TABLE OF CONTENTS OF SPECIAL PROVISIONS

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

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OCTOBER 8, 2014
FEDERAL AID PROJECT NO. FR-HSR-0125-12-01-00
STATE PROJECT NO. 170-3261

NEW HAVEN – HARTFORD – SPRINGFIELD RAIL CORRIDOR PROJECT

Town of Hartford
Federal Aid Project No. FR-HSR-0125-12-01-00

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

CONTRACT TIME AND LIQUIDATED DAMAGES

Three Hundred Sixty (360) calendar days will be allowed for completion of the work on this project and the liquidated damages charge to apply will be Two Thousand Dollars ($2,000.00) per calendar day.

NOTICE TO CONTRACTOR – PRE-BID QUESTIONS AND ANSWERS

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

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

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

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

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

NOTICE TO CONTRACTOR – PROJECT DESCRIPTION (ALL STATIONS)

The Project consists of upgrades to the existing railroad station located in Hartford, Connecticut as shown and described in the Contract.

The project will construct a new 260-foot long platform on property owned by the Greater Hartford Transit District.

Building work for the proposed facility consists of a new high-level platform on the north end of the existing low-level platform, a new egress stair located at the south end of the existing platform near Asylum Street, platform deck repairs and new fencing along the west edge extending the full length of the existing platform.

The platform assemblies will consist of pre-engineered reinforced composite panels on structural steel framing bearing on the main girders of the existing viaduct. New structural steel framing and steel guardrails will both receive a shop-painted high-performance coating system.

The south stair assembly will be shop-fabricated in component parts and shop painted with final assembly on site.

Lighting, fire alarms and CCTV security cameras are included at the new high-level platform, along with lighting at the south egress stair.

A complete package of wayfinding, regulatory, and informational signs are also included as part of the overall station packages. Variable message signs and PA systems are also included.

Environmental work associated with this facility is specified in the NOTICE TO CONTRACTOR – HAZARDOUS MATERIALS INVESTIGATIONS.

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

NOTICE TO CONTRACTOR – BUY AMERICA

The Buy America provision at 49 U.S.C 24405(a) applies. For reporting and certification guidance, FTA's provisions will be used.

Please refer to the Required Contract Provisions (FTA Funded Contracts) – Exhibit A – Federal Transit Administration – Construction Contracts Required Contract Clauses.

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 Manuals: Submit four (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 three (3) copies being forwarded to **Mr. Richard Jankovich** and one (1) 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 three (3) copies being forwarded to **Mr. Richard Jankovich** and one (1) copy being sent to the Engineer.

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

TABLE

Special Provision Number/Name	Warranties	Spare Parts	Training	Operation and Maintenance Manuals
051300 – Retractable Platform Edge	X	X		X
066000 – Pre-Engineered Reinforced Composite Transit Platforms	X			
087100 – Door Hardware	X			
104060 – Benches and Trash Receptacles	X			
104250 – Site Wayfinding & Identification Signage	X			
230500 – Basic Mechanical Materials and Methods	X			X
260500 – Common Work Results for Electrical	X			
262416 - Panelboards	X	X		X
262726 – Wiring Devices				X
263353 – Static Uninterruptable Power Supply	X		X	X
264313 – Surge Protective Devices for Low Voltage	X			X
265600 – Exterior Lighting		X		X
274216 – Passenger Information Display (PID) Systems				X
275116 – Public Address Systems				X
282301 – Video Surveillance System	X		X	X
283101 – Fire Alarm System	X		X	X

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:

Structural Steel Framing
Retractable Platform Edge
Pre-Engineered Reinforced Composite Transit Platforms
UPS Systems
PID/PA Head-End Equipment

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
Health and Safety Plan

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 – FM GLOBAL SUBMITTALS

Copies of the following CSI Section submittal(s), requiring FM Global review for conformance with the Contract, shall be transmitted to the Designer in accordance with NOTICE TO CONTRACTOR- SUBMITTALS. Review of the following CSI Section submittals may take up to 60 days in accordance with Form 816 Article 1.20-1.05.02.

1. CSI Section 230500 – Basic Mechanical Materials and Methods
2. CSI Section 238240 – DX Mini-Splits System
3. CSI Section 283101 – Fire Alarm System

The above list may not be all-inclusive and does not relieve the Contractor from its responsibility to provide ConnDOT or AMTRAK other submittals for approval as may be required elsewhere in the Contract Drawings.

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 within the Vertical Construction Limits which are defined in Notice to Contractor – Measurement and Payment. 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 – FRA GRANT AGREEMENT FLOW DOWN PROVISIONS

The Administrative and Statutory Requirements attached in grant agreement between FRA and the Connecticut Department of Transportation for the New Haven-Hartford-Springfield (NHHS) Rail Project require the Connecticut Department of Transportation to flow down certain provisions to the Contractor ("Flow Down Provisions"). Contractor agrees to comply with such Flow Down Provisions that apply. Contractor also agrees that it will not take any action, or fail to take any action, that would cause the Connecticut Department of Transportation to be in violation of any of the attached provisions. The Flow Down Provisions are attached to this NTC.

Section 11. Buy America.

The Grantee shall comply with the Buy America provisions set forth in 49 U.S.C. 24405(a) for the Project requiring the use of steel, iron, and manufactured goods produced in the United States, in accordance with the conditions therein set forth.

Section 12. Labor Provisions.

49 U.S.C. 24405(b) provides that persons conducting rail operations over rail infrastructure constructed or improved in whole or in part with funds provided through this Agreement shall be considered a "rail carrier," as defined by 49 U.S.C. 10102(5), for the purposes of Title 49, United States Code, and any other statute that adopts that definition or in which that definition applies, including the Railroad Retirement Act of 1974 (45 U.S.C 231 et seq.), the Railway Labor Act (43 U.S.C.151 et seq.), and the Railroad Unemployment Insurance Act (45 U.S.C. 351 et seq.). The Grantee shall reflect these provisions in its agreements with the entities operating rail services over such rail infrastructure to the extent required by 49 U.S.C. 24405(b) and other laws referenced above.

Section 13. Labor Protective Arrangements.

For a project that uses rights-of-way owned by a railroad, the Grantee shall comply with the protective arrangements established under Section 504 of the Railroad Revitalization and Regulatory Reform Act of 1976 (4R Act), 45 U.S.C. 836, with respect to employees affected by actions taken in connection with the Project financed in whole or in part under this Agreement (See 49 U.S.C. 24405(c)). The Grantee agrees to include the applicable protective arrangements established by the Department of Labor under 45 U.S.C. 836. in its agreements with entities operating rail services over rail infrastructure constructed as part of the Project. The following definitions apply for purposes of applying those protective arrangements:

'Protected employee' means an employee of a railroad who had an employment relationship with such railroad on the date on which the Grantee first applied for financial assistance applicable to the Project involved and who is affected by actions taken pursuant to this Agreement; provided, however, that an employee who was benefitted solely as a result of the Project shall not be a protected employee under these provisions.

'Railroad' means a rail carrier or a common carrier by railroad or express as defined in 49 U.S.C. 10102, and includes the National Railroad Passenger Corporation and the Alaska Railroad as well as a person that conducts rail operations over rail infrastructure constructed or improved with funding

provided in whole or in part in a grant made pursuant to this Agreement.

Section 14. Maintenance Responsibility and Refunds.

a. Except as otherwise provided herein, the Grantee shall ensure the maintenance of Project property to the level of utility (including applicable FRA track safety standards) which exists when the Project improvements are placed in service (as set forth in the Statement(s) of Work incorporated into this Agreement) for a period of twenty (20) years from the date such Project property was placed in service, consistent with the satisfactory continuing control and maintenance responsibilities of 49 U.S.C. 24402(b)(1) and (c)(1) and as addressed in Section 2 above. In the event the Project property is not maintained as required by this section, for a period of time in excess of six (6) months, or such other period as may be mutually determined by the parties, and is not restored within a reasonable time to the level of utility which exists when the Project improvements are placed in service, the Grantee will refund to FRA a pro-rata share of the Federal contribution, based upon the percentage remaining of the twenty (20) year period that commenced when the Project property was placed in service.

b. In the event that all intercity passenger rail service making use of the Project property is discontinued during the twenty (20) year period, the Grantee shall continue to ensure that maintenance of the Project property, as set forth above, for a period of one (1) year from the date of the discontinuance to allow for the possible reintroduction of intercity rail passenger service.

Section 15. Project Use for Intercity Passenger Rail Service and Refunds.

a. The Grantee acknowledges that the purpose of the Project is to benefit intercity passenger rail service. In the event that all intercity passenger rail service making use of the Project improvements is discontinued (for any reason) at any time during a period of twenty (20) years from the date such Project improvements were placed in service, as set forth above, and if such intercity passenger rail service is not reintroduced during a one (1) year period following the date of such discontinuance, the Grantee shall refund to FRA, no later than eighteen (18) months following the date of such discontinuance, a pro-rata share of the Federal contribution, based upon the percentage of the twenty (20) year period remaining at the time of such discontinuance.

b. To the extent necessary and appropriate, sections 14 and 15 shall be implemented in a manner so as to avoid any double counting of any refunds paid or required to be paid to the FRA.

Section 16. Davis-Bacon Act Provisions.

Payment of prevailing wages on the Project is required by 49 U.S.C. 24405(c)(2) for Project components that use or would use rights-of-way owned by a railroad. The Grantee shall comply with the provisions of 49 U.S.C. 24405(c) (2), and the relevant section(s) of the HSIPR Program Interim Guidance/NOFA through which this Project was selected for funding (see, e.g., Appendix 3.4.5 of the NOFA published in the Federal Register on June 23, 2009 (74 FR 29900), with respect to the payment of prevailing wages consistent with the provisions of 49 U.S.C. 24312. For these purposes, wages in collective bargaining agreements negotiated under the Railway Labor Act are deemed to comply with Davis-Bacon Act requirements.

Section 17. Replacement of Existing Intercity Passenger Rail Service.

49 U.S.C. 24405(d) requires any entity providing intercity passenger railroad transportation on a project funded by this Agreement to comply with certain requirements with respect to its employees and the employees of preexisting intercity rail passenger services. The Grantee shall comply with the applicable provisions of 49 U.S.C. 24405(d) to the extent it is or becomes a provider of intercity

passenger railroad transportation. If it is not the operator or provider of the intercity passenger rail services benefitting from the Project funded under this Agreement, then it shall notify its selected operator of the requirements imposed by section 24405(d).

Section 18. Additional Guidance.

As noted above, additional guidance for Grantees in complying with the requirements of this Appendix 1A (and with the Cooperative Agreement generally) is found in the HSIPR Program Interim Guidance/NOFA through which this Project was selected for funding. The Grantee should refer to this Guidance as necessary when carrying out the activities associated with implementing the Project.

General Provisions, Attachment 2

1. **Definitions. As used in this Agreement:**

a. **Agreement** means this Grant Agreement or Cooperative Agreement, including all attachments.

b. **Application** means the signed and dated proposal by or on behalf of the Grantee, as may be amended, for Federal financial assistance for the Project, together with all explanatory, supporting, and supplementary documents heretofore filed with and accepted or approved by FRA.

c. **Approved Project Budget** means the most recently dated written statement, approved in writing by FRA, of the estimated total cost of the Project, the items to be deducted from such total in order to calculate the estimated net Project cost, the maximum amount of Federal assistance for which the Grantee is currently eligible, the specific items (including contingencies specified) for which the total may be spent, and the estimated cost of each of such items. The term "Approved Project Budget" also includes "Financial Plan" as used in 49 C.F.R. Part 19.

d. **Awarding Agency** means (1) with respect to a grant, the Federal agency, and (2) with respect to a subgrant, the party that awarded the subgrant. In the case of a Federal Agency, the term "Awarding Agency" also includes "Federal Awarding Agency" as used in 49 C.F.R. Part 19.

e. **Federal Railroad Administration** is an operating administration of the U.S. Department of Transportation.

f. **Federal Government** means the United States of America and any executive department or agency thereof.

g. **Grantee** means any entity that receives Federal grant assistance directly from FRA for the accomplishment of the Project.

h. **Project** means the task or set of tasks set forth in the approved Application which the Grantee carries out pursuant to this Agreement, as set forth in the Statement of Work (Attachment 3).

i. **Subgrantee** means any entity that receives FRA assistance from an FRA Grantee, rather than from FRA directly. The term "subgrantee" does not include "third party contractor."

j. **U.S. DOT** means the U.S. Department of Transportation, including its operating administrations.

2. **Accomplishment of the Project:**

a. General Requirements:

The Grantee agrees to carry out the Project in a sound, economical, and efficient manner, and in accordance with the provisions of this Agreement, grant guidance, the Application, the Approved Project Budget, the Statement of Work, Project schedules, and all applicable laws, regulations, and published policies. This includes, but is not limited to the following, as applicable:

1) U.S. DOT regulations, "Uniform Administrative Requirements for Grants and Cooperative Agreements to State and Local Governments" (common grant management rule), 49 C.F.R. Part 18, applies to Projects with governmental bodies.

2) U.S. DOT regulations, "Uniform Administrative Requirements for Grants and Agreements with Institutions of Higher Education, Hospitals, and Other Nonprofit Organizations," 49 C.F.R. Part 19, applies to Projects with institutions of higher education and private nonprofit organizations. 49 C.F.R. Part 19 also applies to grants and cooperative agreements with private for-profit organizations.

b. Application of Federal, State, and Local Laws and Regulations.

1) Federal Laws and Regulations. The Grantee understands that Federal laws, regulations, policies, and related administrative practices to this Agreement on the date the Agreement was executed may be modified from time to time. The Grantee agrees that the most recent of such Federal requirements will govern the administration of this Agreement at any particular time, except if there is sufficient evidence in this Agreement of a contrary intent. Likewise, new Federal laws, regulations, policies and administrative practices may be established after the date the Agreement has been executed and may apply to this Agreement. To achieve compliance with changing Federal requirements, the Grantee agrees to include in all sub-assistance agreements and third party contracts financed with FRA assistance, specific notice that Federal requirements may change and the changed requirements will apply to the Project as required. All limits or standards set forth in this Agreement to be observed in the performance of the Project are minimum requirements.

2) State or Territorial Law and Local Law. Except to the extent that a Federal statute or regulation preempts State or territorial law, nothing in this Agreement shall require the Grantee to observe or enforce compliance with any provision thereof, perform any other act, or do any other thing in contravention of any applicable State or territorial law; however, if any of the provisions of this Agreement violate any applicable State or territorial law, or if compliance with the provisions of this Agreement would require the Grantee to violate any applicable State or territorial law, the Grantee agrees to notify the FRA immediately in writing in order that FRA and the Grantee may make appropriate arrangements to proceed with the Project as soon as possible.

c. Funds of the Grantee. Unless approved otherwise by FRA, the Grantee agrees to complete all actions necessary to provide the matching contributory funds or cost share of the Project costs, if applicable, at or before the time that such funds are needed to meet Project expenses.

d. Changed Conditions of Performance (Including Litigation). The Grantee agrees to notify FRA immediately of any change in local law, conditions, or any other event that may affect its ability to perform the Project in accordance with the terms of this Agreement. In addition, the Grantee agrees to notify FRA immediately of any decision pertaining to the Grantee's conduct of litigation that may affect FRA's interests in the Project or FRA's administration or enforcement of applicable Federal laws or regulations. Before the Grantee may name FRA as a party to litigation for any reason, the Grantee agrees first to inform FRA; this proviso applies to any type of litigation whatsoever, in any forum.

e. No FRA Obligations to Third Parties. Absent FRA's express written consent, and notwithstanding any concurrence by FRA in or approval of the award of any contract of the Grantee (third party contract) or subcontract of the Grantee (third party subcontract) or the solicitation thereof, FRA shall not be subject to any obligations or liabilities to third party contractors or third party subcontractors or any other person not a party to this Agreement in connection with the performance of the Project.

3. **Ethics:**

a. **Standards of Conduct.** The Grantee agrees to maintain a written code or standards of conduct that shall govern the performance of its officers, employees, board members, or agents engaged in the award and administration of contracts supported by Federal funds. The code or standards shall provide that the Grantee's officers, employees, board members, or agents may neither solicit nor accept gratuities, favors or anything of monetary value from present or potential contractors or subgrantees. The Grantee may set minimum rules where the financial interest is not substantial or the gift is an unsolicited item of nominal intrinsic value. As permitted by State or local law or regulations, such code or standards shall provide for penalties, sanctions, or other disciplinary actions for violations by the Grantee's officers, employees, board members, or agents, or by contractors or subgrantees or their agents.

