Requirements

2. Contractor Work Force Utilization / Specific Equal Employment Opportunity

3. Contract Wage Rates

4. Americans with Disabilities Act of 1990

5. Connecticut Statutory Labor Requirements

    a. Construction, Alteration or Repair of Public Works Projects; Wage Rates
    b. Debarment List - Limitation on Awarding Contracts
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6. Tax Liability - Contractor's Exempt Purchase Certificate (CERT – 141)

7. Executive Orders (State of CT)

8. Non Discrimination Requirement (pursuant to section 4a-60 and 4a-60a of the Connecticut General Statutes, as revised)

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    a. Disclosure of Records
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Index of Exhibits

EXHIBIT A – Title VI Contractor Assurances (page 13)
EXHIBIT B – Contractor Work Force Utilization / Equal Employment Opportunity (page 14)
EXHIBIT C – Health Insurance Portability and Accountability Act of 1996 (HIPAA) (page 17)
EXHIBIT D - Campaign Contribution Restriction (page 25)
EXHIBIT E - State Wage Rates (Attached at the end)

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

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, (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 the applicable parts of Executive Order No. 7C of Governor M. Jodi Rell, promulgated July 13, 2006, concerning contracting reforms and Executive Order No. 14 of Governor M. Jodi Rell, promulgated April 17, 2006, concerning procurement of cleaning products and services, in accordance with their respective terms and conditions. If Executive Orders 7C and 14 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:

i. "Commission" means the Commission on Human Rights and Opportunities;
ii. "Contract" and "contract" include any extension or modification of the Contract or contract;
iii. "Contractor" and "contractor" include any successors or assigns of the Contractor or contractor;
iv. "gender identity or expression" means a person's gender-related identity, appearance or behavior, whether or not that gender-related identity, appearance or behavior is different from that traditionally associated with the person's physiology or assigned sex at birth, which gender-related identity can be shown by providing evidence including, but not limited to, medical history, care or treatment of the gender-related identity, consistent and uniform assertion of the gender-related identity or any other evidence that the gender-related identity is sincerely held, part of a person's core identity or not being asserted for an improper purpose.

v. “good faith" means that degree of diligence which a reasonable person would exercise in the performance of legal duties and obligations;

vi. "good faith efforts" 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;

vii. "marital status" means being single, married as recognized by the state of Connecticut, widowed, separated or divorced;

viii. "mental disability" means one or more mental disorders, as defined in the most recent edition of the American Psychiatric Association's "Diagnostic and Statistical Manual of Mental Disorders", or a record of or regarding a person as having one or more such disorders;

ix. "minority business enterprise" means any small contractor 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

x. “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, including, but not limited to, a municipality, (2) a quasi-public agency, as defined in Conn. Gen. Stat. Section 1-120, (3) any other state, including but not limited to any federally recognized Indian tribal governments, as defined in Conn. Gen. Stat. Section 1-267, (4) the federal government, (5) a foreign government, or (6) an agency of a subdivision, agency, state or government described in the immediately preceding enumerated items (1), (2), (3), (4) or (5).

(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, mental retardation, 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, mental retardation, 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."

The Nondiscrimination Certifications can be found at the Office of Policy and Management website.

http://www.ct.gov/opm/cwp/view.asp?a=2982&Q=390928

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(g)(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 Agreement 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," 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				**14%** **6.9%**
Ansonia	Beacon Falls	Bridgeport	Derby	
Easton	Fairfield	Milford	Monroe	
Oxford	Seymour	Shelton	Stratford	
Trumbull				
Danbury				**4%** **6.9%**
Bethel	Bridgewater	Brookfield	Danbury	
Kent	New Fairfield	New Milford	Newtown	
Redding	Ridgefield	Roxbury	Sherman	
Washington				
Danielson				**2%** **6.9%**
Brooklyn	Eastford	Hampton	Killingly	
Pomfret	Putnam	Scotland	Sterling	
Thompson	Voluntown	Union	Woodstock	
Hartford				**15%** **6.9%**
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 6.9%	**2%**

Chester	Deep River	Essex	Old Lyme
Westbrook			

New Haven 6.9%	**14%**

Bethany	Branford	Cheshire	Clinton
East Haven	Guilford	Hamden	Killingworth
Madison	Meriden	New Haven	North Branford
North Haven	Orange	Wallingford	West Haven
Woodbridge			

New London 6.9%	**8%**

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 6.9%	**17%**

Darien	Greenwich	New Canaan	Norwalk
Stamford	Weston	Westport	Wilton

Torrington 6.9%	**2%**

Canaan	Colebrook	Cornwall	Goshen
Hartland	Kent	Litchfield	Morris
Norfolk	North Canaan	Salisbury	Sharon
Torrington	Warren		

Waterbury 6.9%			**10%**
Bethlehem	Middlebury	Naugatuck	Prospect
Southbury	Thomaston	Waterbury	Watertown
Wolcott	Woodbury		

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(g)(2), as amended by P.A. 10-1, 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 resulting 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 fund-raising 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 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: Branford Shore Line East Railroad Stations

Minimum Rates and Classifications
for Heavy/Highway Construction

Connecticut Department of Labor
Wage and Workplace Standards Division

ID#: **H** 16769

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:
FAP Number:
Project: Branford Shore Line East Railroad Stations