1) Personal Conflict of Interest. The Grantee's code or standards must provide that no employee, officer, board member, or agent of the Grantee may participate in the selection, award, or administration of a contract supported by Federal funds if a real or apparent conflict of interest would be involved. Such a conflict would arise when any of the parties set forth below has a financial or other interest in the firm selected for award:

a) The employee, officer, board member, or agent;
b) Any member of his or her immediate family;
c) His or her partner; or
d) An organization that employs, or is about to employ, any of the above.

2) Organizational Conflicts of Interest. The Grantee's code or standards of conduct must include procedures for identifying and preventing real and apparent organizational conflicts of interests. An organizational conflict of interest exists when the nature of the work to be performed under a proposed third party contract, may, without some restrictions on future activities, result in an unfair competitive advantage to the contractor or impair the contractor's objectivity in performing the contract work.

b. **Existing Provisions.** This section does not require the Grantee to implement a new code or standards of conduct where a State statute, or written code or standards of conduct, already effectively covers all of the elements of a.

4. **Approved Project Budget:**

The Grantee agrees to carry out the Project in accordance with the Approved Project Budget, written approval of which the Grantee shall secure prior to being reimbursed under this Agreement. If the Approved Project Budget is included in this Agreement as Attachment 3, execution of the Agreement shall constitute such written approval. The Grantee agrees to obtain the prior written approval of FRA's Associate Administrator for Railroad Development or the Associate Administrator for Policy and Railroad Safety, as applicable, for any revisions to the Approved Project Budget that equal or exceed 10 percent any line item or pertain to a line item involving contingency or miscellaneous costs. For revisions to the Approved Project Budget that are less than 10 percent of any line item, and do not involve contingency or miscellaneous costs, the Grantee agrees to notify FRA of the revisions

to the Approved Project Budget. Any revisions to the Approved Project Budget must not affect total project costs or the respective cost-sharing responsibilities set forth in Attachment 1, Section 5.

5. **Accounting Records:**

a. **Project Accounts.** The Grantee agrees to establish and maintain for the Project either a separate set of accounts or accounts within the framework of an established accounting system, in a manner consistent with 49 C.F.R. § 18.20, or 49 C.F.R. § 19.21, as amended, whichever is applicable.

b. **Funds Received or Made Available for the Project.** Consistent with the provisions of 49 C.F.R. § 18.21, or 49 C.F.R. § 19.21, as amended, whichever is applicable, the Grantee agrees to record in the Project Account, and deposit in a financial institution all Project payments received by it from FRA pursuant to this Agreement and all other funds provided for, accruing to, or otherwise received on account of the Project (Project Funds). The Grantee is encouraged to use financial institutions owned at least 50 percent by minority group members.

c. **Documentation of Project Costs and Program Income.** All costs charged to the Project, including any approved services contributed by the Grantee or others, shall be supported by properly executed payrolls, time records, invoices, contracts, or vouchers describing in detail the nature and propriety of the charges. The Grantee also agrees to maintain accurate records of all Program Income derived from Project implementation.

d. **Checks, Orders, and Vouchers.** The Grantee agrees that all checks, payrolls, invoices, contracts, vouchers, orders, or other accounting documents pertaining in whole or in part to the Project shall be clearly identified, readily accessible, and, to the extent feasible, kept separate from documents not pertaining to the Project.

6. **Record Retention:**

a. **Submission of Proceedings, Contracts and Other Documents.** During the course of the Project and for three years thereafter, the Grantee agrees to retain intact and to provide any data, documents, reports, records, contracts, and supporting materials relating to the Project as FRA may require. Reporting and record-keeping requirements are set forth in-

1) 49 C.F.R. Part 18 for governmental Grantees; and
2) 49 C.F.R. Part 19 for private non-profit and for-profit Grantees.

Project closeout does not alter these requirements.

b. **Audit and Inspection.**

1) General Audit Requirements. A Grantee that is:

a) a State, local government or Indian tribal government agrees to comply with the audit requirements of 49 C.F.R. § 18.26 and OMB Circular A-133, and any revision or supplement thereto.

b) an institution of higher education or nonprofit organization agrees to comply with the audit requirements of 49 C.F.R. § 19.26 and OMB Circular A-133, and any revision or supplement thereto.

c) a private for-profit organization agrees to comply with the audit

requirements of OMB Circular A-133.

The Grantee agrees to obtain any other audits required by FRA. Project closeout will not alter the Grantee's audit responsibilities. Audit costs for Project administration and management are allowable under this Project to the extent authorized by OMB Circular A-87, Revised; OMB Circular A-21, Revised; or OMB Circular A-122, Revised.

2) Inspection by Federal Officials. The Grantee agrees to permit the Secretary and the Comptroller General of the United States, or their authorized representatives, to inspect all Project work, materials, payrolls, and other data, and to audit the books, records, and accounts of the Grantee and its contractors pertaining to the Project. The Grantee agrees to require each third party contractor whose contract award is not based on competitive bidding procedures as defined by the Secretary to permit the Secretary of Transportation and the Comptroller General of the United States, or their duly authorized representatives, to inspect all work, materials, payrolls, and other data and records involving that contract, and to audit the books, records, and accounts involving that contract as it affects the Project.

7. **Payments:**

a. Request by the Grantee for Payment. The Grantee's request for payment of the Federal share of allowable costs shall be made to FRA via the Department of Transportation's Delphi eInvoicing System, and will be acted upon by FRA as set forth in this section. Information on the Delphi eInvoicing System can be found in Section 7 of Attachment 1, Special Provisions. Each payment made to the Grantee must comply with Department of the Treasury regulations, "Rules and Procedures for Funds Transfers," 31 C.F.R. Part 205. To receive a Federal assistance payment, the Grantee must:

1) Have demonstrated or certified that it has made a binding commitment of non-Federal funds, if applicable, adequate when combined with Federal payments, to cover all costs to be incurred under the Project to date. A Grantee required by Federal statute or this Agreement to provide contributory matching funds or a cost share agrees:

a) to refrain from requesting or obtaining Federal funds in excess of the amount justified by the contributory matching funds or cost share that has been provided; and

b) to refrain from taking any action that would cause the proportion of Federal funds made available to the Project at any time to exceed the percentage authorized under this Agreement. The requirement for contributory matching funds or cost share may be temporarily waived only to the extent expressly provided in writing by FRA.

2) Have submitted to FRA all financial and progress reports required to date under this Agreement; and

3) Have identified the source(s) of financial assistance provided under this Project, if applicable, from which the payment is to be derived.

b. Payment by FRA.

1) Reimbursement Payment by FRA. FRA uses the reimbursement method, whereby the Grantee agrees to:

a. Complete and submit Standard Form 3881, "Payment Information Form - ACH Payment Vendor Payment System," to FRA; and

b. Complete and submit Standard Form 270, "Request for Advance or Reimbursement," to FRA.

2) Upon receipt of a payment request and adequate accompanying information (invoices in accordance with applicable cost principles), FRA will authorize payment by direct deposit, or if requested by the Grantee, by issuance of a treasury check (allow 30 day processing time for issuance of check), provided the Grantee: (i) is complying with its obligations under this Agreement, (ii) has satisfied FRA that it needs the requested Federal funds during the requisition period, and (iii) is making adequate and timely progress toward Project completion. If all these circumstances are present, FRA may reimburse allowable costs incurred by the Grantee up to the maximum amount of FRA's share of the total Project funding.

3) Other Payment Information.

a. The Grantee agrees to adhere to and impose on its subgrantees all applicable foregoing "Payment by FRA" requirements of this Agreement.

b. If the Grantee fails to adhere to the foregoing "Payment by FRA" requirements of this Agreement, FRA may revoke the portion of the Grantee's funds that has not been expended.

c. Allowable Costs. The Grantee's expenditures will be reimbursed only if they meet all requirements set forth below:

1) Conform with the Project description, the Statement of Work, and the Approved Project Budget and all other terms of this Agreement;

2) Be necessary in order to accomplish the Project;

3) Be reasonable for the goods or services purchased;

4) Be actual net costs to the Grantee (i.e., the price paid minus any refunds, rebates, or other items of value received by the Grantee that have the effect of reducing the cost actually incurred);

5) Be incurred (and be for work performed) after the effective date of this Agreement, unless specific authorization from FRA to the contrary is received in writing;

6) Unless permitted otherwise by Federal status or regulation, conform with Federal guidelines or regulations and Federal cost principles as set forth below:

a. For Grantees that are governmental organizations, the standards of OMB Circular A-87, Revised, "Cost Principles for State and Local Governments" apply;

b. For Grantees that are institutions of higher education, the standards of OMB Circular A-21, Revised, "Cost Principles for Educational Institutions" apply;

c. For Grantees that are private nonprofit organizations, the standards of OMB Circular A-122, Revised, "Cost Principles for Nonprofit Organizations" apply; and

d. For Grantees that are for-profit organizations, the standards of the Federal Acquisition Regulation, 48 C.F.R. Chapter I, Subpart 31.2, "Contracts with Commercial Organizations" apply.

7) Be satisfactorily documented; and

8) Be treated uniformly and consistently under accounting principles and procedures approved and prescribed by FRA for the Grantee, and those approved or prescribed by the Grantee for its subgrantees and contractors.

d. Disallowed Costs. In determining the amount of Federal assistance FRA will provide, FRA will exclude:

1) Any Project costs incurred by the Grantee before the obligation date of this Agreement, or amendment or modification thereof, whichever is later, unless specifically allowed by this Agreement, otherwise permitted by Federal law or regulation, or unless an authorized representative of FRA states in writing to the contrary;

2) Any costs incurred by the Grantee that are not included in the latest Approved Project Budget; and

3) Any costs attributable to goods or services received under a contract or other arrangement that is required to be, but has not been, concurred in or approved in writing by FRA.

The Grantee agrees that reimbursement of any cost under the "Payment by FRA," part of this Agreement does not constitute a final FRA decision about the allowability of that cost and does not constitute a waiver of any violation by the Grantee of the terms of this Agreement. The Grantee understands that FRA will not make a final determination about the allowability of any cost until an audit of the Project has been completed. If FRA determines that the Grantee is not entitled to receive any part of the Federal funds requested, FRA will notify the Grantee stating the reasons therefore. Project closeout will not alter the Grantee's obligation to return any funds due to FRA as a result of later refunds, corrections, or other transactions. Nor will Project closeout alter FRA's right to disallow costs and recover funds on the basis of a later audit or other review. Unless prohibited by law, FRA may offset any Federal assistance funds to be made available under this Project as needed to satisfy any outstanding monetary claims that the Federal Government may have against the Grantee. Exceptions pertaining to disallowed costs will be assessed based on their applicability, as set forth in the applicable Federal cost principals or other written Federal guidance.

e. Bond Interest and Other Financing Costs. To the extent permitted in writing by FRA, bond interest and other financing costs are allowable.

f. Requirement to Remit Interest. The Grantee agrees that:

1) Any interest earned by the Grantee on FRA funds must be remitted to FRA, except as provided by 31 U.S.C. § 6503, or the Indian Self-Determination Act, 25 U.S.C. § 450 et seq., and any regulations thereunder that may be issued by the U.S. Secretary of the Treasury.

2) Irrespective of whether the Grantee has deposited funds in an interest-bearing account, the Grantee agrees to pay to FRA interest on any FRA funds that the Grantee has drawn down and failed to spend for eligible Project activities. Unless waived by FRA, interest will be calculated at rates imposed by the U.S. Secretary of the Treasury, beginning on the fourth day after the funds were deposited in the Grantee's bank or other financial depository. This requirement does not apply to any Grantee that is a state, state instrumentality, or Indian Tribal Government, except as permitted under applicable state law and by regulations that may be issued by the U.S. Secretary of the Treasury.

3) Upon notice by FRA to the Grantee of specific amounts due, the Grantee agrees to promptly remit to FRA any excess payment of amounts or disallowed costs, including any interest due thereon.

g. De-obligation of Funds. FRA reserves the right to de-obligate unspent FRA funds prior to Project closeout.

8. **Property, Equipment and Supplies:**

Unless otherwise approved by FRA, the following conditions apply to property, equipment, and supplies financed under this Agreement:

a. **Use of Property.** The Grantee agrees that Project property, equipment, and supplies shall be used for the provision of the Project activity for the duration of its useful life, as determined by FRA. Should the Grantee unreasonably delay or fail to use Project property, equipment, or supplies during its useful life, the Grantee agrees that FRA may require the Grantee to return the entire amount of FRA assistance expended on that property, equipment, or supplies. The Grantee further agrees to notify FRA immediately when any Project property or equipment is withdrawn from use in the Project activity or when such property or equipment is used in a manner substantially different from the representations made by the Grantee in its Application or the text of the Project description.

b. **General Federal Requirements.**

1) a Grantee that is a governmental entity agrees to comply with the property management standards of 49 C.F.R. §§ 18.31, 18.32, and 18.33, including any amendments thereto, and other applicable guidelines or regulations that are issued.

2) a Grantee that is not a governmental entity agrees to comply with the property standards of 49 C.F.R. §§ 19.30 through 19.37 inclusive, including any amendments thereto, and other applicable guidelines or regulations that are issued. Exceptions to the requirements of 49 C.F.R. §§ 18.31, 18.32, and 18.33, and 49 C.F.R. §§ 19.30 through 19.37 inclusive, must be specifically approved by FRA.

c. **Maintenance.** The Grantee agrees to maintain the Project property and equipment in good operating order, and in accordance with any guidelines, directives, or regulations that FRA may issue.

d. **Records.** The Grantee agrees to keep satisfactory records with regard to the use of the property, equipment, and supplies, and submit to FRA, upon request, such information as may be required to assure compliance with this section of this Agreement.

e. **Transfer of Project Property.** The Grantee agrees that FRA may:

1) require the Grantee to transfer title to any property, equipment, or supplies financed with FRA assistance made available by this Agreement, as permitted by 49 C.F.R. § 18.32(g) or 49 C.F.R. §§ 19.30 through 19.37 inclusive, whichever may be applicable.

2) direct the disposition of property or equipment financed with FRA assistance made available under this Agreement, as set forth by 49 C.F.R. §§ 18.31 and 18.32 or 49 C.F.R. §§ 19.30 through 19.37 inclusive, whichever may be applicable.

f. **Withdrawn Property.** If any Project property, equipment, or supplies are not used for the Project for the duration of its useful life, as determined by FRA, whether by planned withdrawal, misuse or casualty loss, the Grantee agrees to notify FRA immediately. Disposition of withdrawn property, equipment, or supplies shall be in accordance with 49 C.F.R. §§ 18.31 and 18.32 for a Grantee that is a governmental entity, or 49 C.F.R. §§ 19.30 through 19.37 inclusive, for a Grantee that is an institution of higher education or a private organization.

g. **Encumbrance of Project Property.** Unless expressly authorized in writing by FRA, the Grantee agrees to refrain from:

1) Executing any transfer of title, lease, lien, pledge, mortgage, encumbrance, contract, grant anticipation note, alienation, or other obligation that in any way would affect FRA interest in any Project property or equipment; or

2) Obligating itself in any manner to any third party with respect to Project property or equipment.

The Grantee agrees to refrain from taking any action or acting in a manner that would adversely affect FRA's interest or impair the Grantee's continuing control over the use of Project property or equipment.

9. **Relocation and Land Acquisition:**

The Grantee agrees to comply with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended, 42 U.S.C. §§ 4601 et seq.; and U.S. DOT regulations, "Uniform Relocation and Real Property Acquisition for Federal and Federally Assisted Programs," 49 C.F.R. Part 24.

10. **Flood Hazards:**

The Grantee agrees to comply with the flood insurance purchase requirements of Section 102(a) of the Flood Disaster Protection Act of 1973, 42 U.S.C. § 4012a(a), with respect to any construction or acquisition Project.

11. **Procurement:**

a. Federal Standards. The Grantee agrees to comply with the Procurement Standards requirements set forth at 49 C.F.R. § 18.36 or 49 C.F.R. §§ 19.40 through 19.48 inclusive, whichever may be applicable, and with applicable supplementary U.S. DOT or FRA directives or regulations. If determined necessary for proper Project administration, FRA reserves the right to review the Grantee's technical specifications and requirements.

b. Cargo Preference -- Use of United States-Flag Vessels. Pursuant to U.S. DOT, Maritime Administration regulations, "Cargo Preference -- U.S.-Flag Vessels," 46 C.F.R. Part 381, the Grantee shall insert the following clauses in contracts let by the Grantee in which equipment, materials or commodities may be transported by ocean vessel in carrying out the Project:

As required by 46 C.F.R. Part 381, The contractor agrees -

1) To utilize privately owned United States-flag commercial vessels to ship at least 50% of the gross tonnage (computed separately for dry bulk carriers, dry cargo liners, and tankers) involved, whenever shipping any equipment, materials, or commodities pursuant to this contract to the extent such vessels are available at fair and reasonable rates for United States-flag commercial vessels.

2) To furnish within 20 days following the date of loading for shipments originating within the United States, or within 30 working days following the date of loading for shipment originating outside the United States, a legible coy of a rated, “on-board” commercial ocean bill-of-lading in English for each shipment of cargo described in paragraph (1) above to the recipient (through the prime contractor in the case of subcontractor bills-of lading) and to the Division of Cargo Preference

and Domestic Trade, Maritime Administration, 1200 New Jersey Avenue, SE, Washington, D.C. 20590, marked with appropriate identification of the Project.

3) To insert the substance of the provisions of this clause in all subcontracts issued pursuant to this contract

c. Notification Requirement. With respect to any procurement for goods and services (including construction services) having an aggregate value of $500,000 or more, the Grantee agrees to:

1) specify in any announcement of the awarding of the contract for such goods or services the amount of Federal funds that will be used to finance the acquisition; and

2) express the said amount as a percentage of the total costs of the planned acquisition.

d. Debarment and Suspension; and Drug-Free Work Place. The Grantee agrees to obtain certifications on debarment and suspension from its third party contractors and subgrantees and otherwise comply with U.S. DOT regulations, "Nonprocurement Suspension and Debarment," 2 C.F.R. Part 1200, and "Government wide Requirements for Drug-Free Workplace (Grants)," 49 C.F.R. Part 32.

e. Notification of Third Party Contract Disputes or Breaches. The Grantee agrees to notify FRA of any current or prospective major dispute, breach, or litigation pertaining to any third party contract. If the Grantee seeks to name FRA as a party to litigation for any reason, the Grantee agrees first to inform FRA before doing so. This proviso applies to any type of litigation whatsoever, in any forum.

f. Participation by Small Business Concerns Owned and Controlled by Socially and Economically Disadvantaged Individuals.

1) The Grantee agrees to: (a) provide maximum practicable opportunities for small businesses, including veteran-owned small businesses and service disabled veteran-owned small businesses, and (b) implement best practices, consistent with our nation's civil rights and equal opportunity laws, for ensuring that all individuals – regardless of race, gender, age, disability, and national origin – benefit from activities funded through this Agreement.

2) An example of a best practice under (b) above would be to incorporate key elements of the Department's Disadvantage Business Enterprise (DBE) program (see 49 C.F.R. Part 26) in contracts under this Agreement. This practice would involve setting a DBE contract goal on contracts funded under this Agreement that have subcontracting possibilities. The goal would reflect the amount of DBE participation on the contract that the Grantee would expect to obtain absent the effects of discrimination and consistent with the availability of certified DBE firms to perform work under the contract. When a DBE contract goal has been established by a Grantee, the contract would be awarded only to a bidder/offer that has met or made (or in the case of a design/build project, is committed to meeting or making) documented, good faith efforts to reach the goal. Good faith efforts are defined as efforts to achieve a DBE goal or other requirement of this Agreement which, by their scope, intensity, and appropriateness to the objective can reasonably be expected to achieve the goal or other requirement.

3) The Grantee must provide FRA a plan for incorporating the above best practice into its implementation of the Project within 30 days following execution of this Agreement. If the Grantee is not able to substantially incorporate Part 26 elements in accordance with the above-described best practice, the Grantee agrees to provide the FRA with a written explanation and an alternative program for ensuring the use of contractors owned and controlled by socially and economically disadvantaged

individuals.

12. **Metric System:**

The Grantee agrees to use the metric system of measurement in its Project activities to the extent practicable, in conformance with applicable regulations, guidelines, and policies that U.S. DOT or FRA may issue. The Metric Conversion Act of 1975, as amended by the Omnibus Trade and Competitiveness Act of 1988 (15 U.S.C. 205), designates the metric system of measurement as the preferred system of weights and measures for United States trade and commerce, and it requires that each agency use the metric system of measurement in its procurements, grants, and other business-related activities, except to the extent that such use is impracticable or likely to cause significant inefficiencies or loss of markets to U.S. firms.

13. **Patent Rights:**

a. If any invention, improvement, or discovery of the Grantee or any of its third party contractors is conceived or first actually reduced to practice in the course of or under this Project, and that invention, improvement, or discovery is patentable under the laws of the United States of America or any foreign country, the Grantee agrees to notify FRA immediately and provide a detailed report. The rights and responsibilities of the Grantee, third party contractors and FRA with respect to such invention, improvement, or discovery will be determined in accordance with applicable Federal laws, regulations, policies, and any waiver thereof.

b. If the Grantee secures a patent with respect to any invention, improvement, or discovery of the Grantee or any of its third party contractors conceived or first actually reduced to practice in the course of or under this Project, the Grantee agrees to grant to FRA a royalty-free, non-exclusive, and irrevocable license to use and to authorize others to use the patented device or process for Federal Government purposes.

c. The Grantee agrees to include the requirements of the "Patent Rights" section of this Agreement in its third party contracts for planning, research, development, or demonstration under the Project.

14. **Rights in Data and Copyrights:**

a. The term "subject data" used in this section means recorded information, whether or not copyrighted, that is developed, delivered, or specified to be delivered under this Agreement. The term includes graphic or pictorial delineations in media such as drawings or photographs; text in specifications or related performance or design-type documents; machine forms such as punched cards, magnetic tape, or computer memory printouts; and information retained in computer memory. Examples include, but are not limited to: computer software, engineering drawings and associated lists, specifications, standards, process sheets, manuals, technical reports, catalog item identifications, and related information. The term does not include financial reports, cost analyses, and similar information incidental to Project administration.

b. The following restrictions apply to all subject data first produced in the performance of this Agreement:

1) Except for its own internal use, the Grantee may not publish or reproduce such data in whole or in part, or in any manner or form, nor may the Grantee authorize others to do so, without the written consent of FRA, until such time as FRA may have either released or approved the release of such data to the public; this restriction on publication, however, does not apply to grant agreements with

academic institutions.

2) As authorized by 49 C.F.R. § 18.34, or 49 C.F.R. § 19.36, as applicable, FRA reserves a royalty-free, non-exclusive and irrevocable license to reproduce, publish or otherwise use, and to authorize others to use, for Federal Government purposes:

a) Any work developed under a grant, cooperative agreement, sub-grant, sub- agreement, or third party contract, irrespective of whether or not a copyright has been obtained; and

b) Any rights of copyright to which a Grantee, subgrantee, or a third party contractor purchases ownership with Federal assistance.

c. When FRA provides assistance to a Grantee for a Project involving planning, research, or development, it is generally FRA's intent to increase the body of knowledge, rather than to limit the benefits of the Project to those parties that have participated therein. Therefore, unless FRA determines otherwise, the Grantee understands and agrees that, in addition to the rights set forth in preceding portions of this section of this Agreement, FRA may make available to any FRA Grantee, subgrantee, third party contractor, or third party subcontractor, either FRA's license in the copyright to the "subject data" derived under this Agreement or a copy of the "subject data" first produced under this Agreement. In the event that such a Project which is the subject of this Agreement is not completed, for any reason whatsoever, all data developed under that Project shall become subject data as defined herein and shall be delivered as FRA may direct.

d. To the extent permitted by State law, the Grantee agrees to indemnify, save and hold harmless FRA, its officers, agents, and employees acting within the scope of their official duties against any liability, including costs and expenses, resulting from any willful or intentional violation by the Grantee of proprietary rights, copyrights, or right of privacy, arising out of the publication, translation, reproduction, delivery, use, or disposition of any data furnished under this Agreement. The Grantee shall not be required to indemnify FRA for any such liability arising out of the wrongful acts of employees or agents of FRA.

e. Nothing contained in this section on rights in data, shall imply a license to FRA under any patent or be construed as affecting the scope of any license or other right otherwise granted to FRA under any patent.

f. The requirements of this section of this Agreement do not apply to material furnished to the Grantee by FRA and incorporated in the work carried out under this Agreement, provided that such incorporated material is identified by the Grantee at the time of delivery of such work.

g. Unless FRA determines otherwise, the Grantee agrees to include the requirements of this section of this Agreement in its third party contracts for planning, research, development, or demonstration under the Project.

15. **Acknowledgment of Support and Disclaimer:**

a. An acknowledgment of FRA support and a disclaimer must appear in any grantee publication, whether copyrighted or not, based on or developed under the Agreement, in the following terms:

> "This material is based upon work supported by the Federal Railroad Administration under a grant/cooperative agreement, dated ." (Fill-in appropriate identification of grant/cooperative agreement)

b. All grantee publications must also contain the following:

"Any opinions, findings, and conclusions or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the view of the Federal Railroad Administration and/or U.S. DOT."

c. The Grantee agrees to cause to be erected at the site of any construction, and maintain during construction, signs satisfactory to FRA identifying the Project and indicating that FRA is participating in the development of the Project.

16. **Reprints of Publications:**

At such time as any article resulting from work under this Agreement is published in a scientific, technical, or professional journal or publication, two reprints of the publication should be sent to FRA's Grant Manager, clearly referenced with the appropriate identifying information.

17. **Site Visits:**

FRA, through its authorized representatives, has the right, at all reasonable times, to make site visits to review Project accomplishments and management control systems and to provide such technical assistance as may be required. If any site visit is made by FRA on the premises of the Grantee, subgrantee, contractor, or subcontractor under this Agreement, the Grantee shall provide and shall require its subgrantees or subcontractors to provide, all reasonable facilities and assistance for the safety and convenience of FRA representatives in the performance of their duties. All site visits and evaluations shall be performed in such a manner as will not unduly delay work being conducted by the Grantee, subgrantee, contractor, or subcontractor.

18. **Safety Oversight:**

To the extent applicable, the Grantee agrees to comply with any Federal regulations, laws, or policy and other guidance that FRA or U.S. DOT may issue pertaining to safety oversight in general, and in the performance of this Agreement, in particular.

19. **Civil Rights:**

The Grantee agrees to comply with all civil rights laws and regulations, in accordance with applicable Federal directives, except to the extent that the FRA determines otherwise in writing. These include, but are not limited to, the following: (a) Title VI of the Civil Rights Act of 1964 (P.L. 88-352) (as implemented by 49 C.F.R. Part 21), which prohibits discrimination on the basis of race, color or national origin; (b) Title IX of the Education Amendments of 1972, as amended (20 U.S.C. §§ 1681-1683, and 1685-1686), which prohibits discrimination on the basis of sex, (c) Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. § 794), which prohibits discrimination of the basis of handicaps; (d) the Age Discrimination Act of 1975, as amended (42 U.S.C. §§ 1601-1607), which prohibits discrimination on the basis of age; (e) the Drug Abuse Office and Treatment Act of 1972 (P.L. 92-255), as amended, relating to nondiscrimination on the basis of drug abuse; (f) the Comprehensive Alcohol Abuse and Alcoholism Prevention, Treatment and Rehabilitation Act of 1970 (P.L. 91-616), as amended, relating to nondiscrimination on the basis of alcohol abuse or alcoholism; (g) §§ 523 and 527 of the Public Health Service Act of 1912 (42 U.S.C. §§ 290 dd-3 and 290 ee-3), as amended, relating to confidentiality of alcohol and drug abuse patient records; (h) Title V111 of the Civil Rights Act of 1968 (42 U.S.C. §§ 3601 et seq.), as amended, relating to nondiscrimination in the sale, rental or financing of housing, (i) 49 U.S.C. § 306, which prohibits discrimination on the basis of race, color, national origin, or sex in railroad financial assistance programs; (j) any other nondiscrimination provisions in the specific statute(s) under which application

for Federal assistance was made; and (k) the requirements of any other nondiscrimination statute(s) which may apply to the Grantee.

20. **Americans With Disabilities Act:**

The Grantee agrees to utilize funds provided under this Agreement in a manner consistent with the requirements of the Americans With Disabilities Act of 1990, as amended (42 U.S.C. § 12101 et seq.).

21. **Environmental Protection:**

a. All facilities that will be used to perform work under this Agreement shall not be so used unless the facilities are designed and equipped to limit water and air pollution in accordance with all applicable local, state and Federal standards.

b. The Grantee will conduct work under this Agreement, and will require that work that is conducted as a result of this Agreement be in compliance with the following provisions, as modified from time to time, all of which are incorporated herein by reference: section 114 of the Clean Air Act, 42 U.S.C. 7414, and section 308 of the Federal Water Pollution Control Act, 33 U.S.C. 1318, and all regulations issued thereunder. The Grantee certifies that no facilities that will be used to perform work under this Agreement are listed on the List of Violating Facilities maintained by the Environmental Protection Agency ("EPA"). The Grantee will notify the Administrator as soon as it or any contractor or subcontractor receives any communication from the EPA indicating that any facility which will be used to perform work pursuant to this Agreement is under consideration to be listed on the EPA's List of Violating Facilities; provided, however, that the Grantee's duty of notification hereunder shall extend only to those communications of which it is aware, or should reasonably have been aware. The Grantee will include or cause to be included in each contract or subcontract entered into, which contract or subcontract exceeds Fifty Thousand Dollars ($50,000.00) in connection with work performed pursuant to this Agreement, the criteria and requirements of this section and an affirmative covenant requiring such contractor or subcontractor to immediately inform the Grantee upon the receipt of a communication from the EPA concerning the matters set forth herein.

c. The Grantee may not expend any of the funds provided in this agreement on construction or other activities that represent an irretrievable commitment of resources to a particular course of action affecting the environment until after all environmental and historic preservation analyses required by the National Environmental Policy Act (42 U.S.C. 4332)(NEPA), the National Historic Preservation Act (16 U.S.C. 470(f))(NHPA), and related laws and regulations have been completed and the FRA has provided the Grantee with a written notice authorizing the Grantee to proceed.

d. The Grantee shall assist the FRA in its compliance with the provisions of NEPA, the Council on Environmental Quality's regulations implementing NEPA (40 C.F.R. Part 1500 et seq.), FRA's "Procedures for Considering Environmental Impacts" (45 Fed. Reg. 40854, June 16, 1980), as revised May 26, 1999, 64 Fed. Reg. 28545), Section 106 of the NHPA, and related environmental and historic preservation statutes and regulations. As a condition of receiving financial assistance under this agreement, the Grantee may be required to conduct certain environmental analyses and to prepare and submit to the FRA draft documents required under NEPA, NHPA, and related statutes and regulations (including draft environmental assessments and proposed draft and final environmental impact statements).

e. No publicly-owned land from a park, recreational area, or wildlife or waterfowl refuge of national, state, or local significance as determined by the Federal, State, or local officials having jurisdiction thereof, or any land from an historic site of national, state or local significance as so determined by such officials shall be used by the Grantee without the prior written concurrence of FRA. The Grantee

shall assist the FRA in complying with the requirements of 49 U.S.C. §303(c).

f. The Grantee agrees to facilitate compliance with the policies of Executive Order No. 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," 42 U.S.C. '4321 note, except to the extent that the FRA determines otherwise in writing.

22. **Project Completion, Audit, Settlement, and Closeout:**

a. **Project Completion.** Within 90 days of the Project completion date or termination by FRA, the Grantee agrees to submit a final Federal Financial Report (Standard Form 425), a certification or summary of Project expenses, and third party audit reports, as applicable.

b. **Audits.** Each governmental Grantee agrees to undertake the audits required by 49 C.F.R. § 18.26 and OMB Circular A-128 or any revision or supplement thereto. Each non-governmental Grantee agrees to undertake the audits required by 49 C.F.R. § 19.26 and OMB Circular A-133 or any revision or supplement thereto.

c. **Remittance of Excess Payments.** If FRA has made payments to the Grantee in excess of the total amount of FRA funding due, the Grantee agrees to promptly remit that excess and interest as may be required by the "Payment by FRA" section of this Attachment.

d. **Project Closeout.** Project closeout occurs when all required Project work and all administrative procedures described in 49 C.F.R. Part 18, or 49 C.F.R. Part 19, as applicable, have been completed, and when FRA notifies the Grantee and forwards the final Federal assistance payment, or when FRA acknowledges the Grantee's remittance of the proper refund. Project closeout shall not invalidate any continuing obligations imposed on the Grantee by this Agreement or by the FRA's final notification or acknowledgment.

23. **Right of FRA to Terminate:**

a. Upon written notice, the Grantee agrees that FRA may suspend or terminate all or part of the financial assistance provided herein if the Grantee has violated the terms of this Agreement, or if FRA determines that the purposes of the statute under which the Project is authorized would not be adequately served by continuation of Federal financial assistance for the Project. Any failure to make reasonable progress on the Project or other violation of this Agreement that significantly endangers substantial performance of the Project shall provide sufficient grounds for FRA to terminate this Agreement.

b. In general, termination of any financial assistance under this Agreement will not invalidate obligations properly incurred by the Grantee and concurred in by FRA before the termination date, to the extent those obligations cannot be canceled. However, if FRA determines that the Grantee has willfully misused Federal assistance funds by failing to make adequate progress, failing to make reasonable use of the Project property, facilities, or equipment, or failing to adhere to the terms of this Agreement, FRA reserves the right to require the Grantee to refund the entire amount of FRA funds provided under this Agreement or any lesser amount as may be determined by FRA.

c. Expiration of any Project time period established for this Project does not, by itself, constitute an expiration or termination of this Agreement.