Project Town Branford
State Number: 310-0056

CLASSIFICATION	Hourly Rate	Benefits
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**		
1) Boilermaker	33.79	34% + 8.96
1a) Bricklayer, Cement Masons, Cement Finishers, Plasterers, Stone Masons	32.50	24.55
2) Carpenters, Piledrivermen	29.65	21.00
2a) Diver Tenders	29.65	21.00

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3) Divers	38.11	21.00
4) Painters: (Bridge Construction) Brush, Roller, Blasting (Sand, Water, etc.), Spray	42.75	16.90
4a) Painters: Brush and Roller	30.22	16.90
4b) Painters: Spray Only	33.22	16.90
4c) Painters: Steel Only	30.47	15.40
4d) Painters: Blast and Spray	33.22	16.90
4e) Painters: Tanks, Tower and Swing	32.22	16.90
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)	36.25	22.49

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6) Ironworkers: (Ornamental, Reinforcing, Structural, and Precast Concrete Erection)	33.50	27.98 + 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)	38.67	25.56

----LABORERS---- - Last updated 4/11/12

8) Group 1: Laborer (Unskilled), Common or General, acetylene burner, concrete specialist	25.80	16.45
9) Group 2: Chain saw operators, fence and guard rail erectors, pneumatic tool operators, powdermen, air tool operator	26.05	16.45
10) Group 3: Pipelayers (Installation of water, storm drainage or sewage lines outside of the building line with P6, P7 license)	26.30	16.45
11) Group 4: Jackhammer/Pavement breaker (handheld); mason tenders (cement/concrete), catch basin builders, asphalt rakers, air track operators, block pavers and curb setters	26.30	16.45
12) Group 5: Toxic waste removal (non-mechanical systems)	27.80	16.45

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13) Group 6: Blasters	27.55	16.45
Group 7: Asbestos Removal, non-mechanical systems (does not include leaded joint pipe)	26.80	16.45
Group 8: Traffic control signalmen	16.00	16.45

----LABORERS (TUNNEL CONSTRUCTION, FREE AIR). Shield Drive and Liner Plate Tunnels in Free Air.---- Last updated 4/11/12----

13a) Miners, Motormen, Mucking Machine Operators, Nozzle Men, Grout Men, Shaft & Tunnel Steel & Rodmen, Shield & Erector, Arm Operator, Cable Tenders	31.28	16.45 + a
13b) Brakemen, Trackmen	30.37	16.45 + a

----CLEANING, CONCRETE AND CAULKING TUNNEL----Last updated 4/11/12----

14) Concrete Workers, Form Movers, and Strippers	30.37	16.45 + a

15) Form Erectors	30.68	16.45 + a

----ROCK SHAFT LINING, CONCRETE, LINING OF SAME AND TUNNEL IN FREE AIR:----Last updated 4/11/12----

16) Brakemen, Trackmen, Tunnel Laborers, Shaft Laborers	30.37	16.45 + a
17) Laborers Topside, Cage Tenders, Bellman	30.26	16.45 + a
18) Miners	31.28	16.45 + a

----TUNNELS, CAISSON AND CYLINDER WORK IN COMPRESSED AIR: ----Last updated 4/11/12----

18a) Blaster	37.41	16.45 + a
19) Brakemen, Trackmen, Groutman, Laborers, Outside Lock Tender, Gauge Tenders	37.22	16.45 + a

Project: Branford Shore Line East Railroad Stations

20) Change House Attendants, Powder Watchmen, Top on Iron Bolts	35.35	16.45 + a
21) Mucking Machine Operator	37.97	16.45 + a

----TRUCK DRIVERS----(*see note below)

Two axle trucks	27.88	17.22 + a
Three axle trucks; two axle ready mix	27.98	17.22 + a
Three axle ready mix	28.03	17.22 + a
Four axle trucks, heavy duty trailer (up to 40 tons)	28.08	17.22 + a
Four axle ready-mix	28.13	17.22 + a

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Heavy duty trailer (40 tons and over)	28.33	17.22 + a
Specialized earth moving equipment other than conventional type on-the road trucks and semi-trailer (including Euclids)	28.13	17.22 + 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. (Trade License Required)	35.50	20.50 + a
Group 2: Cranes (100 ton rate capacity and over); Backhoe/Excavator over 2 cubic yards; Piledriver ($3.00 premium when operator controls hammer). (Trade License Required)	35.18	20.50 + 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)	34.44	20.50 + a
Group 4: Trenching Machines; Lighter Derrick; Concrete Finishing Machine; CMI Machine or Similar; Koehring Loader (Skooper)	34.05	20.50 + a
Group 5: Specialty Railroad Equipment; Asphalt Paver; Asphalt Spreader; Asphalt Reclaiming Machine; Line Grinder; Concrete Pumps; Drills with Self Contained Power Units; Boring Machine; Post Hole Digger; Auger; Pounder; Well Digger; Milling Machine (over 24" Mandrell)	33.46	20.50 + a

Project: Branford Shore Line East Railroad Stations

Group 5 continued: Side Boom; Combination Hoe and Loader; Directional Driller.	33.46	20.50 + a
Group 6: Front End Loader (3 up to 7 cubic yards); Bulldozer (rough grade dozer).	33.15	20.50 + 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).	32.81	20.50 + a
Group 8: Mechanic, Grease Truck Operator, Hydroblaster, Barrier Mover, Power Stone Spreader; Welder; Work Boat under 26 ft.; Transfer Machine.	32.41	20.50 + 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).	31.98	20.50 + a
Group 10: Vibratory Hammer, Ice Machine, Diesel and Air Hammer, etc.	29.94	20.50 + a
Group 11: Conveyor, Earth Roller; Power Pavement Breaker (whiphammer), Robot Demolition Equipment.	29.94	20.50 + a
Group 12: Wellpoint Operator.	29.88	20.50 + a