24. **Transparency Act Requirements—Reporting Subawards and Executive Compensation (Does not Apply to American Recovery and Reinvestment Act Funds):**

The Grantee will insert the following clause in all first-tier subgrants of $25,000 or more--

a. **Reporting of First-Tier Subawards.**

1) Applicability. Unless you are exempt as provided in paragraph d. of this section, you must report each action that obligates $25,000 or more in Federal funds that does not include Recovery funds (as defined in section 1512(a)(2) of the American Recovery and Reinvestment Act of 2009, Pub. L. 111-5) for a subaward to an entity (see definitions in subsection e. of this section).

2) Where and when to report.

a. You must report each obligating action described in subsection a.1. of this section to http://www.fsrs.gov.

b. For subaward information, report no later than the end of the month following the month in which the obligation was made. (For example, if the obligation was made on November 7, 2010, the obligation must be reported by no later than December 31, 2010.)

3) What to report. You must report the information about each obligating action that the submission instructions posted at http://www.fsrs.gov specify.

b. **Reporting Total Compensation of Recipient Executives.**

1) Applicability and what to report. You must report total compensation for each of your five most highly compensated executives for the preceding completed fiscal year, if—

a. the total Federal funding authorized to date under this award is $25,000 or more;

b. in the preceding fiscal year, you received—

(1) 80 percent or more of your annual gross revenues from Federal procurement contracts (and subcontracts) and Federal financial assistance subject to the Transparency Act, as defined at 2 CFR 170.320 (and subawards); and

(2) $25,000,000 or more in annual gross revenues from Federal procurement contracts (and subcontracts) and Federal financial assistance subject to the Transparency Act, as defined at 2 CFR 170.320 (and subawards); and

c. The public does not have access to information about the compensation of the executives through periodic reports filed under section 13(a) or 15(d) of the Securities Exchange Act of 1934 (15 U.S.C. 78m(a), 78o(d)) or section 6104 of the Internal Revenue Code of 1986. (To determine if the public has access to the compensation information, see the U.S. Security and Exchange Commission total compensation filings at http://www.sec.gov/answers/execomp.htm.)

2) Where and when to report. You must report executive total compensation described in subsection b.1. of this section:

a. As part of your registration profile at http://www.ccr.gov.

b. By the end of the month following the month in which this award is made, and annually thereafter.

c. **Reporting of Total Compensation of Subrecipient Executives.**

1) Applicability and what to report. Unless you are exempt as provided in subsection d. of this section, for each first-tier subrecipient under this award, you shall report the names and total compensation of each of the subrecipient's five most highly compensated executives for the subrecipient's preceding completed fiscal year, if—

a. in the subrecipient's preceding fiscal year, the subrecipient received—

(1) 80 percent or more of its annual gross revenues from Federal procurement contracts (and subcontracts) and Federal financial assistance subject to the Transparency Act, as defined at 2 CFR 170.320 (and subawards); and

(2) $25,000,000 or more in annual gross revenues from Federal procurement contracts (and subcontracts), and Federal financial assistance subject to the Transparency Act (and subawards); and

b. The public does not have access to information about the compensation of the executives through periodic reports filed under section 13(a) or 15(d) of the Securities Exchange Act of 1934 (15 U.S.C. 78m(a), 78o(d)) or section 6104 of the Internal Revenue Code of 1986. (To determine if the public has access to the compensation information, see the U.S. Security and Exchange Commission total compensation filings at http://www.sec.gov/answers/execomp.htm.)

2) Where and when to report. You must report subrecipient executive total compensation described in subsection c.1. of this section:

a. To the recipient.

b. By the end of the month following the month during which you make the subaward. For example, if a subaward is obligated on any date during the month of October of a given year (i.e., between October 1 and 31), you must report any required compensation information of the subrecipient by November 30 of that year.

d. **Exemptions.**

If, in the previous tax year, you had gross income, from all sources, under $300,000, you are exempt from the requirements to report:

a. Subawards,

and

b. The total compensation of the five most highly compensated executives of any subrecipient.

e. **Definitions. For purposes of this section:**

1) Entity means all of the following, as defined in 2 CFR part 25:

a. A Governmental organization, which is a State, local government, or Indian tribe;

b. A foreign public entity;

c. A domestic or foreign nonprofit organization;

d. A domestic or foreign for-profit organization;

e. A Federal agency, but only as a subrecipient under an award or subaward to a non-Federal entity.

2) Executive means officers, managing partners, or any other employees in management positions.

3) Subaward:

a. This term means a legal instrument to provide support for the performance of any portion of the substantive project or program for which you received this award and that you as the recipient award to an eligible subrecipient.

b. The term does not include your procurement of property and services needed to carry out the project or program (for further explanation, see Sec. —— .210 of the attachment to OMB Circular A-133, "Audits of States, Local Governments, and Non-Profit Organizations").

c. A subaward may be provided through any legal agreement, including an agreement that you or a subrecipient considers a contract.

4) Subrecipient means an entity that:

a. Receives a subaward from you (the recipient) under this award; and

b. Is accountable to you for the use of the Federal funds provided by the subaward.

5) Total compensation means the cash and noncash dollar value earned by the executive during the recipient's or subrecipient's preceding fiscal year and includes the following (for more information see 17 CFR 229.402(c)(2)):

a. Salary and bonus.

b. Awards of stock, stock options, and stock appreciation rights. Use the dollar amount recognized for financial statement reporting purposes with respect to the fiscal year in accordance with the Statement of Financial Accounting Standards No. 123 (Revised 2004) (FAS 123R), Shared Based Payments.

c. Earnings for services under non-equity incentive plans. This does not include group life, health, hospitalization or medical reimbursement plans that do not discriminate in favor of executives, and are available generally to all salaried employees.

d. Change in pension value. This is the change in present value of defined benefit and actuarial pension plans.

e. Above-market earnings on deferred compensation which is not tax-qualified.

f. Other compensation, if the aggregate value of all such other compensation (e.g. severance, termination payments, value of life insurance paid on behalf of the employee, perquisites or property) for the executive exceeds $10,000.

25. **Entire Agreement:**

This Agreement constitutes the entire agreement between the parties. All prior discussions and understandings concerning such scope and subject matter are superseded by this Agreement.

26. **Grant Amendments:**

Modifications to this Agreement may be made only in writing, signed by the each party's authorized representative, and specifically referred to as a modification to this Agreement.

27. **Flow Down Provisions:**

The Grantee shall include provisions to carry out the purposes of this Agreement in all contracts or grant agreements with persons who perform any part of the work under this Agreement. There shall be provisions for a further flow down of such requirements to each sub-tier contractor or grantee as required.

28. **Successors and Assignees:**

This Agreement may not be assigned without the express prior written consent of the other party.

29. **Execution:**

This Agreement may be executed in several counterparts, each of which shall be deemed an original.

30. **Severability:**

If any provision of this Agreement is held invalid, all remaining provisions of this Agreement shall continue in full force and effect to the extent not inconsistent with such holding.

NOTICE TO CONTRACTOR – HAZARDOUS MATERIALS INVESTIGATIONS

A limited hazardous building materials site investigation has been conducted at the AMTRAK – Union Station Platform in Hartford, Connecticut where renovations are scheduled.

The results of this investigation indicated the presence of asbestos-containing materials (ACM) identified on the North and South platforms and in the C-S room. Lead based paint (LBP) was identified on metal columns and beams, plaster, concrete and brick. Universal Waste (UW) items, Connecticut Regulated Waste (CRW) items, CFC's/Freon devices and microbial growth were also identified and all are expected to be impacted by the renovation.

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

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

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

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

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

Information pertaining to the results of the hazardous building materials investigation 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.

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- Pre-Renovation Investigative Survey for Hazardous Building Materials, AMTRAK – Union Station Platform, Hartford, Connecticut, TRC, July 2014.

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 buildings unless said damage is scheduled as part of the Project work. The Contractor shall take all precautions necessary to protect the existing facilities and its occupants for the duration said facilities are to remain in operation.

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 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. Sanitary Facilities: The Contractor is responsible for emptying the sanitary facilities at its expense.

The Contractor shall bid the Project accordingly.

NOTICE TO CONTRACTOR – LIMITED SPACE AND AVAILABILITY OF PARKING

In order to maintain the maximum number of parking spaces available to commuters at the active station, the Contractor shall restrict its operations to the area(s) 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 the staging area, outside of the limits of operation of the active station.

NOTICE TO CONTRACTOR – LOCAL PERMITS

The Contractor is hereby notified that permits from local authorities are required for this project. These permits include, but may not be limited to, the following:

Demolition Permit (City of Hartford Building and Trade Inspection Division)

Electrical Permit (City of Hartford Building and Trade Inspection Division)

Hot Work Permit (City of Hartford Fire Department)

The Contractor shall apply for and obtain all local permits as required, and shall pay all associated fees.

The Contractor shall submit a copy of the approved permit(s), to the Engineer, a minimum of 15 working days prior to the start of any associated work.

The Contractor is hereby notified that the local authority may impose a waiting period before granting any permit. It is the Contractor's responsibility to schedule activities to accommodate for such waiting periods and that these waiting periods will not be allowed as the basis of delay claims.

The Contractor shall bid the project accordingly.

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 Item (MLSI), of the Project, Item No. 0063510A, titled "Rail Facility Upgrade". These separate 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.

NOTICE TO CONTRACTOR – PHOTO IDENTIFICATION

The Contractor is hereby notified that all employees, including subcontractors, who will work on the Project will be required to carry personal photo identification, such as a valid driver's license.

NOTICE TO CONTRACTOR – PLATFORM CONSTRUCTION

This project contains platform construction along existing railroad tracks. Where shown on the plans, the approximate centerline of the existing track has been established utilizing data included in the survey performed by the Connecticut Department of Transportation. The existing track centerlines are shown for informational purposes only and are in no way warranted to indicate the as-built conditions in the field. The Contractor shall verify the location of the tracks via a field survey prior to the start of platform construction and shall notify the Engineer immediately of any discrepancies.

The Contractor is advised that the railroad platforms must be constructed to specific offset requirements as required by Amtrak. These requirements are shown on Amtrak Standard Track Plan 70050-G "Minumum Roadway Clearances" and are detailed below:

> **At all times during construction of the platforms, the Contractor shall maintain a 5'-7" horizontal offset to the face of the rubrail and a 4'-0" vertical offset from the top of nearest rail as shown on the plans and in Amtrak Standard Track Plan 70050-G.**

The Contractor shall develop and submit a "Platform Layout Plan" to the Engineer and Amtrak for review and approval prior to commencing work on the platform construction. The Contractor's "Platform Layout Plan" shall adhere to all offset requirements as required by Amtrak and shown on Amtrak Standard Track Plan 70050-G, noted above, and as shown in the contract plans.

If made available by the Department, the Contractor shall not rely on CADD files for the construction of the railroad platforms and items incidental thereto. At all times, the Contractor shall be bound by the horizontal and vertical offset controls noted above. It is the Contractor's responsibility to field verify the site conditions, and notify the Engineer of any discrepancies, prior to the start of the platform construction.

The Contractor shall bid the project accordingly.

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 5 Section 051300, "Retractable Platform Edge."
2. Division 6 Section 066000, "Pre-Engineered Reinforced Composite Transit Platforms."
3. Division 8 Section 087100, "Door Hardware."
4. Division 23 Section 230584, "Through Penetration Firestop Systems"
5. Division 23 Section 230713, "Duct Installation"
6. Division 23 Section 230716, "Equipment Insulation"
7. Division 23 Section 230719, "HVAC Piping Insulation"

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. Structural Steel Framing, CSI Section 051200
3. Retractable Platform Edge, CSI Section 051300
4. Pre-Engineered Reinforced Composite Transit Platforms, CSI Section 066000
5. Site Wayfinding & Identification Signage, CSI Section 104250
6. Raceway and Boxes for Electrical Systems, CSI Section 260533
7. Decorative Metal Fences and Gates, CSI Section 323116

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 – RAILROAD SAFETY TRAINING

All individuals employed by the Contractor and its subcontractors shall attend AMTRAK's online 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. All individuals working on the project must carry their AMTRAK safety training cards at all times while on railroad property. Registration and payment by the Contractor of $18 per class per person must be made online at www.amtrakcontractor.com prior to taking the training. The training is required yearly. 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.

NOTICE TO CONTRACTOR - RIGHTS OF WAY RESTRICTIONS

The Contractor is hereby advised that at the time of advertising for bids not all property may be acquired by the State, and asbestos removal, by others, to be disposed of may not have been completed. The Contractor is further advised that limitations, as enumerated herein below, are imposed which may interfere with the physical construction of the project. Following are statements which will set forth the restrictions on the right of entrance to property and conditions governing construction of the project.

1. The Contractor shall not occupy property that is not acquired, perform any work thereon, or inhibit access thereto until the properties have been acquired and right of possession has been obtained. If the Contractor is allowed to proceed with the physical construction of the project, no action will be taken that will result in unnecessary inconvenience such as the discontinuance of utilities, the prevention of ingress and egress to the property, or will result in disproportionate injury or any action coercive in nature to occupants.

2. The Contractor shall notify property owners a minimum of 30 days in advance of any use of, or work on, any parcels noted as requiring an "Access Easement", "Temporary Access Easement", or "Construction Easement".

   The following is a complete listing of properties which have not been acquired, and vacated as of September 15, 2014 with the anticipated dates such properties will be acquired and/or vacated.

NAME	LOCATION
Greater Hartford Transit District (Title Est. by May 29, 2015)	Union Station

3. In addition to the requirements of No. 2 above, the Contractor is notified that all work impacting the Greater Hartford Transit District property must be completed within the time frames noted in the Contract Documents. Specifically, the Contractor will be allowed to close/impact the parking lot under the southern portion of the viaduct for a period of 50 calendar days, and the parking lot under the northern portion of the viaduct for a period of 90 calendar days. The Contractor shall employ extra manpower, equipment and/or workshifts, including overtime and/or weekends, to complete the work in accordance with the specified time. The Contractor shall bid the project accordingly.

4. It should be anticipated that the Greater Hartford Transit District property may be considered to have an effect upon construction operations.

5. The Contractor shall be aware that extensions of time will be granted, if necessary, for delays in construction operations caused by property not being acquired or asbestos abatement concluding beyond the estimated time period.

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 – 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. Retractable Platform Edge, CSI Section 051300
2. Vitrified Polymer Composite (VPC) Surface Applied Tactile Tiles, CSI Section 051300
3. Pre-Engineered Reinforced Composite Transit Platforms, CSI Section 066000
4. Pre-Engineered Reinforced Composite Transit Stairs, CSI Section 066000
5. Aggregate Deck Topping, CSI Section 066000
6. Passenger Information Display (PID) Systems, CSI Section 274216

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 shall 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 – 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 Form 816 Article 1.20-1.05.02 and the latest ConnDOT Policies and Procedures. All submittals shall be produced and controlled using SharePoint, in accordance with Item No. 0969050A – Document Control Specialist.

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

Transmittal letters shall be sent digitally via the SharePoint System (Email Notification) to Mr. Bruce A. Olmstead, P.E., Transportation Supervising 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. Eric Bergeron.; and to the District 1 Administration Office, 1107 Cromwell Avenue, Rocky Hill, CT 06067, ATTN: Ravi Chandran. The appropriate distributions will be set up by the Program Manager (PB) prior to the Notice to Proceed.

Submittals requiring review for conformance with the Contract that shall be submitted digitally to the Assistant District Engineer in lieu of the Designer are listed below:

Concrete 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 will also be sent digitally via the SharePoint System to Denise Young, DOT Environmental Compliance, Bureau of Engineering and Construction, Connecticut Department of Transportation, 2800 Berlin Turnpike, P.O. Box 317546, Newington, CT 06131-7546. The appropriate distributions will be set up by the Program Manager (PB) prior to the Notice to Proceed.

Health and Safety Plan
Disposal Plan and Site
Lead/Asbestos Abatement Plan

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.

The Contractor shall also provide FM Global with one (1) printed copy of the any submittals required as part of the Notice to Contractor – FM Global Submittals and/or as required in the specifications. Address:

FM Global, Boston Operations
1175 Boston-Providence Turnpike
Norwood, MA 02062

All submittals are to be packaged in PDF format according to guides provided by the Program Management Team (PB) and transmitted digitally using the SharePoint System. For all approved submittals, the Contractor shall maintain a record copy (paper print) of approved submittals on site at the field trailer and transmit 1 paper copy of approved submittals to the designated CTDOT inspection field office addressed to District 1 Engineer – Ravi Chandran.

Samples: Where Samples are for selection of color, pattern, texture or similar characteristics from a range of choices, submit two (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 one (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 – 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 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.

For measurement and payment for work described in this Notice to Contractor see Item No. 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 UNIFORM PROFILE (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	N/A	2 ¼	2 ¾	3 ¾
2	30	1	1 ⅝	N/A	2	1 ½	2 ¼
3	60	1	1 ½	N/A	1 ⅝	7/8	1 ¼
4	80	1	1 ¼	N/A	1 ½	¾	1
5	90	1	1 ⅛	N/A	1	⅜	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	N/A	1 ⅛	1 ⅜	1 ⅞
2	30	½	13/16	N/A	1	¾	1 ⅛
3	60	½	¾	N/A	13/16	7/16	⅝
4	80	½	⅝	N/A	¾	⅜	½
5	90	½	9/16	N/A	½	3/16	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 – UTILITY SERVICE CONNECTIONS [AND RELOCATIONS]

The **electric, telephone, gas, water (including fire protection), and sewer** services to the Project Site require service connections **to** the applicable utility company's facilities. Utility service connections **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: Northeast Utilities Service Company
Telephone: AT&T Connecticut

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

An allowance is included in the Contract to reimburse the affected utilities for the work required to install their facilities to the new/upgraded railroad stations. The Contractor shall include this allowance 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 – 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). In addition to Amtrak trains, trains operated by the Connecticut Southern Railroad, CSX Railroad, and Pan Am Railroad operate on the territory. 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 activities 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. The Contractor shall not be entitled to time extensions for delays associated with normal Railroad operations. 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 the Contractor 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.

The Contractor’s activities may overlap with activities of other contractors engaged in construction projects on the railroad. There is a potential for limitations on track outages and extraordinary requirements for vehicular access coordination. A series of fourteen full track

outages extending from Monday nights at 10 PM until Wednesday mornings at 6 AM will be implemented during the construction period to facilitate culvert replacements conducted by another Contractor. The Contractor shall conduct the work within such limitations and coordinate activities for overpass installation within these outages. This may require night work, premium time, weekend work, or multiple shifts. The Contractor is fully responsible to complete the contract work.

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:

DAYTIME: Monday to Sunday 7:30 am to 1:30 pm
OR DAYTIME: Monday to Friday 7:30 am to 1:30 pm
Saturday and Sunday Extended duration outages (greater than 1.5 hours) not available, shorter windows of foul time may be available between trains, see Timetables.

NIGHT: Monday to Thursday Night 10:00 pm to 6:00 am
Friday Night 12:00 am to 6:00 am
Saturday Night 11:30 pm to 6:00 am
Sunday Night 10:30 pm to 6:00 am

The contractor can expect to lose ½ hour at the beginning and end of each of the above windows. This time allows the employee in charge to obtain use of the track for contractor purposes as well as time for the contractor to clear up before track is returned to Amtrak.

The contractor should plan to lose 10 percent of the daily (day and night combined) track time listed in Section 2 above to scheduled and unscheduled Amtrak or other Railroad

maintenance or operations (i.e. Sperry car, equipment moves, circus train). Loss in track time greater than 10% should be submitted to the COTR/CM on a daily basis.

Sixty (60) temporary at-grade crossings across tracks WILL be permitted with advance authorization by AMTRAK and the Engineer. Provide a minimum of 30 calendar days advance notice for scheduling any work to be performed by AMTRAK forces.

All work involving rail, ties, and other track components on active tracks, crossing warning systems and signal work, unless specifically designated otherwise within the Contract, will be performed by AMTRAK employees.

Notes:

1. Single-track outages in double track territory 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 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 the times the track(s) will be out of service. These outage times do not represent the time the track(s) are available to the Contractor. Time needs to be allowed to take the track out of service and return track to service within the durations noted above.

4. Station area work shall be performed, and flag protection acquired, in accordance with AMTRAK Safety procedures.

5. AMTRAK employees, unless specifically designated otherwise within the Contract, will perform all work involving rail, ties, and other track components, crossing warning systems and signal work on all tracks (in service or out of service). The Contractor may not remove abandoned track (out of service) unless given prior written approval from the Engineer and AMTRAK.

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 - RAILROAD SPECIFICATIONS

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

NOTICE TO CONTRACTOR - CONNECTICUT DEPARTMENT OF TRANSPORTATION DISCLAIMER

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

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

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

NOTICE TO CONTRACTOR - TRAFFIC DRUMS AND TRAFFIC CONES

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

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

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

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

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

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

Prior to using the Category 1 Devices on the project, the Contractor shall submit to the Engineer a copy of the manufacturer's self-certification that the devices conform to the requirements in National Cooperative Highway Research Program (NCHRP) Report 350 or the AASHTO Manual for Assessing Safety Hardware (MASH), as appropriate.

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

Prior to using Category 2 Devices on the project, the Contractor shall submit to the Engineer a copy of the Letter of Acceptance issued by the FHWA to the manufacturer documenting that the devices (both sign and portable support tested together) have been crash tested and have approval in writing from FHWA conforming to the requirements in National Cooperative Highway Research Program (NCHRP) Report 350 or the AASHTO Manual for Assessing Safety Hardware (MASH), as appropriate.

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

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

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

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

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

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

Prior to using Category 3 Devices on the project, the Contractor shall submit to the Engineer a copy of the Letter of Acceptance issued by the FHWA to the manufacturer documenting that the devices have been crash tested and have approval in writing from FHWA conforming to the requirements in National Cooperative Highway Research Program (NCHRP) Report 350 or the AASHTO Manual for Assessing Safety Hardware (MASH), as appropriate.

SECTION 1.02 – PROPOSAL REQUIREMENTS AND CONDITIONS

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

Replace the third sentence of the last paragraph with:

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

SECTION 1.03 - AWARD AND EXECUTION OF CONTRACT

Article 1.03.02 - Award and Execution of Contract:

After the second sentence of the only paragraph add the following:

The successful bidder is hereby notified of the Department's intent to award this contract within 63 days of the bid opening.

Article 1.03.08 - Notice to Proceed and Commencement of Work:

Change the first paragraph to read as follows:

The Contractor shall commence and proceed with the Contract work on the date specified in a written Notice to Proceed issued by the Engineer to the Contractor. The date specified will be no later than 45 calendar days after the date of the execution of the Contract by the Department, however, the contractor is hereby put on notice that it is the Department's intent to issue the Notice to Proceed no later than 40 calendar days after the date of the execution of the Contract by the Department.

SECTION 1.07 - LEGAL RELATIONS AND RESPONSIBILITIES

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

Add the following after the only paragraph:

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

SECTION 1.08 - PROSECUTION AND PROGRESS

Article 1.08.07 - Determination of Contract Time:

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

When the contract time is on a calendar day basis, it shall be the number of consecutive calendar days stated in the contract, INCLUDING the time period from December 1 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.".

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

Description

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

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

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

Funding

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

Minorities and Women

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

Assigning Training Goals

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

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

The dollar thresholds for training assignments are as follows:

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

Training Classifications

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

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

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

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

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

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

Records and Reports

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

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

Trainee Interviews

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

Trainee Wages

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

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

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

Achieving or Failing to Meet Training Goals

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

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

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

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

Measurement and Payment

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

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

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

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

www.ct.gov/dot

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

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

January 2013

I. ABBREVIATIONS AND DEFINITIONS AS USED IN THIS SPECIAL PROVISION

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

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

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

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

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

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

1. That is at least 51 percent owned by one or more individuals who are both socially and economically disadvantaged or, in the case of a corporation, in which 51 percent of the stock is owned by one or more such individuals; and

2. Whose management and daily business operations are controlled by one or more of the socially and economically disadvantaged individuals who own it; and

3. Certified by CTDOT under Title 49 of the Code of Federal Regulations, Part 26, (Title 49 CFR Part 23 of the Code of Federal Regulations for Participation of Disadvantaged Business Enterprise in Airport Concessions)

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

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

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

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

1. Any individual who CTDOT finds, on a case-by-case basis, to be a socially and economically disadvantaged individual.

2. Any individuals in the following groups, members of which are rebuttably presumed to be socially and economically disadvantaged:

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

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

II. ADMINISTRATIVE REQUIREMENTS

A. General Requirements

A DBE goal percentage equaling **SIX (6.0)** percent (%) of the Contract value has been established for this Contract. This DBE goal percentage will be applied to the final Contract value to ultimately determine the required DBE goal. If additional work is required, DBE firms should be provided the appropriate opportunities to achieve the required DBE goal.

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

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

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

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

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

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

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

In addition, the report shall include:

1. A projected time frame of when the remaining work is to be completed for each DBE.

2. A statement by the Contractor either confirming that the approved DBEs are on schedule to meet the Contract goal, or that the Contractor is actively pursuing a GFE.

3. If retainage is specified in the Contract specifications, then a statement of certification that the subcontractors' retainage is being released in accordance with 1.08.01 (Revised or supplemented).

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

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

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

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

B. Subcontract Requirements

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

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

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

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

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

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

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

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

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

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

C. Modification to Pre-Award Commitment

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

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

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

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

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

1. If the change is due to a scope of work revision or non-routine quantity revision by CTDOT, the Contractor must notify CTDOT's OOC in writing or via electronic mail that their DBE participation on the project may be impacted as soon as they are aware of the change. In this case, a release of work from the DBE firm may not be required; however the Contractor must concurrently notify the DBE firm in writing, and copy the OOC for inclusion in the project DBE file. This does not relieve the Contractor of its obligation to meet the Contract specified DBE goal, or of any other responsibility found in this specification.

2. If the change is due to a factor other than a CTDOT directive, a request for approval in writing or via electronic mail of the modification from the OOC must be submitted, along with an explanation of the change(s), prior to the commencement of work. The Contractor must also obtain a letter of release from the originally named DBE indicating their concurrence with the change, and the reason(s) for their inability to perform the work. In the event a release cannot be obtained, the Contractor must document all efforts made to obtain it.

3. In the event a DBE firm that was listed in the pre-award documents is **unable** or **unwilling** to perform the work assigned, the Contractor shall:

    - Notify the OOC Division Chief immediately and make efforts to obtain a release of work from the firm.

    - Submit documentation that will provide a basis for the change to the OOC for review and approval prior to the implementation of the change.

    - Use the DBE Directory to identify and contact firms certified to perform the type of work that was assigned to the unable or unwilling DBE firm. The Contractor should also contact CTDOT's Office of Contract Compliance for assistance in locating additional DBE firms to the extent needed to meet the contract goal.

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

If the Contractor is unable to find a DBE replacement:

- The Contractor should identify other contracting opportunities and solicit DBE firms in an effort to meet the Contract DBE goal requirement, if necessary, and provide documentation to support a GFE. (Refer to GFE in Section III.)

- The Contractor must demonstrate that the originally named DBE, who is unable or unwilling to perform the work assigned, is in default of its subcontract, or identify other issues that affected the DBE firm's ability to perform the assigned work. **The Contractor's ability to negotiate a more advantageous agreement with another subcontractor is not a valid basis for change.**

III. GOOD FAITH EFFORTS

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

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

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

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

1. A detailed statement of the efforts made to replace an unable or unwilling DBE firm, and a description of any additional subcontracting opportunities that were identified and offered to DBE firms in order to increase the likelihood of achieving the stated goal.

2. A detailed statement, including documentation of the efforts made to contact and solicit bids from certified DBEs, including the names, addresses, and telephone numbers of each DBE firm contacted; the date of contact and a description of the information provided to each DBE regarding the scope of services and anticipated time schedule of work items proposed to be subcontracted and the response from firms contacted.

3. Provide a detailed explanation for each DBE that submitted a subcontract proposal which the Contractor considered to be unacceptable stating the reason(s) for this conclusion.

4. Provide documentation, if any, to support contacts made with CTDOT requesting assistance in satisfying the specified Contract goal.

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

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

IV. PROJECT COMPLETION

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

1. Submit a final report to CTDOT`s unit administering the Contract indicating the work done by, and the dollars paid to DBEs.

2. Submit verified payments made to all DBE subcontractors for the work that was completed.

3. Submit documentation detailing any changes to the DBE pre-award subcontractors that have not met the original DBE pre-award commitment, including copies of the Department's approvals of those changes.

4. Retain all records for a period of three (3) years following acceptance by CTDOT of the Contract and those records shall be available at reasonable times and places for inspection by authorized representatives of CTDOT and Federal agencies. If any litigation, claim, or audit is started before the expiration of the three (3) year period, the records shall be retained until all litigation, claims, or audit findings involving the records are resolved.

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

V. SHORTFALLS

A. Failure to meet DBE goals

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

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

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

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

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

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

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

B. Administrative Remedies for Non-Compliance:

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

1. A reduction in Contract payments to the Contractor as determined by CTDOT, not to exceed the shortfall amount of the **DBE goal**. The maximum shortfall will be calculated by multiplying the Contract DBE goal (adjusted by any applicable GFE) by the final Contract value, and subtracting any verified final payments made to DBE firms by the Contractor.

2. A reduction in Contract payments to the Contractor determined by CTDOT, not to exceed the shortfall amount of the **pre-award commitment**. The maximum shortfall will be calculated by subtracting any verified final payments made by the Contractor to each DBE subcontractor from the amount originally committed to that subcontractor in the pre-award commitment.

3. A reduction in Contract payments to the Contractor determined by CTDOT for any pre-award DBE subcontractor who has not obtained the dollar value of work identified in the DBE pre-award commitment and has not followed the requirements of Section II-C or for any DBE firm submitted for DBE credit that has not performed a CUF.

4. The Contractor being required to submit a written DBE Program Corrective Action Plan to CTDOT for review and approval, which is aimed at ensuring compliance on future projects.

5. The Contractor being required to attend a Non-Responsibility Meeting on the next contract where it is the apparent low bidder.

6. The Contractor being suspended from bidding on contracts for a period not to exceed six (6) months.

VI. CLASSIFICATIONS OTHER THAN SUBCONTRACTORS

A. Material Manufacturers

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

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

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

B. Material Suppliers (Dealers)

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

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

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

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

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

C. Brokering

- Brokering of work for DBE firms who have been listed by the Department as certified brokers is allowed. Credit for those firms shall be applied following the procedures in Section VI-D.

- Brokering of work by DBEs who have been approved to perform subcontract work with their own workforce and equipment is not allowed, and is a Contract violation.

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

D. Non-Manufacturing or Non-Supplier DBE Credit

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

- Reasonable fees or commissions charged for providing a bona fide service such as professional, technical, consultant or managerial services and assistance in the procurement of essential personnel, facilities, equipment materials or supplies necessary for the performance of the Contract, provided that the fee or commission is determined by the OOC to be reasonable and consistent with fees customarily allowed for similar services.

- The fees charged only for delivery of materials and supplies required on a job site when the hauler, trucker, or delivery service is a DBE, and not the manufacturer, or regular dealer of the materials and supplies, and provided that the fees are determined by the OOC to be reasonable and not excessive as compared with fees customarily allowed for similar services.

- The fees or commissions charged for providing bonds or insurance specifically required for the performance of the Contract, provided that the fees or commissions are determined by CTDOT to be reasonable and not excessive as compared with fees customarily allowed for similar services.

E. Trucking

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

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

VII. Suspected DBE Fraud

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

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

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

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

State Contract No.

Federal Aid Project No.

Description of Project

I, _____, acting in behalf of _____,
(Name of person signing Affidavit) (DBE person, firm, association or corporation)
of which I am the _____ certify and affirm that _____
(Title of Person) (DBE person, firm, association or corporation)
is a certified Connecticut Department of Transportation DBE. I further certify and affirm that I have read and understand 49 CFR, Sec. 26.55(e)(2), as the same may be revised.

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

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

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

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

(Name of Corporation or Firm)

(Signature & Title of Official making the Affidavit)

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

Notary Public (Commissioner of the Superior Court)

My Commission Expires_____

CERTIFICATE OF CORPORATION

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

_____ _____
(Signature of Person Certifying) (Date)

ITEM #0000985A – TRACK MONITORING

Description: The Contractor shall monitor track horizontal and vertical movement in allowance with this special provision as follows:

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 UNIFORM PROFILE (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	N/A	2 ¼	2 ¾	3 ¾
2	30	1	1 ⅝	N/A	2	1 ½	2 ¼
3	60	1	1 ½	N/A	1 ⅝	7/8	1 ¼
4	80	1	1 ¼	N/A	1 ½	¾	1
5	90	1	1 ⅛	N/A	1	⅜	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	N/A	1 ⅛	1 ⅜	1 ⅞
2	30	½	13/16	N/A	1	¾	1 ⅛
3	60	½	¾	N/A	13/16	7/16	⅝
4	80	½	⅝	N/A	¾	⅜	½
5	90	½	9/16	N/A	½	3/16	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

Materials: As determined by the Contractor and approved by the Engineer and Amtrak.