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Group 13: Compressor Battery Operator.	29.30	20.50 + a
Group 14: Elevator Operator; Tow Motor Operator (Solid Tire No Rough Terrain).	28.16	20.50 + a
Group 15: Generator Operator; Compressor Operator; Pump Operator; Welding Machine Operator; Heater Operator.	27.75	20.50 + a
Group 16: Maintenance Engineer/Oiler	27.10	20.50 + a
Group 17: Portable asphalt plant operator; portable crusher plant operator; portable concrete plant operator.	31.41	20.50 + a
Group 18: Power Safety Boat; Vacuum Truck; Zim Mixer; Sweeper; (minimum for any job requiring CDL license).	28.99	20.50 + a

**NOTE: SEE BELOW

----LINE CONSTRUCTION----(Railroad Construction and Maintenance)----Last updated 9/3/2010----

As of: Thursday, July 19, 2012

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20) Lineman, Cable Splicer, Dynamite Man	44.36	3% + 13.70
21) Heavy Equipment Operator	39.92	3% + 13.70
22) Equipment Operator, Tractor Trailer Driver, Material Men	37.71	3% + 13.70
23) Driver Groundmen	33.27	3% + 13.70

----LINE CONSTRUCTION----Last updated 4/17/09----

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

As of: Thursday, July 19, 2012

Project: Branford Shore Line East Railroad Stations

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

As of: Thursday, July 19, 2012

Project: Branford Shore Line East Railroad Stations

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*

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.

As of: Thursday, July 19, 2012

Project: Branford Shore Line East Railroad Stations

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: Thursday, July 19, 2012

Project: Guilford Shore Line East Railroad Stations

Minimum Rates and Classifications
for Heavy/Highway Construction

Connecticut Department of Labor
Wage and Workplace Standards Division

ID#: **H** 16770

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:
FAP Number:
Project: Guilford Shore Line East Railroad Stations

Project Town Guilford
State Number: 310-0057

CLASSIFICATION	Hourly Rate	Benefits
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**		
1) Boilermaker	33.79	34% + 8.96
1a) Bricklayer, Cement Masons, Cement Finishers, Plasterers, Stone Masons	32.50	24.55
2) Carpenters, Piledrivermen	29.65	21.00
2a) Diver Tenders	29.65	21.00

As of: Thursday, July 19, 2012

Project: Guilford Shore Line East Railroad Stations

3) Divers	38.11	21.00
4) Painters: (Bridge Construction) Brush, Roller, Blasting (Sand, Water, etc.), Spray	42.75	16.90
4a) Painters: Brush and Roller	30.22	16.90
4b) Painters: Spray Only	33.22	16.90
4c) Painters: Steel Only	30.47	15.40
4d) Painters: Blast and Spray	33.22	16.90
4e) Painters: Tanks, Tower and Swing	32.22	16.90
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)	36.25	22.49

As of: Thursday, July 19, 2012

Project: Guilford Shore Line East Railroad Stations

6) Ironworkers: (Ornamental, Reinforcing, Structural, and Precast Concrete Erection)	33.50	27.98 + 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)	38.67	25.56

----LABORERS---- - Last updated 4/11/12

8) Group 1: Laborer (Unskilled), Common or General, acetylene burner, concrete specialist	25.80	16.45
9) Group 2: Chain saw operators, fence and guard rail erectors, pneumatic tool operators, powdermen, air tool operator	26.05	16.45
10) Group 3: Pipelayers (Installation of water, storm drainage or sewage lines outside of the building line with P6, P7 license)	26.30	16.45
11) Group 4: Jackhammer/Pavement breaker (handheld); mason tenders (cement/concrete), catch basin builders, asphalt rakers, air track operators, block pavers and curb setters	26.30	16.45
12) Group 5: Toxic waste removal (non-mechanical systems)	27.80	16.45

As of: Thursday, July 19, 2012

Project: Guilford Shore Line East Railroad Stations

13) Group 6: Blasters	27.55	16.45
Group 7: Asbestos Removal, non-mechanical systems (does not include leaded joint pipe)	26.80	16.45
Group 8: Traffic control signalmen	16.00	16.45

----LABORERS (TUNNEL CONSTRUCTION, FREE AIR). Shield Drive and Liner Plate Tunnels in Free Air.---- Last updated 4/11/12----

13a) Miners, Motormen, Mucking Machine Operators, Nozzle Men, Grout Men, Shaft & Tunnel Steel & Rodmen, Shield & Erector, Arm Operator, Cable Tenders	31.28	16.45 + a
13b) Brakemen, Trackmen	30.37	16.45 + a

----CLEANING, CONCRETE AND CAULKING TUNNEL----Last updated 4/11/12----

14) Concrete Workers, Form Movers, and Strippers	30.37	16.45 + a

15) Form Erectors	30.68	16.45 + a

----ROCK SHAFT LINING, CONCRETE, LINING OF SAME AND TUNNEL IN FREE AIR:----Last updated 4/11/12----

16) Brakemen, Trackmen, Tunnel Laborers, Shaft Laborers	30.37	16.45 + a
17) Laborers Topside, Cage Tenders, Bellman	30.26	16.45 + a
18) Miners	31.28	16.45 + a