Construction Methods: The Contractor shall submit a detailed method of track monitoring to the Engineer and Amtrak for review and approval prior to performing any sheet pile driving within 50 feet of the track and/or any excavation or directional drilling operations under the tracks.

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 price for "Track Monitoring", which price shall include all materials, equipment, tools, and labor incidental thereto.

Pay Item	Pay Unit
Track Monitoring	l.s.

ITEM 0020801A – ASBESTOS ABATEMENT

Description:

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

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

The asbestos abatement work shall include the removal and disposal of all ACM as identified on the Contract Plans and Specifications prior to the planned renovation/demolition project.

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

The Contractor may elect to utilize an Alternative Work Practice (AWP), if approved by the CTDPH and the Engineer prior to the initiation of the abatement activities. An AWP is a variance from certain CTDPH asbestos regulatory requirements, which must provide the equivalent or a greater measure of asbestos emission control than the standard work practices prescribed by the CTDPH.

Materials:

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

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

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

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

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

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

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

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

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

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

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

Mastic removal chemicals shall be low odor and non-citrus based, with a flash point in excess of 140° F.

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

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

Construction Methods:

(1) Pre-Abatement Submittals and Notices

(a) The Contractor shall submit, in accordance with CTDPH Standard 19a-332a-3, proper notification using the prescribed form, to the Commissioner, State of Connecticut, Department of Public Health not fewer than ten (10) days prior to the commencement of work as follows:

1. **The asbestos to be removed is exterior NESHAP Category I Non-Friable ACM, and it is not expected that the abatement procedures will render the Category I asbestos friable; thereby not categorizing it as NESHAP Regulated ACM (RACM); therefore not defining the removal as a CTDPH "abatement"; and as such <u>the CT licensed Asbestos Abatement Contractor will not be required to file an Asbestos Abatement notification so long as no more than 10 linear feet (LF)/25 square feet (SF) of ACM is rendered friable</u>.**

(b) Fifteen (15) working days prior to the commencement of asbestos abatement work, the Contractor shall submit to the Engineer for review and acceptance and/or acknowledgment of the following:

1. Permits and licenses for the removal, transport, and disposal of asbestos-containing or contaminated materials, including a CTDPH valid asbestos removal contractor's license.

2. Documentation dated within the previous twelve (12) months, certifying that all employees have received USEPA Model Accreditation Plan approved asbestos worker/supervisor training in the proper handling of materials that contain asbestos; understand the health implications and risks involved, including the illnesses possible from exposure to airborne asbestos fibers; understands the use and limits of respiratory equipment to be used; and understands the results of monitoring of airborne quantities of asbestos as related to health and respiratory equipment as indicated in 29 CFR 1926.1101 on an initial and annual basis, and copies of all employees CTDPH asbestos worker and/or supervisor licenses.

3. Documentation from the Contractor, typed on company letterhead and signed by the Contractor, certifying that all employees listed therein have received the following:

    a. medical monitoring within the previous twelve (12) months, as required in 29 CFR 1926.1101;
    b. respirator fit testing within the previous twelve (12) months as detailed in 29 CFR 1910.134 (for all employees who must also don a tight-fitting face piece respirator).

4. Copies of the EPA/State-approved certificates for the proposed asbestos landfill.

(c) No abatement shall commence until a copy of all required submittals have been received and found acceptable to the Engineer. Those employees added to the Contractor's

original list will be allowed to perform work only upon submittal to, and receipt of, all required paperwork by the Engineer.

(2) Asbestos Abatement Provisions:

(a) General Requirements

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

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

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

The Contractor shall:

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

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

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

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

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

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

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

(b) Set-Up

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

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

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

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

The Contractor shall ensure that no personnel or equipment be permitted to leave the Regulated Area until proper decontamination procedures (including HEPA vacuuming, wet wiping and

showering) to remove all asbestos debris have occurred. No asbestos-contaminated materials or persons shall enter the Clean Room.

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

(c) **Alternate set up requirements for exterior non-friable asbestos abatement procedures**

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

(d) Personnel Protection

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

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

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

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

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

(e) Asbestos Abatement Procedures

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

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

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

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

<u>Phase 1 –North Platform</u>

Phase 1 includes the removal of:

- **thick, asphalt floor tile (FAS1)**

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

<u>Phase 2 –South Platform</u>

Phase 2 includes the removal of:

- **thick, asphalt floor tile (FAS1)**

A regulated area(s) shall be established at the perimeter of the work area(s), and access shall be controlled by the Contractor. A remote personnel decontamination unit shall be

utilized. Removal shall be undertaken in accordance with OSHA Class II and USEPA Asbestos NESHAP requirements.

Note: ACM was identified as black putty window glaze on the door entering the C-S room. It is not expected to be impacted by the renovation.

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

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

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

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

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

After completion of abatement work, all surfaces from which asbestos has been removed shall be wet brushed, using a nylon brush, wet wiped and sponged or cleaned by an equivalent method to

remove all visible material (wire brushes are not permitted). During this work the surfaces being cleaned shall be kept wet. Cleaning shall also include the use of HEPA filtered vacuum equipment.

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

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

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

(f) Air Monitoring Requirements

1. The Contractor shall:

    a. Provide air monitoring equipment including sample filter cassettes of the type and quantity required to properly monitor operations and personnel exposure surveillance throughout the duration of the project.

    b. Conduct personnel exposure assessment air sampling, as necessary, to assure that workers are using appropriate respiratory protection in accordance with OSHA Standard 1926.1101. Documentation of air sampling results must be recorded at the work site within twenty-four (24) hours and shall be available for review until the job is complete.

2. The Project Monitor, acting as the representative of the Engineer during abatement activities, will:

    a. Collect air samples in accordance with the current revision of the NIOSH 7400 Method of Air Sampling for Airborne Asbestos Fibers while overseeing the activities of the Abatement Contractor. Frequency and duration of the air sampling during abatement will be representative of the actual conditions at the abatement site. The size and configuration of the asbestos project will be a factor in the number of samples required to monitor the abatement activities and shall be determined by the Project

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

1. Pre-Abatement (Optional)
    a. Background areas
    b. Area(s) adjacent to Work Area(s)
    c. Work Area(s)

2. During Abatement (Optional)
    a. At the exhaust of air filtering device
    b. Within Regulated Area(s)
    c. Area(s) adjacent to Regulated Areas(s) (exterior to critical barriers)
    d. At the Decontamination Enclosure System

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

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

(g) Post Abatement Work Area Deregulation

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

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

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

(h) Waste Disposal

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

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

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

Waste haulers and disposal facilities utilized shall match those indicated on the submitted CTDPH notification.

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

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

Transport vehicles hauling ACM waste shall have appropriate USDOT placards visible on all four (4) sides of the vehicle.

The Contractor shall dispose of asbestos-containing and/or asbestos contaminated material at an EPA authorized site and must be in compliance with the requirements of the Special Waste Provisions of the Office of Solid Waste Management, Department of Environmental Protection, State of Connecticut, or other designated agency having jurisdiction over solid waste disposal.

Any asbestos-containing and/or asbestos-contaminated waste materials which also contain other hazardous contaminants shall be disposed of in accordance with the EPA's Resource Conservation and Recovery Act (RCRA), CTDEEP and ConnDOT requirements. Materials may be required to be stored on-site and tested by the Project Monitor to determine proper waste disposal requirements.

(i) Project Closeout Data:

1. Provide the Engineer, within 30 days of completion of asbestos abatement, a compliance package; which shall include, but not be limited to, the following:

    a. Asbestos Abatement Site Supervisor job log;

b. OSHA personnel air sampling data;
c. Completed waste shipment records.

The Contractor shall submit the original completed waste shipment records to the Engineer.

Method of Measurement:

No measurement will be made for the work in this Section. The completed work shall be paid as a lump sum.

Basis of Payment:

The lump sum bid price for this item shall include the specialty services of the Asbestos Removal Contractor including: labor, materials, equipment, insurance, permits, notifications, submittals, personal air sampling, personal protection equipment, temporary enclosures, utility costs, incidentals, fees and labor incidental to the removal, transport and disposal of ACM, including close out documentation.

Final payment for asbestos abatement will not be made until all the project closeout data submittals have been completed (including waste shipment record(s) signed by an authorized disposal facility representative) and provided to the Engineer. Once the completed package has been received in its entirety, the Engineer will make the final payment to the Contractor.

Pay Item	Pay Unit
Asbestos Abatement	Lump Sum

ITEM 0020903A – LEAD COMPLIANCE FOR MISCELLANEOUS EXTERIOR TASKS

Description:

Work under this item shall include the special handling measures and work practices required for miscellaneous exterior tasks that impact materials containing or covered by lead paint. Lead paint includes paint found to contain **any** detectable amount of lead by Atomic Absorption Spectrophotometry (AAS) or X-Ray Fluorescence (XRF). Examples of typical miscellaneous exterior tasks includes; work impacting signs, guiderails, minor bridge rehabilitation, catenary structures, canopy structures, spot paint removal, etc.

All activities shall be performed in accordance with the OSHA Lead in Construction Regulations (29 CFR 1926.62), the USEPA RCRA Hazardous Waste Regulations (40 CFR Parts 260 through 274), and the CTDEEP Hazardous Waste Regulations (RCSA 22a-209-1 and 22a-449(c)).

All activities shall be performed by individuals with appropriate levels of OSHA lead awareness and hazard communication training and shall supervised by the Contractors Competent Person on the job site at all times. The Contractors Competent Person is one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

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

Materials:

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

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

The following material requirements are to be met if to be used during the work:

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

Polyethylene disposable bags shall be minimum six (6) mils thick.

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

Cleaning Agents and detergent shall be lead specific, such as TriSodium Phosphate (TSP).

Chemical strippers and chemical neutralizers shall be compatible with the substrate as well as with each other. Such chemical stripper shall contain less than 50% Volatile Organic Compounds (VOCs) by weight in accordance with RCSA 22a-174-40 Table 40-1.

Labels and warning signs shall conform to 29 CFR 1926.62, 40 CFR 260 through 274 and 49 CFR 172 as appropriate.

Air filtration devices and vacuum units shall be equipped with High-Efficiency Particulate Air (HEPA) filters.

Construction Methods:

(1) Pre-Abatement Submittals and Notices

A. On a per "Contiguous Site Basis," prior to the start of **any** work that will generate hazardous lead waste above conditionally exempt small quantities (greater than 100 kg/month or greater than 1000 kg at any time), the Contractor shall obtain from the Engineer a temporary EPA Hazardous Waste Generators ID number, unless otherwise directed by the Engineer.

B. Fifteen (15) working days prior to beginning work that impacts lead paint, the Contractor shall submit the following to the Engineer:

1. Work plan for work impacting lead paint including engineering controls, methods of containment of debris and work practices to be employed, as needed, to minimize employee exposure and prevent the spread of lead contamination outside the Regulated Area.

2. Copies of all employee certificates, dated within the previous twelve (12) months, relating to OSHA lead awareness and hazard communication training and training in the use of lead-safe work practices. SSPC training programs may be accepted as meeting these requirements if it can be demonstrated that such training addressed all required topics.

   This information shall be updated and resubmitted annually, or as information changes, for the duration of the activities impacting lead to verify continued compliance.

3. Name and qualifications of Contractor's OSHA Competent Person under 29 CFR 1926.62.

4. Documentation from the Contractor, typed on company letterhead and signed by the Contractor, certifying that all employees listed therein have received the following:

   a. medical monitoring within the previous twelve (12) months, as required in 29 CFR 1926.62;
   b. biological monitoring within the previous six (6) months, as required in 29 CFR 1926.62;
   c. respirator fit testing within the previous twelve (12) months, as required in 29 CFR 1910.134 (for those who don a tight-fitting face piece respirator)

   This information shall be updated and resubmitted annually, or as information changes, for the duration of the activities impacting lead to verify continued compliance.

5. Names of the proposed non-hazardous construction and demolition (C&D) lead debris bulky waste disposal facility (CTDEEP-permitted Solid Waste landfill).

6. Names of the proposed scrap metal recycling facilities. The Contractor shall submit to the Engineer all documentation necessary to demonstrate the selected facility is able to accept lead-painted scrap metal.

7. Names of the proposed hazardous waste disposal facility (selected from the Department approved list provided herein), and copies of each facilities acceptance criteria and sampling frequency requirements.

8. Copies of the proposed hazardous waste transporters current USDOT Certificate of Registration for Hazardous Materials Transport, and the proposed transporters current Hazardous Waste Transporter Permits for the State of Connecticut and the waste destination State.

9. Negative exposure assessments conducted within the previous 12 months documenting that employee exposure to lead for each task is below the OSHA Action Level of 30 $\mu g/m^3$. If a negative exposure assessment has not been conducted, the Contractor shall submit its air monitoring program for the work tasks as part of the Work Plan. Until a negative exposure assessment is developed for each task impacting lead paint, the Contractor shall ensure that all workers and authorized persons entering the Regulated Area wear protective clothing and respirators in accordance with OSHA 29 CFR 1926.62.

No activity shall commence until all required submittals have been received and found acceptable to the Engineer. Those employees added to the Contractor's original list will be allowed to perform work only upon submittal of acceptable documentation to, and review by, the Engineer.

Contractor shall provide the Engineer with a minimum of 48 hours notice in advance of scheduling, changing or canceling work activities.

(2) Lead Abatement Provisions

A. General Requirements:

All employees of the Contractor who perform work impacting lead paint shall be properly trained to perform such duties. In addition, the Contractor shall instruct all workers in all aspects of personnel protection, work procedures, emergency evacuation procedures and use of equipment including procedures unique to this project.

Contractor shall provide all labor, materials, tools, equipment, services, testing, and incidentals which are necessary or required to perform the work in accordance with applicable governmental regulations, industry standards and codes, and these Specifications.

Prior to beginning work, the Engineer and Contractor shall perform a visual survey of each work area and review conditions.

As necessary, the Contractor shall:

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

If adequate electrical supply is not available at the site, the Contractor shall supply temporary power. Such temporary power shall be sufficient to provide adequate lighting and power the Contractor's equipment. The Contractor is responsible for proper connection and installation of electrical wiring and shall ensure safe installation of electrical equipment in compliance with applicable electrical codes and OSHA requirements.

If water is not available at the site for the Contractor's use, the Contractor shall supply sufficient water for each shift to operate the wash facility/decontamination shower units in addition to the water needed at the work area.

The Engineer may provide a Project Monitor to monitor compliance of the Contractor and protect the interests of the Department. In such cases, no activity impacting lead paint shall be performed until the Project Monitor is on-site. Where no Project Monitor will be provided, Contractor shall proceed at the direction of the Engineer. Environmental sampling, including ambient air sampling, TCLP waste stream sampling, and dust wipe sampling, will be conducted by the State as it deems necessary throughout the project. Air monitoring to comply with the Contractor's obligations under OSHA remains solely responsibility of the Contractor.

If at any time, procedures for engineering, work practice, administrative controls or other topics are anticipated to deviate from those documented in the submitted and accepted Lead Work Plan,

the Contractor shall submit a modification of its existing plan for review and acceptance by the Engineer prior to implementing the change.

If air samples collected outside of the Regulated Area during activities impacting lead paint indicate airborne lead concentrations greater than original background levels or 30 ug/m^3, whichever is larger, or if at any time visible emissions of lead paint extend out from the Regulated Area, an examination of the Regulated Area shall be conducted and the cause of such emissions corrected. Cleanup of surfaces outside the Regulated Area using HEPA vacuum equipment or wet cleaning techniques shall be done prior to resuming work.

Work outside the initial designated area(s) will not be paid for by the Engineer. The Contractor will be responsible for all costs incurred from these activities including repair of any damage.

B. Regulated Area

The Contractor shall establish a Regulated Area through the use of appropriate barrier tape or other means to control unauthorized access into the area where activities impacting lead paint are occurring. Warning signs meeting the requirements of 29 CFR 1926.62 shall be posted at all approaches to Regulated Areas. These signs shall read:

WARNING
LEAD WORK AREA
POISON
NO SMOKING OR EATING

The Contractor shall implement appropriate engineering controls such as poly drop cloths, local exhaust ventilation, wet dust suppression methods, etc. as necessary, and as approved by the Engineer, to prevent the spread of lead contamination beyond the Regulated Area in accordance with the Contractor's approved work plan. Should the previously submitted work plan prove to be insufficient to contain the contamination, the Contractor shall modify its plan and submit it for review by the Engineer.

C. Wash Facilities:

The Contractor shall provide handwash facilities in compliance with 29 CFR 1926.51(f) and 29 CFR 1926.62 <u>regardless of airborne lead exposure</u>.

If employee exposure to airborne lead exceeds the OSHA Permissible Exposure Limit of 50 micrograms per cubic meter (μg/m^3), shower rooms must be provided. The Shower Room shall be of sufficient capacity to accommodate the number of workers. One shower stall shall be provided for each eight (8) workers. Showers shall be equipped with hot and cold or warm running water. Shower water shall be collected and filtered using best available technology and disposed of in accordance with all Federal, State and local laws, regulations and ordinances.

D. Personal Protection:

The Contractor shall initially determine if any employee performing construction tasks impacting lead paint may be exposed to lead at or above the OSHA Action Level of 30 $\mu g/m^3$. Assessments shall be based on initial air monitoring results as well as other relevant information. The Contractor may rely on historical air monitoring data obtained within the past 12 months under workplace conditions closely resembling the process, type of material, control methods, work practices and environmental conditions used and prevailing in the Contractors current operations to satisfy the exposure assessment requirements. Monitoring shall continue as specified in the OSHA standard until a negative exposure assessment is developed.

Until a negative exposure assessment is developed for each task impacting lead paint, the Contractor shall ensure that all workers and authorized person entering the Regulated Area wear protective clothing and respirators in accordance with OSHA 29 CFR 1926.62. Protective clothing shall include impervious coveralls with elastic wrists and ankles, head covering, gloves and foot coverings. Sufficient quantities shall be provided to last throughout the duration of the project.

Protective clothing provided by the Contractor and used during chemical removal operations shall be impervious to caustic materials. Gloves provided by the Contractor and used during chemical removal shall be of neoprene composition with glove extenders.

Respiratory protective equipment shall be provided and selection shall conform to 42 CFR Part 84, 29 CFR Part 1910.134, and 29 CFR Part 1926.62. A formal respiratory protection program must be implemented in accordance with 29 CFR Part 1926.62 and Part 1910.134.

E. Air Monitoring Requirements

The Contractor shall:

1. Provide air monitoring equipment including sample filter cassettes of the type and quantity required to properly monitor operations and personnel exposure surveillance throughout the duration of the project.

2. Conduct initial exposure monitoring to determine if any employee performing construction tasks impacting lead paint may be exposed to lead at or above the OSHA Action Level of 30 micrograms per cubic meter. Monitoring shall continue as specified in the OSHA standard until a negative exposure assessment is developed.

3. Conduct personnel exposure assessment air sampling, as necessary, to assure that workers are using appropriate respiratory protection in accordance with OSHA Standard 1926.62. Documentation of air sampling results must be recorded at the work site within twenty-four (24) hours and shall be available for review until the job is complete.

F. Lead Abatement Procedures

The Contractor's Competent Person shall be at the job site at all times during work impacting lead.

Work impacting lead paint shall not begin until authorized by the Engineer, following a pre-work visual inspection by the Project Monitor or Engineer to verify existing conditions.

Any activity impacting lead painted surfaces shall be performed in a manner which minimizes the spread of lead dust contamination and generation of airborne lead.

The Contractor shall conduct exposure assessments for all tasks which impact lead paint in accordance with 29 CFR 1926.62(d) and shall implement appropriate personal protective equipment until negative exposure assessments are developed.

All work impacting the materials identified below shall be conducted within an established Regulated Area with a remote wash facility/decontamination system in accordance with "C. Wash Facilities" and the OSHA Lead in Construction Standard. In accordance with 29 CFR 1926.62, engineering controls and work practices shall be utilized to prevent the spread of lead dust and debris beyond the Regulated Area and limit the generation of airborne lead. All wastes containing lead paint shall be properly contained and secured for storage, transportation and disposal.

The Contractor shall ensure proper entry and exit procedures for workers and authorized persons who enter and leave the Regulated Area. All workers and authorized persons shall leave the Regulated Area and proceed directly to the wash or shower facilities where they will HEPA vacuum gross debris from work suit, remove and dispose of work suit, wash and dry face and hands, and vacuum clothes. Lead chips and dust must not be removed by blowing or shaking of clothing. Wash water shall be collected, filtered, and disposed of in accordance with Federal, State and local water discharge standards. Any permit required for such discharge shall be the responsibility of the Contractor.

No one shall eat, drink, smoke, chew gum or tobacco, or apply cosmetics while in the Regulated Area.

Data from the limited lead testing performed by the Engineer is documented in the reports listed in the "Notice to Contractor – Hazardous Materials Investigations" or is presented herein. Under no circumstances shall this information be the sole means used by the Contractor for determining the extent of lead painted materials. The Contractor shall be responsible for verification of all field conditions affecting performance of the work as described in these Specifications in accordance with OSHA, USEPA, USDOT and CTDEEP standards. Compliance with the applicable requirements is solely the responsibility of the Contractor.

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

Amtrak – Union Station Platform, Hartford, Connecticut

- **Lead paint was identified on the painted metal surfaces at the Union Station Platform. XRF readings showed the paint to be lead based.**

Columns, I-beams, etc.	**Metal**	**Blue Green**	**0.1 to 29.3 mg/cm^2**

- **TCLP waste stream sampling/analysis of the paint from the metal characterized the paint waste as RCRA/CTDEEP hazardous waste.**

Paint debris	**75 mg/l**

While conducting the work where it is necessary to impact the painted metal surfaces, the Contractor shall either:

a. **Remove the paint to be impacted prior to impacting the substrate in accordance with OSHA Lead in Construction Standard 29 CFR 1926.62, or**
b. **Impact the substrate using mechanical means with the paint in place in accordance with OSHA Lead in Construction Standard 29 CFR 1926.62.**

The Contractor shall submit a Work Plan to ConnDOT outlining the exact procedures that will be used to perform the work, contain the spread of lead debris and protect the employees performing the required renovation work impacting the lead paint. No work shall be started by the Contractor until the Work Plan is approved by the Engineer.

All work impacting the lead paint materials shall be conducted within an established Regulated Area with a remote wash facility/decontamination system in accordance with "C. Wash Facilities" and the OSHA Lead in Construction Standard. In accordance with 29 CFR 1926.62, engineering controls and work practices shall be utilized to prevent the spread of lead dust and debris beyond the Regulated Area and limit the generation of airborne lead. All wastes containing lead paint shall be properly contained and secured for storage, transportation and disposal.

The Engineer has characterized the paint waste stream at the Union Station Platform as RCRA hazardous waste. If the paint is removed from the metal, the paint shall be handled

and disposed of in accordance with USEPA/CTDEEP Hazardous Waste Regulations as described under this Item 0020903A.

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

Should lead contamination be discovered outside of the Regulated Area, the Contractor shall immediately stop all work in the Regulated Area, eliminate causes of such contamination and take steps to decontaminate non-work areas.

Special Requirements:

1. Demolition/Renovation:

    a. Demolish/renovate in a manner which minimizes the spread of lead contamination and generation of lead dust.

    b. Implement dust suppression controls, such as misters, local exhaust ventilation, etc. to minimize the generation of airborne lead dust.

    c. Segregate work areas from non-work areas through the use or barrier tape, drop cloths, etc.

    d. Clean up immediately after renovation/demolition has been completed

2. Chemical Removal:

    a. Apply chemical stripper in quantities and for durations specified by manufacturer.

    b. Where necessary, scrape lead paint from surface down to required level of removal (i.e. stabilized surface, bare substrate with no trace of residual pigment, etc.). Use sanding, hand scraping, and dental picks to supplement chemical methods as necessary.

    c. Apply neutralizer compatible with substrate and chemical agent to substrate following removal in accordance with manufacturer's instructions.

    d. Protect adjacent surfaces from damage from chemical removal.

    e. Maintain a portable eyewash station in the work area.

    f. Wear respirators that will protect workers from chemical vapors.

g. Do not apply caustic agents to aluminum surfaces.

3. Mechanical Paint Removal:

   a. Provide sanders, grinders, rotary wire brushes, or needle gun removers equipped with a HEPA filtered vacuum dust collection system. Cowling on the dust collection system for orbital-type tools must be capable of maintaining a continuous tight seal with the surface being abated. Cowling on the dust collection system for reciprocating-type tools shall promote an effective vacuum flow of loosened dust and debris. Inflexible cowlings may be used on flat surfaces only. Flexible contoured cowlings are required for curved or irregular surfaces.

   b. Provide HEPA vacuums that are high performance designed to provide maximum static lift and maximum vacuum system flow at the actual operating vacuum condition with the shroud in use. The HEPA vacuum shall be equipped with a pivoting vacuum head.

   c. Remove lead paint from surface down to required level of removal (i.e. stabilized surface, bare substrate with no trace of residual pigment, etc.). Use chemical methods, hand scraping, and dental picks to supplement abrasive removal methods as necessary.

   d. Protect adjacent surfaces from damage from abrasive removal techniques.

   e. “Sandblasting” type removal techniques shall not be allowed.

4. Component Removal/Replacement:

   a. Wet down components which are to be removed to reduce the amount of dust generated during the removal process.

   b. Remove components utilizing hand tools, and follow appropriate safety procedures during removal. Remove the components by approved methods which will provide the least disturbance to the substrate material. Do not damage adjacent surfaces.

   c. Clean up immediately after component removals have been completed. Remove any dust located behind the component removed.

G. Prohibited Removal Methods:

The use of heat guns in excess of 700 degrees Fahrenheit to remove lead paint is prohibited.

The use of sand, steel grit, air, CO_2, baking soda, or any other blasting media to remove lead or lead paint without the use of a HEPA ventilated contained negative pressure enclosure is prohibited.

Power/pressure washing shall not be used to remove lead paint.

Compressed air shall not be utilized to remove lead paint.

Chemical strippers containing Methylene Chloride are prohibited. Any chemical stripping may be prohibited on a project by project basis.

Power tool assisted grinding, sanding, cutting, or wire brushing of lead paint without the use of cowled HEPA vacuum dust collection systems is prohibited.

Lead paint burning, busting of rivets painted with lead paint, welding of materials painted with lead paint, and torch cutting of materials painted with lead paint is prohibited. Where cutting, welding, busting, or torch cutting of materials is required, lead paint in the affected area must be removed first.

Chemical stripping of coatings from bridge components is generally prohibited unless specifically allowed on a project by project basis.

H. Clean-up and Visual Inspection:

The Contractor shall remove and containerize all lead waste material and visible accumulations of debris, paint chips and associated items.

During clean-up the Contractor shall utilize rags and sponges wetted with lead-specific detergent and water as well as HEPA filtered vacuum equipment.

The Engineer will conduct a visual inspection of the work areas in order to document that all surfaces have been maintained as free as practicable of accumulations of lead in accordance with 29 CFR 1926.62(h). If visible accumulations of waste, debris, lead paint chips or dust are found in the work area, the Contractor shall repeat the cleaning, at the Contractor's expense, until the area is in compliance. The visual inspection will detect incomplete work, damage caused by the abatement activity, and inadequate clean up of the work site.

I. Post-Work Regulated Area Deregulation:

Following an acceptable visual inspection, any engineering controls implemented may be removed.

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

If this final visual inspection is acceptable, the Contractor will reopen the Regulated Area and remove all signage.

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

J. Waste Disposal/Recycling:

Non-metallic building debris waste materials tested and found to be non-hazardous Construction and Demolition (C&D) bulky waste shall be disposed of properly at a CTDEEP approved Solid Waste landfill as described under this Item 0020903A.

Metallic debris shall be segregated and recycled as scrap metal at an approved metal recycling facility.

Concrete, brick, etc. coated with <u>any amount of lead paint</u> cannot be crushed, recycled or buried on-site to minimize waste disposal unless tested and found to meet the RSR GA/Residential standards.

Hazardous lead debris shall be disposed of as described under this Item 0020903A.

The Contractor shall comply with the latest requirements of the USEPA RCRA Hazardous Waste Regulations 40 CFR 260-274 and the DEEP Hazardous/Solid Waste Management Standards 22a-449(c).

Hazardous lead debris shall be transported from the Project by a licensed hazardous waste transporter approved by the Department and disposed of at an EPA-permitted and Department-approved hazardous waste landfill within 90 days from the date of generation.

The Contractor must use one or more of the following Department-approved disposal facilities for the disposal of <u>hazardous</u> waste:

Clean Earth of North Jersey, Inc., (CENJ) 115 Jacobus Avenue, South Kearny, NJ 07105 Phone: (973) 344-4004; Fax: (973) 344-8652	Clean Harbors Environmental Services, Inc. 2247 South Highway 71, Kimball, NE 69145 Phone: (308) 235-8212; Fax: (308) 235-4307
Clean Harbors of Braintree, Inc. 1 Hill Avenue, Braintree, MA 02184 Phone: (781) 380-7134; Fax: (781) 380-7193	Cycle Chem (General Chemical Corp.) 217 South First Street, Elizabeth, NJ 07206 Phone: (908) 355-5800; Fax (908) 355-0562
EnviroSafe Corporation Northeast (former Jones Environmental Services (NE), Inc.) 263 Howard Street, Lowell, MA 01852 Phone: (978) 453-7772; Fax: (978) 453-7775	Environmental Quality Detroit, Inc. 1923 Frederick Street, Detroit, MI 48211 Phone: (800) 495-6059; Fax: (313) 923-3375

Republic Environmental Systems 2869 Sandstone Drive, Hatfield, PA 19440 Phone: (215) 822-8995; Fax: (215) 997-1293	Chemical Waste Management of New York 1550 Balmer Rd., Model City, NY 14107 Phone: (800) 843-3604; Fax: (716) 754-0211
Environmental Quality Company: Wayne Disposal Facility 49350 North I-94 Service Drive Belleville, MI 48111 Phone: (800) 592-5489; Fax: (800) 592-5329	Northland Environmental, Inc. (PSC Environmental Systems) 275 Allens Avenue, Providence, RI 02905 Phone: (401) 781-6340; Fax: (401) 781-9710

The apparent low bidder shall submit in writing, within fourteen days after Bid opening, (1) a letter listing the names of the hazardous waste disposal facilities (from the above list) that the bidder, if it is awarded the Contract, will use to receive hazardous material from this Project, and (2) a copy of each facility's acceptance criteria and sampling frequency requirements.

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.

Prior to the generation of any hazardous waste (on a per "Contiguous Site" Basis), the Contractor shall notify the Engineer of its selected hazardous waste transporter and disposal facility. The Contractor must submit to the Engineer (1) the transporter's current US DOT Certificate of Registration and (2) the transporter's current Hazardous Waste Transporter Permits for the State of Connecticut, the hazardous waste destination state and any other applicable states. The Engineer, on a per "Contiguous Site" Basis, will then obtain a temporary EPA Generators ID number for the "contiguous site" that he will forward to the Contractor. Any changes in transporter or facility shall be immediately forwarded to the Engineer for review.

Handling, storage, transportation and disposal of hazardous waste materials generated as a result of execution of this project shall comply with all Federal, State and Local regulations including the USEPA RCRA Hazardous Waste Regulations (40 CFR Parts 260-271), the CTDEEP Hazardous Waste Regulations (22a-209 and 22a-449(c)), and the USDOT Hazardous Materials Regulations (49 CFR Part 171-180).

All debris shall be contained and collected daily or more frequently as directed by the Engineer, due to debris buildup. Debris shall be removed by HEPA vacuum collection. Such debris and

paint chips shall be stored in leak-proof storage containers in the secured storage site, or as directed by the Engineer. The storage containers and storage locations shall be reviewed by the Engineer and shall be located in areas not subject to ponding. Storage containers shall be placed on pallets and closed and covered with tarps at all times except during placement, sampling and disposal of the debris.

Hazardous waste materials are to be properly packed and labeled for transport by the Contractor is accordance with EPA, CTDEEP and USDOT regulations. The disposal of debris characterized as hazardous waste shall be completed within 90 calendar days of the date on which it began to be accumulated in the lined containers. Storage of containers shall be in accordance with current DEEP/EPA procedures.

The Contractor shall label hazardous waste storage containers with a 6-inch square, yellow, weatherproof, Hazardous Waste sticker in accordance with USDOT regulations.

Materials other than direct paint related debris which are incidental to the paint removal work activities (tarps, poly, plywood, PPE, gloves, decontamination materials, etc.) which may be contaminated with lead, shall be stored separately from the direct paint debris, and shall be sampled by the Engineer for waste disposal characterization testing. Such materials characterized as hazardous shall be handled/disposed of as described herein, while materials characterized as non-hazardous shall be disposed of as non-hazardous CTDEEP Solid Waste.

Direct paint related debris materials not previously sampled and characterized for disposal, which may be originally presumed to be hazardous waste, shall also be stored separately and sampled by the Engineer for ultimate waste disposal characterization testing and handled/disposed of based on that testing.