----TUNNELS, CAISSON AND CYLINDER WORK IN COMPRESSED AIR: ----Last updated 4/11/12----

18a) Blaster	37.41	16.45 + a
19) Brakemen, Trackmen, Groutman, Laborers, Outside Lock Tender, Gauge Tenders	37.22	16.45 + a

Project: Guilford Shore Line East Railroad Stations

20) Change House Attendants, Powder Watchmen, Top on Iron Bolts	35.35	16.45 + a
21) Mucking Machine Operator	37.97	16.45 + a

----TRUCK DRIVERS----(*see note below)

Two axle trucks	27.88	17.22 + a
Three axle trucks; two axle ready mix	27.98	17.22 + a
Three axle ready mix	28.03	17.22 + a
Four axle trucks, heavy duty trailer (up to 40 tons)	28.08	17.22 + a
Four axle ready-mix	28.13	17.22 + a

As of: Thursday, July 19, 2012

Heavy duty trailer (40 tons and over)	28.33	17.22 + a
Specialized earth moving equipment other than conventional type on-the road trucks and semi-trailer (including Euclids)	28.13	17.22 + 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. (Trade License Required)	35.50	20.50 + a
Group 2: Cranes (100 ton rate capacity and over); Backhoe/Excavator over 2 cubic yards; Piledriver ($3.00 premium when operator controls hammer). (Trade License Required)	35.18	20.50 + 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)	34.44	20.50 + a
Group 4: Trenching Machines; Lighter Derrick; Concrete Finishing Machine; CMI Machine or Similar; Koehring Loader (Skooper)	34.05	20.50 + a
Group 5: Specialty Railroad Equipment; Asphalt Paver; Asphalt Spreader; Asphalt Reclaiming Machine; Line Grinder; Concrete Pumps; Drills with Self Contained Power Units; Boring Machine; Post Hole Digger; Auger; Pounder; Well Digger; Milling Machine (over 24" Mandrell)	33.46	20.50 + a

Project: Guilford Shore Line East Railroad Stations

Group 5 continued: Side Boom; Combination Hoe and Loader; Directional Driller.	33.46	20.50 + a
Group 6: Front End Loader (3 up to 7 cubic yards); Bulldozer (rough grade dozer).	33.15	20.50 + 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).	32.81	20.50 + a
Group 8: Mechanic, Grease Truck Operator, Hydroblaster, Barrier Mover, Power Stone Spreader; Welder; Work Boat under 26 ft.; Transfer Machine.	32.41	20.50 + 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).	31.98	20.50 + a
Group 10: Vibratory Hammer, Ice Machine, Diesel and Air Hammer, etc.	29.94	20.50 + a
Group 11: Conveyor, Earth Roller; Power Pavement Breaker (whiphammer), Robot Demolition Equipment.	29.94	20.50 + a
Group 12: Wellpoint Operator.	29.88	20.50 + a

As of: Thursday, July 19, 2012

Project: Guilford Shore Line East Railroad Stations

Group 13: Compressor Battery Operator.	29.30	20.50 + a
Group 14: Elevator Operator; Tow Motor Operator (Solid Tire No Rough Terrain).	28.16	20.50 + a
Group 15: Generator Operator; Compressor Operator; Pump Operator; Welding Machine Operator; Heater Operator.	27.75	20.50 + a
Group 16: Maintenance Engineer/Oiler	27.10	20.50 + a
Group 17: Portable asphalt plant operator; portable crusher plant operator; portable concrete plant operator.	31.41	20.50 + a
Group 18: Power Safety Boat; Vacuum Truck; Zim Mixer; Sweeper; (minimum for any job requiring CDL license).	28.99	20.50 + a

**NOTE: SEE BELOW

----LINE CONSTRUCTION----(Railroad Construction and Maintenance)----Last updated 9/3/2010----

As of: Thursday, July 19, 2012

Project: Guilford Shore Line East Railroad Stations

20) Lineman, Cable Splicer, Dynamite Man	44.36	3% + 13.70
21) Heavy Equipment Operator	39.92	3% + 13.70
22) Equipment Operator, Tractor Trailer Driver, Material Men	37.71	3% + 13.70
23) Driver Groundmen	33.27	3% + 13.70

----LINE CONSTRUCTION----Last updated 4/17/09----

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

As of: Thursday, July 19, 2012

Project: Guilford Shore Line East Railroad Stations

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28) Material Men, Tractor Trailer Drivers, Equipment Operators	35.04	6.5% + 10.45

As of: Thursday, July 19, 2012

Project: Guilford Shore Line East Railroad Stations

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*

Crane with 150 ft. boom (including jib) - $1.50 extra
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As of: Thursday, July 19, 2012

Project: Guilford Shore Line East Railroad Stations

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: Thursday, July 19, 2012

Project: Branford Shore Line East Railroad Stations

Minimum Rates and Classifications
for Building Construction

Connecticut Department of Labor
Wage and Workplace Standards Division

ID# : B 16769

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:
State#: 310-0056

Project Town Branford
FAP#:

Project: Branford Shore Line East Railroad Stations

CLASSIFICATION	Hourly Rate	Benefits
1a) Asbestos Worker/Insulator (Includes application of insulating materials, protective coverings, coatings, & finishes to all types of mechanical systems; application of firestopping material for wall openings & penetrations in walls, floors, ceilings - Last updated 7/21/11	36.86	25.51
1b) 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 7**		
2) Boilermaker	34.65	24.10

As of: **Thursday, July 19, 2012**

Project: Branford Shore Line East Railroad Stations

3a) Bricklayer, Cement Mason, Concrete Finisher (including caulking), Stone Masons	32.50	25.20 + a
3b) Tile Setter	32.94	22.42
3c) Terrazzo Mechanics and Marble Setters	31.69	22.35
3d) Tile, Marble & Terrazzo Finishers	26.25	19.20
3e) Plasterer	32.50	25.20

------LABORERS------

As of: **Thursday, July 19, 2012**

Project: Branford Shore Line East Railroad Stations

4) Group 1: Laborers (common or general), acetylene burners, carpenter tenders, concrete specialists, wrecking laborers, fire watchers.	25.80	16.45
4a) Group 2: Mortar mixers, plaster tender, power buggy operators, powdermen, fireproofer/mixer/nozzleman, fence erector.	26.05	16.45
4b) Group 3: Jackhammer operators, mason tender (brick) and mason tender (cement/concrete)	26.30	16.45
4c) **Group 4: Pipelayers (Installation of water, storm drainage or sewage lines outside of the building line with P6, P7 license) (the pipelayer rate shall apply only to one or two employees of the total crew who primary task is to actually perform the mating of pipe sections)[If using this classification call the Labor Department for clarification]	26.05	16.45
4d) Group 5: Air track operators, Sand blasters	26.55	16.45
4e) Group 6: Nuclear toxic waste removers, blasters	28.80	16.45

As of: **Thursday, July 19, 2012**

4f) Group 7: Asbestos/lead removal and encapsulation (except it's removal from mechanical systems which are not to be scrapped)	26.80	16.45
4g) Group 8: Bottom men on open air caisson, cylindrical work and boring crew	26.30	16.45
4h) Group 9: Top men on open air caisson, cylindrical work and boring crew	25.80	16.45
4i) Group 10: Traffic Control Signalman	16.00	16.45
5) Carpenter, Acoustical Ceiling Installation, Soft Floor/Carpet Laying, Metal Stud Installation, Form Work and Scaffold Building, Drywall Hanging, Modular-Furniture Systems Installers, Lathers, Piledrivers, Resilient Floor Layers.	29.65	21.00
5a) Millwrights	30.15	21.39

As of: **Thursday, July 19, 2012**

6) Electrical Worker (including low voltage wiring) (Trade License required: E1,2 L-5,6 C-5,6 T-1,2 L-1,2 V-1,2,7,8,9)	36.25	22.49
7a) Elevator Mechanic (Trade License required: R-1,2,5,6)	45.97	23.535+a+b

-----LINE CONSTRUCTION----

Groundman	23.80	3% + 13.70
Linemen/Cable Splicer	43.28	3% + 13.70
8) Glazier (Trade License required: FG-1,2)	33.78	16.90 + a

As of: **Thursday, July 19, 2012**

9) Ironworker, Ornamental, Reinforcing, Structural, and Precast Concrete Erection	33.50	27.98 + a

----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. and over. (Trade License Required)	35.50	20.50 + a
Group 2: Cranes (100 ton rate capacity and over); Backhoe/Excavator over 2 cubic yards; Piledriver ($3.00 premium when operator controls hammer). (Trade License Required)	35.18	20.50 + a
Group 3: Excavator; Backhoe/Excavator under 2 cubic yards; Cranes (under 100 ton rated capacity), Grader/Blade; 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.).	34.44	20.50 + a
Group 4: Trenching Machines; Lighter Derrick; Concrete Finishing Machine; CMI Machine or Similar; Koehring Loader (Skooper).	34.05	20.50 + a

Project: Branford Shore Line East Railroad Stations

Group 5: Specialty Railroad Equipment; Asphalt Paver; 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)	33.46	20.50 + a
Group 5 continued: Side Boom; Combination Hoe and Loader; Directional Driller; Pile Testing Machine.	33.46	20.50 + a
Group 6: Front End Loader (3 up to 7 cubic yards); Bulldozer (rough grade dozer).	33.15	20.50 + 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 Mandrell).	32.81	20.50 + a
Group 8: Mechanic, grease truck operator, hydroblaster; barrier mover; power stone spreader; welding; work boat under 26 ft.; transfer machine.	32.41	20.50 + a
Group 9: Front end loader (under 3 cubic yards), skid steer loader regardless of attachments, (Bobcat or Similar): forklift, power chipper; landscape equipment (including Hydroseeder).	31.98	20.50 + a

As of: **Thursday, July 19, 2012**

Group 10: Vibratory hammer; ice machine; diesel and air, hammer, etc.	29.94	20.50 + a
Group 11: Conveyor, earth roller, power pavement breaker (whiphammer), robot demolition equipment.	29.94	20.50 + a
Group 12: Wellpoint operator.	29.88	20.50 + a
Group 13: Compressor battery operator.	29.30	20.50 + a
Group 14: Elevator operator; tow motor operator (solid tire no rough terrain).	28.16	20.50 + a
Group 15: Generator Operator; Compressor Operator; Pump Operator; Welding Machine Operator; Heater Operator.	27.75	20.50 + a

As of: **Thursday, July 19, 2012**

Group 16: Maintenance Engineer/Oiler.	27.10	20.50 + a
Group 17: Portable asphalt plant operator; portable crusher plant operator; portable concrete plant operator.	31.41	20.50 + a
Group 18: Power safety boat; vacuum truck; zim mixer; sweeper; (Minimum for any job requiring a CDL license).	28.99	20.50 + a

------PAINTERS (Including Drywall Finishing)------

10a) Brush and Roller	30.22	16.90
10b) Taping Only/Drywall Finishing	30.97	16.90

As of: **Thursday, July 19, 2012**

10c) Paperhanger and Red Label	30.72	16.90
10e) Blast and Spray	33.22	16.90
11) Plumber (excluding HVAC pipe installation) (Trade License required: P-1,2,6,7,8,9 J-1,2,3,4 SP-1,2)	38.67	25.56
12) Well Digger, Pile Testing Machine	33.01	19.40 + a
Roofer: Cole Tar Pitch	37.00	12.75 + a
Roofer: Slate, Tile, Composition, Shingles, Singly Ply and Damp/Waterproofing	35.50	12.75 + a

As of: **Thursday, July 19, 2012**

Project: Branford Shore Line East Railroad Stations

15) Sheetmetal Worker (Trade License required for HVAC and Ductwork: SM-1,SM-2,SM-3,SM-4,SM-5,SM-6)	33.21	30.56
16) Pipefitter (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)	38.67	25.56

------TRUCK DRIVERS------

17a) 2 Axle	27.88	17.22 + a
17b) 3 Axle, 2 Axle Ready Mix	27.98	17.22 + a
17c) 3 Axle Ready Mix	28.03	17.22 + a

As of: **Thursday, July 19, 2012**

Project: Branford Shore Line East Railroad Stations

17d) 4 Axle, Heavy Duty Trailer up to 40 tons	28.08	17.22 + a
17e) 4 Axle Ready Mix	28.13	17.22 + a
17f) Heavy Duty Trailer (40 Tons and Over)	28.33	17.22 + a
17g) Specialized Earth Moving Equipment (Other Than Conventional Type on-the-Road Trucks and Semi-Trailers, Including Euclids)	28.13	17.22 + a
18) Sprinkler Fitter (Trade License required: F-1,2,3,4)	40.50	16.85 + a
19) Theatrical Stage Journeyman	22.22	6.53

As of: **Thursday, July 19, 2012**

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As of: **Thursday, July 19, 2012**

Project: Branford Shore Line East Railroad Stations

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As of: **Thursday, July 19, 2012**

Project: Guilford Shore Line East Railroad Stations

Minimum Rates and Classifications
for Building Construction

Connecticut Department of Labor
Wage and Workplace Standards Division

ID# : B 16770

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Project Number:
State#: 310-0057

Project Town Guilford
FAP#:

Project: Guilford Shore Line East Railroad Stations

CLASSIFICATION	Hourly Rate	Benefits
1a) Asbestos Worker/Insulator (Includes application of insulating materials, protective coverings, coatings, & finishes to all types of mechanical systems; application of firestopping material for wall openings & penetrations in walls, floors, ceilings - Last updated 7/21/11	36.86	25.51
1b) 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 7**		
2) Boilermaker	34.65	24.10

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3a) Bricklayer, Cement Mason, Concrete Finisher (including caulking), Stone Masons	32.50	25.20 + a
3b) Tile Setter	32.94	22.42
3c) Terrazzo Mechanics and Marble Setters	31.69	22.35
3d) Tile, Marble & Terrazzo Finishers	26.25	19.20
3e) Plasterer	32.50	25.20

------LABORERS------

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Project: Guilford Shore Line East Railroad Stations

4) Group 1: Laborers (common or general), acetylene burners, carpenter tenders, concrete specialists, wrecking laborers, fire watchers.	25.80	16.45
4a) Group 2: Mortar mixers, plaster tender, power buggy operators, powdermen, fireproofer/mixer/nozzleman, fence erector.	26.05	16.45
4b) Group 3: Jackhammer operators, mason tender (brick) and mason tender (cement/concrete)	26.30	16.45
4c) **Group 4: Pipelayers (Installation of water, storm drainage or sewage lines outside of the building line with P6, P7 license) (the pipelayer rate shall apply only to one or two employees of the total crew who primary task is to actually perform the mating of pipe sections)[If using this classification call the Labor Department for clarification]	26.05	16.45
4d) Group 5: Air track operators, Sand blasters	26.55	16.45
4e) Group 6: Nuclear toxic waste removers, blasters	28.80	16.45

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4f) Group 7: Asbestos/lead removal and encapsulation (except it's removal from mechanical systems which are not to be scrapped)	26.80	16.45
4g) Group 8: Bottom men on open air caisson, cylindrical work and boring crew	26.30	16.45
4h) Group 9: Top men on open air caisson, cylindrical work and boring crew	25.80	16.45
4i) Group 10: Traffic Control Signalman	16.00	16.45
5) Carpenter, Acoustical Ceiling Installation, Soft Floor/Carpet Laying, Metal Stud Installation, Form Work and Scaffold Building, Drywall Hanging, Modular-Furniture Systems Installers, Lathers, Piledrivers, Resilient Floor Layers.	29.65	21.00
5a) Millwrights	30.15	21.39

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6) Electrical Worker (including low voltage wiring) (Trade License required: E1,2 L-5,6 C-5,6 T-1,2 L-1,2 V-1,2,7,8,9)	36.25	22.49
7a) Elevator Mechanic (Trade License required: R-1,2,5,6)	45.97	23.535+a+b
-----LINE CONSTRUCTION----		
Groundman	23.80	3% + 13.70
Linemen/Cable Splicer	43.28	3% + 13.70
8) Glazier (Trade License required: FG-1,2)	33.78	16.90 + a

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9) Ironworker, Ornamental, Reinforcing, Structural, and Precast Concrete Erection	33.50	27.98 + a

----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. and over. (Trade License Required)	35.50	20.50 + a
Group 2: Cranes (100 ton rate capacity and over); Backhoe/Excavator over 2 cubic yards; Piledriver ($3.00 premium when operator controls hammer). (Trade License Required)	35.18	20.50 + a
Group 3: Excavator; Backhoe/Excavator under 2 cubic yards; Cranes (under 100 ton rated capacity), Grader/Blade; 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.).	34.44	20.50 + a
Group 4: Trenching Machines; Lighter Derrick; Concrete Finishing Machine; CMI Machine or Similar; Koehring Loader (Skooper).	34.05	20.50 + a

Group 5: Specialty Railroad Equipment; Asphalt Paver; 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)	33.46	20.50 + a
Group 5 continued: Side Boom; Combination Hoe and Loader; Directional Driller; Pile Testing Machine.	33.46	20.50 + a
Group 6: Front End Loader (3 up to 7 cubic yards); Bulldozer (rough grade dozer).	33.15	20.50 + 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 Mandrell).	32.81	20.50 + a
Group 8: Mechanic, grease truck operator, hydroblaster; barrier mover; power stone spreader; welding; work boat under 26 ft.; transfer machine.	32.41	20.50 + a
Group 9: Front end loader (under 3 cubic yards), skid steer loader regardless of attachments, (Bobcat or Similar): forklift, power chipper; landscape equipment (including Hydroseeder).	31.98	20.50 + a

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Group 10: Vibratory hammer; ice machine; diesel and air, hammer, etc.	29.94	20.50 + a
Group 11: Conveyor, earth roller, power pavement breaker (whiphammer), robot demolition equipment.	29.94	20.50 + a
Group 12: Wellpoint operator.	29.88	20.50 + a
Group 13: Compressor battery operator.	29.30	20.50 + a
Group 14: Elevator operator; tow motor operator (solid tire no rough terrain).	28.16	20.50 + a
Group 15: Generator Operator; Compressor Operator; Pump Operator; Welding Machine Operator; Heater Operator.	27.75	20.50 + a

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Group 16: Maintenance Engineer/Oiler.	27.10	20.50 + a
Group 17: Portable asphalt plant operator; portable crusher plant operator; portable concrete plant operator.	31.41	20.50 + a
Group 18: Power safety boat; vacuum truck; zim mixer; sweeper; (Minimum for any job requiring a CDL license).	28.99	20.50 + a

------PAINTERS (Including Drywall Finishing)------

10a) Brush and Roller	30.22	16.90
10b) Taping Only/Drywall Finishing	30.97	16.90

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10c) Paperhanger and Red Label	30.72	16.90
10e) Blast and Spray	33.22	16.90
11) Plumber (excluding HVAC pipe installation) (Trade License required: P-1,2,6,7,8,9 J-1,2,3,4 SP-1,2)	38.67	25.56
12) Well Digger, Pile Testing Machine	33.01	19.40 + a
Roofer: Cole Tar Pitch	37.00	12.75 + a
Roofer: Slate, Tile, Composition, Shingles, Singly Ply and Damp/Waterproofing	35.50	12.75 + a

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15) Sheetmetal Worker (Trade License required for HVAC and Ductwork: SM-1,SM-2,SM-3,SM-4,SM-5,SM-6)	33.21	30.56
16) Pipefitter (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)	38.67	25.56

------TRUCK DRIVERS------

17a) 2 Axle	27.88	17.22 + a
17b) 3 Axle, 2 Axle Ready Mix	27.98	17.22 + a
17c) 3 Axle Ready Mix	28.03	17.22 + a

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17d) 4 Axle, Heavy Duty Trailer up to 40 tons	28.08	17.22 + a
17e) 4 Axle Ready Mix	28.13	17.22 + a
17f) Heavy Duty Trailer (40 Tons and Over)	28.33	17.22 + a
17g) Specialized Earth Moving Equipment (Other Than Conventional Type on-the-Road Trucks and Semi-Trailers, Including Euclids)	28.13	17.22 + a
18) Sprinkler Fitter (Trade License required: F-1,2,3,4)	40.50	16.85 + a
19) Theatrical Stage Journeyman	22.22	6.53

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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*

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.

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.

As of: **Thursday, July 19, 2012**

Project: Guilford Shore Line East Railroad Stations

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: **Thursday, July 19, 2012**

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, Plasters, Stone Masons
(Building Construction)
(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.

Bricklayer (Residential- Fairfield County)

a. Paid Holiday: If an employee works on Christmas Eve until noon he shall be paid for 8 hours.

Electricians
Fairfield County: West of the Five Mile River in Norwalk

a. $2.00 per hour not to exceed $14.00 per day.

Elevator Constructors: Mechanics

a. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor 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 workdays 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 workday preceding the holiday or the regular workday 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.

Revised: March 12, 2008

Informational 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.

✓***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.***

On any construction project, an assortment of workers are needed to carry out all of the required tasks. Employees include various skilled crafts people, machine operators, general laborers, and apprentices. Prevailing wage rate schedules identify the classes of workers likely to be employed on each of the four types of construction projects. (If a contractor wants to use a class of worker not listed in a wage determination, there is a process for requesting the U.S. Department of Labor to establish a prevailing wage rate for that additional classification). (Contact U.S. Department of Labor at 202.693.0062 or 215.861.5800)

A registered apprentice is not a separate prevailing wage job classification. Apprentices are paid a percentage of the base rate received by the craft that they are training to become and the full fringe rate. This percentage increases in steps, as the apprentice advances through the stages of the apprenticeship process.

✎ Any questions regarding the proper classification 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 860.263.6543.

Below are additional clarifications of specific job duties performed for certain classifications:

⇨ ***ASBESTOS WORKERS/INSULATORS***:

- Handle, install, apply, fabricate, distribute, prepare, alter, repair, or dismantle heat and frost insulation, including penetration and fire stopping work on all penetration fire stop systems.

⇨***BOILERMAKERS:***

- Erects hydro plants, incomplete vessels, steel stacks, storage tanks for water, fuel, etc. Builds incomplete boilers, repairs heat exchanges and steam generators.

⇨***BRICKLAYERS, CEMENT MASONS, CEMENT FINISHERS, MARBLE MASONS, PLASTERERS, STONE MASONS, PLASTERERS, STONE MASONS, TERRAZZO WORKERS, TILE SETTERS:***

- Lays building materials such as brick, structural tile and concrete cinder, glass, gypsum, terra cotta block. Cuts, tools and sets marble, sets stone, finishes concrete, applies decorative steel, aluminum and plastic tile, applies cements, sand, pigment and marble chips to floors, stairways, etc.

⇨***CARPENTERS, MILLWRIGHTS, PILEDRIVERMEN, LATHERS, RESILEINT FLOOR LAYERS, DOCK BUILDERS, DIVERS, DIVER TENDERS***:

- Constructs, erects, installs and repairs structures and fixtures of wood, plywood and wallboard. Installs, assembles, dismantles, moves industrial machinery. Drives piling into ground to provide foundations for structures such as buildings and bridges, retaining walls for earth embankments, such as cofferdams. Fastens wooden, metal or rockboard lath to walls, ceilings and partitions of buildings, acoustical tile layer, concrete form builder. Applies firestopping materials on fire resistive joint systems only. Installation of curtain/window walls only where attached to wood or metal studs.

- Assembly and installation of modular furniture/furniture systems.
  [**New**] a. Free-standing furniture is not covered. This includes: 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.

⇨***CLEANING LABORER:***

- The clean up of any construction debris and the general cleaning, including sweeping, wash down, mopping, wiping of the construction facility, washing, polishing, dusting, etc., prior to the issuance of a certificate of occupancy falls under the *Labor classification.*

⇨DELIVERY PERSONNEL:

- If delivery of supplies/building materials is to one common point and stockpiled there, prevailing wages are not required. If the delivery personnel are involved in the distribution of the material to multiple locations within the construction site then they would have to be paid prevailing wages for the type of work performed: laborer, equipment operator, electrician, ironworker, plumber, etc.

- An example of this would be where delivery of drywall is made to a building and the delivery personnel distribute the drywall from one "stockpile" location to further sub-locations on each floor. Distribution of material around a construction site is the job of a laborer/tradesman and not a delivery personnel.

⇨ELECTRICIANS:

- Install, erect, maintenance, alteration or repair of any wire, cable, conduit, etc., which generates, transforms, transmits or uses electrical energy for light, heat, power or other purposes. ****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: [updated]

- Installs light metal sash, head sills, and 2-story aluminum commercial storefronts.

⇨IRONWORKERS:

- Handling, sorting, and installation of reinforcing steel (rebar).
- Installation of aluminum window walls and curtain walls.
- Metal bridge rail (traffic), metal bridge handrail, and decorative security fence installation.
- Installation of handrails, stairs, and platforms installed on Wastewater Treatment Plant projects. [new]

⇨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. Past practice using the applicable licensed trades, Plumber, Sheet Metal, Sprinkler Fitter, and Electrician, is not inconsistent with the Insulator classification and would be permitted.

⇨LEAD PAINT REMOVAL:

- Painter 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 Rate-
  1) Removal of lead paint from any surface *NOT* to be repainted.
  2) Where removal is on a *TOTAL* Demolition project only.

⇨LABORERS:

- Acetylene burners, asphalt rakers, chain saw operators, concrete and power buggy operator, concrete saw operator, fence and guard rail erector, hand operated concrete vibrator operator, mason tenders, pipelayers (installation of water, storm drainage or sewage lines outside of the building line with P6, P7 license), 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 finishing for any and all types of building and residential work.

⇨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:

- Preparation of surface, tear-off and/or removal of any type of roofing, and/or clean-up of any areas where a roof is to be relaid.

⇨SHEET METAL WORKER:

- 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, wall panel siding, 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. Insulated metal and insulated composite panels are still installed by the Iron Worker. 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.

⇨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:

- Truck Drivers delivering asphalt are covered under prevailing wage while on the site and directly involved in the paving operation.
- 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.

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