Project construction waste materials unrelated to the paint removal operations shall NOT be combined/stored with paint debris waste and/or incidental paint removal materials as they are not lead contaminated and shall NOT be disposed of as hazardous waste. The Engineer's on-site Inspectors shall conduct inspections to verify materials remain segregated.

The Contractor shall obtain and complete all paperwork necessary to arrange for material disposal, including disposal facility waste profile sheets. It is solely the Contractor's responsibility to co-ordinate the disposal of hazardous materials with its selected treatment/recycling/disposal facility(s). Upon receipt of the final approval from the facility, the Contractor shall arrange for the loading, transport and treatment/recycling/disposal of the materials in accordance with all Federal and State regulations. **No claim will be considered based on the failure of the Contractor's disposal facility(s) to meet the Contractor's production rate or for the Contractor's failure to select sufficient facilities to meet its production rate.**

The Contractor shall process the hazardous waste such that the material conforms with the requirements of the selected treatment/disposal facility, including but not limited to specified size and dimension. Refusal on the part of the treatment/disposal facility to accept said material

solely on the basis of non-conformance of the material to the facility's physical requirements is the responsibility of the Contractor and no claim for extra work shall be accepted for reprocessing of said materials to meet these requirements.

All DOT shipping documents, including the Uniform Hazardous Waste Manifests utilized to accompany the transportation of the hazardous waste material shall be prepared by the Contractor and reviewed/signed by an authorized agent representing ConnDOT, as Generator, for each load of hazardous material that is packed to leave the site. The Contractor shall not sign manifests on behalf of the State as Generator. The Contractor shall forward the appropriate original copies of all manifests to the Engineer the same day the material leaves the Project site.

Materials not related to lead paint removal and/or characterized as non-hazardous waste shall NOT be shipped for hazardous waste disposal in accordance with USEPA RCRA hazardous waste minimization requirements.

A load-specific certificate of disposal, signed by the authorized agent representing the waste disposal facility, shall be obtained by the Contractor and promptly delivered to the Engineer for each load.

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

- All vehicles departing the site are to be properly logged to show the vehicle identification, driver's name, time of departure, destination, and approximate volume, and contents of materials carried. Vehicles shall display the proper USDOT placards for the type and quantity of waste;

- No materials shall leave the site unless a disposal facility willing to accept all of the material being transported has agreed to accept the type and quantity of waste;

- Documentation must be maintained indicating that all applicable laws have been satisfied and that the materials have been successfully transported and received at the disposal facility; and,

- The Contractor shall segregate the waste streams (i.e. concrete, wood, etc.) as directed by the receiving disposal facility.

Any spillage of debris during disposal operations during loading, transport and unloading shall be cleaned up in accordance with EPA 40 CFR 265 Subparts C & D, at the Contractor's expense.

The Contractor is liable for any fines, costs or remediation costs incurred as a result of their failure to be in compliance with this Item and all Federal, State and Local laws.

K. Project Closeout Data:

Provide the Engineer, within thirty (30) days of completion of the project site work, a compliance package; which shall include, but not be limited to, the following:

1. Competent persons (supervisor) job log;
2. OSHA-compliant personnel air sampling data;
3. Completed waste shipment papers for non-hazardous lead construction and demolition (C&D) waste disposal or recycling and scrap metal recycling.
4. Copies of completed Hazardous Waste Manifests (signed by authorized disposal facility representative).

Method of Measurement:

The completed work shall be paid as a lump sum. This item will include all noted services, equipment, facilities, testing and other associated work for up to three (3) ConnDOT project representatives. Services provided to any ConnDOT project representatives in excess of three (3) representatives will be measured for payment in accordance with Article 1.09.04 – "Extra and Cost-Plus Work."

Basis of Payment:

The lump sum price bid for this item shall include: services, materials, equipment, all permits, notifications, submittals, personal air sampling, personal protection equipment, temporary enclosures, incidentals, fees and labor incidental to activities impacting lead removal, treatment and handling of lead contaminated materials, and the transport and disposal of any hazardous and/or non-hazardous lead construction and demolition (C&D) bulky waste.

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

Pay Item	Pay Unit
Lead Compliance for Miscellaneous Exterior Tasks	Lump Sum

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 #0100500A - CONSTRUCTION COMMUNICATION EQUIPMENT

Description: Under this item, the Contractor shall provide the communication equipment for use by the ConnDOT forces. 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.

Materials: Materials, supplies and equipment shall be in like new condition as approved by the Engineer. The following shall be provided:

QTY	Description:
2	Windows Tablets as specified below under Computer Hardware and Software. All supplies, maintenance and wireless service plans shall be provided by the Contractor.

Any supplies required to maintain or operate the equipment above listed above shall be provided by the Contractor for the duration of the project at no additional charge.

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 the removal of Department owned equipment, software, data, and associated equipment.

Computer Hardware and Software:

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 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 the computer system with all required supplies, maintenance and repairs (including labor and parts) throughout the Contract life.

(A) Windows Tablet – Minimum Specification:

Nokia Lumia 2520 Tablet or equivalent.
Processor – Qualcomm Snapdragon™ 800, quad-core 2.2 GHz.
Memory – 2 GB.
Screen – 10.1 inch, full HD, wide angle view LCD, gorilla glass, touch display.
Hard Drive – 32 GB solid state hard drive.
Multimedia Package – Integrated front and rear cameras, microphone and speaker.

Wireless Network Adapters – Intel a/b/g/n, Bluetooth, and 4G Broadband Cellular (including month to month data service plan (min 4GB/ mo) on the Verizon or AT&T networks).
External Memory Slot – SD / micro SD with a 32 GB memory card.
Power adapters – One (1) AC wall adapter and One (1) 12 Volt DC Auto adapter.
Stylus – One (1) stylus compatible with touch screen.
Operating System – Windows 8.1 RT, latest available Service Pack.
Application Software – MS Office 2013 Outlook, Word, Excel and OneNote.
Multi-function Cover and Keyboard – Nokia Multi-function Cover and Keyboard.
Protective Carrying Case – Carrying case sized to carry tablet and accessories.
Warranty & Service Plan – 1 year onsite.

Note: Before ordering the computer hardware and software, the Contractor must submit a copy of their proposed PC specifications to the ConnDOT Project Engineer for review. If the specification meets or exceeds the listed minimum specifications, then the Contractor will be notified that the order may be placed.

Arrangements must be made a minimum of 24 hours in advance of delivery of computer equipment to the District Office. Arrangements should be made by contacting the ConnDOT Project Engineer. 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.

Construction Methods:

Before ordering the computer hardware and software, the Contractor must submit a copy of their proposed PC specifications to the ConnDOT Project Engineer for review. If the specification meets or exceeds the listed minimum specifications, then the Contractor will be notified that the order may be placed.

Arrangements must be made a minimum of 24 hours in advance of delivery of equipment to the District Office. Arrangements should be made by contacting the ConnDOT Project Engineer. 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.

Method of Measurement: The item, Construction Communication Equipment, will be measured for payment based on actual detailed 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 0101143A – HANDLING AND DISPOSAL OF REGULATED ITEMS

Description:

Work under this item shall include the management (handling and disposal) of regulated items, the remediation of microbial/moisture impacted building materials and all associated work by persons who are employed by a CTDEEP permitted Spill Contractor and trained/certified in accordance with OSHA Hazard Communication regulations and by persons who are knowledgeable, qualified and trained in the remediation of microbial/moisture impacted materials and the subsequent cleaning of the affected environment in accordance with applicable Industry Standards and Guidelines on Microbial Remediation and OSHA Construction Standards. Regulated items include hazardous and other materials and wastes, the disposal of which is restricted by Federal and/or State laws and regulations, and which may be a component of equipment or other items located on-site. Regulated items include those listed herein, or additional similar items identified on site by the Engineer. Work under this item does not include asbestos containing materials, lead paint, contaminated or hazardous soils.

Activities shall be performed in accordance with, but not limited to, the current revision of the USEPA & CTDEEP Hazardous Waste Regulations (40 CFR 260-282, 22a-209 and 22a-449(c)), USEPA PCB Regulations (40 CFR 761), USEPA Protection of Stratospheric Ozone (40 CFR 82), OSHA Hazard Communication (29 CFR 1910.1200), OSHA Hazardous Waste & Emergency Response Regulations (29 CFR 1910.120), USDOT Hazardous Materials Regulation (49 CFR 171-180), USEPA 402-K-01-001 *Mold Remediation in Schools and Commercial Buildings,* NYCDOH *Guidelines on Assessment and Remediation of Fungi in Indoor Environments,* OSHA SHIB 03-10-10 *A Brief Guide to Mold in the Work Place,* ACGIH *Bioaerosols: Assessment and Control,* IICRC S520 *Standard and Reference Guide for Professional Mold Remediation,* IICRC S500 *Standard and Reference Guide for Professional Water Damage Restoration,* AIHA Guideline 3-2004 *Assessment, Remediation and Post Remediation Verification of Mold in Buildings,* OSHA, RCRA, CERCLA, CAA, TSCA, and all other laws and regulations.

The work activities include the removal, handling, packing, labeling, transport, manifesting, and recycling or disposal of various regulated items at the Project site prior to beginning planned renovation/demolition activities.

The Contractor is solely responsible for verifying actual locations and quantities of the items with hazardous/regulated material/waste constituents and for their proper handling and disposal. The recycling or proper disposal, as appropriate, of all regulated items shall be completed prior to the initiation of any demolition or renovation activities.

Materials:

All materials shall be suitable for the management of regulated items and shall meet all applicable federal, state and local regulations. Such materials include, but are not limited to, proper containers, packing materials, labels, signs, shipping papers, personnel protective equipment (PPE) and spill kits.

All materials shall be suitable for the remediation of microbial/moisture impacted building materials shall include, but not limited to, fire retardant polyethylene sheeting, 6-mil thickness, polyethylene disposal bags, 6-mil thickness, duct tape, detergents, non-toxic & biodegradable, biocides (if preapproved by Engineer), encapsulants (if preapproved by Engineer), mastic removal chemicals (low odor, citrus based, flash point >140F) and protective clothing, respirators & filter cartridges

Construction Methods:

(1) Allowable Disposal/Recycling Facilities

Disposal facilities for RCRA-hazardous, TSCA-hazardous, Connecticut Regulated, and Universal wastes shall be chosen from among those listed below. No other facility shall be used for these types of wastes without the written approval of the Engineer.

Advanced Disposal Services
Greentree Landfill
635 Toby Road
Kersey, PA 15846
Phone: (814) 265-1744 Fax: (814) 265-8745
MSW, C&D, asbestos, PCB remediation waste <50 ppm, petroleum contaminated soils, nonhazardous solid wastes

Allied Waste Niagara Falls Landfill, LLC
5600 Niagara Falls Blvd.
Niagara, NY 14304
Phone: (716) 285-3344 Fax: (716) 285-3398
Non-hazardous waste, industrial solid waste, municipal sewage treatment sludge, contaminated soil & debris, asbestos waste, C&D debris, industrial process sludge

American Lamp Recycling, LLC
26 Industrial Way
Wappingers Falls, NY 12590
Phone: (845) 896-0058 Fax: (845) 896-1520
Mercury containing device, universal waste

Bridgeport United Recycling, Inc.
50 Cross Street
Bridgeport, CT 06610
Phone: (203) 334-1666 Fax: (203) 334-1439
RCRA & CRW waste oil, fuel, wastewater

Clean Earth of Philadelphia, Inc.
3201 South 61 St.,
Philadelphia, PA 19153
Phone: (215) 724-5520 Fax: (215) 724-2939
Petroleum contaminated soil

Clean Earth of New Jersey, Inc. (aka CENJ)
115 Jacobus Ave,
South Kearny, NJ 07105
Phone: (973) 344-4004 Fax: (973) 344-8652
RCRA liquid and solid, asbestos

Clean Earth of Southeast Pennsylvania, Inc.
7 Steel Road,
Morrisville, PA 19067
Phone: (215) 428-1700 Fax: (215) 428-1704
Petroleum contaminated soil

Clean Harbors Environmental Services, Inc.
2247 South Hwy. 71,
Kimball, NE 69145
Phone: (308) 235-1012 Fax: (308) 235-4307
RCRA liquid, solid & sludge

Clean Harbors Environmental Services, Inc.
2900 Rockefeller Ave.,
Cleveland, OH 44115
Phone: (216) 429-2401 Fax: (216) 883-1918
RCRA liquid: aqueous organic & inorganic wastewater

Clean Harbors of Baltimore, Inc.
1910 Russell St,
Baltimore, MD 21230
Phone: (410) 244-8200 Fax: (410) 752-2647
RCRA liquid: aqueous organic & inorganic wastewater

Clean Harbors of Braintree, Inc.
1 Hill Avenue,
Braintree, MA 02184
Phone: (781) 380-7134 Fax: (781) 380-7193
RCRA & TSCA liquid & solid

Clean Harbors of Connecticut, Inc.
51 Broderick Road,
Bristol, CT 06010
Phone: (860) 583-8917 Fax: (860) 583-1740
RCRA & CRW liquid

Clean Harbors of Woburn
(Murphy's Waste Oil Services, Inc.)
252 Salem Street,
Woburn, MA 01801
Phone: (781) 935-9066 Fax: (781) 935-8615
RCRA liquid: oil, oil/water mixtures; CRW oil filters, oily soil & debris, F001/F002 contaminated soils, antifreeze

Colonie Landfill (Waste Connections, Inc.)
1319 Loudon Rd, Cohoes,
New York 12047
Phone: (518) 783-2827 Fax: (518) 786-7331
Non-haz. wastes, special wastes, contaminated soil

Cumberland County Landfill
(aka Community Refuse Services
Managed by Interstate Waste Services)
135 Vaughn Road,
Shippensburg, PA 17257
Phone: (717) 729-2060 Fax: (717) 423-6822
Municipal solid waste, non-hazardous waste

Cycle Chem (aka General Chemical Corp.)
217 South First Street,
Elizabeth, NJ 07206
Phone: (908) 355-5800 Fax: (908) 355-0562
RCRA, TSCA liquid and solid

Environmental Quality Company:
Wayne Disposal Facility
(aka EQ Michigan Disposal Waste Treatment Plant and Wayne Disposal Inc. Site #2)
49350 North I-94 Service Drive
Belleville, MI 48111
Phone: (734) 697-2200 Fax: (734) 699-3499
RCRA & TSCA liquid and solid

Environmental Quality Detroit Inc.
1923 Frederick Street,
Detroit MI 48211
Phone: (734) 329-8017 Fax: (313) 923-3375
RCRA & CRW liquid wastewater

EQ Pennsylvania (formerly Envirite of PA)
730 Vogelsong Road,
York, PA 17404
Phone: (717) 846-1900 Fax: (717) 854-6757
RCRA liquid & solid

Environmental Soil Management of New York, LLC (ESMI of New York)
304 Towpath Road,
Fort Edward, NY 12828
Phone: (518) 747-5500 Fax: (518) 747-1181
Petroleum contaminated soil

Environmental Soil Management of NH
67 International Dr.
Loudon, NH 03307
Phone: (603) 783-0228 Fax: (603) 783-0104
Petroleum contaminated soil

EnviroSafe Corporation Northeast (formerly Jones Environmental Services, soon to be Triumvirate)
263 Howard Street,
Lowell, MA 01852
Phone: (978) 453-7772 Fax: (978) 453-7775
RCRA & TSCA liquid and solid

Greenwood Street Landfill
(NEWS of Worcester, LLC/Casella)
30 Nipp Napp Trail,
Worcester, MA 01607
Phone: (508) 755-4604 Fax: (508) 755-8587
Non-hazardous solid waste including contaminated soils

Hazelton Creek Properties, LLC*
(Hazelton Mine Reclamation Project)
280 South Church St.,
Hazelton, PA 18201
Phone: (570) 574-1010 Fax: (570) 457-3395
Fresh, brackish or marine dredge material, coal ash, cement kiln dust, lime kiln dust, co-gen ash, regulated fill
*Please note that if this facility is to be used, each bin letter will require an additional 10 day (or more) waiting period on top of the 15 day lab period designated in the specs to allow for PADEP review.

Heritage Hazardous Waste Landfill (Heritage Environmental Services, LLC)
4370 W County Rd 1275 N
Roachdale, IN 46172
Phone: (765) 435-2704 Fax: (315) 687-3898
Hazardous Wastes, Asbestos

Moretown Landfill
(Managed by Interstate Waste Services)
187 Palisades Park,
Waterbury, VT 05676
Phone: (802) 244-1100 x226
Fax: (802) 244-5133
Municipal solid waste, non-hazardous waste

Mostoller Landfill
(Managed by Interstate Waste Services)
7095 Glades Pike,
Summerset, PA 15501
Phone: (717) 729-2060 Fax: (814) 444-0127
Municipal solid waste, C&D debris, residual waste, sewage sludge, incinerator ash, asbestos

Northampton Landfill
(Operated by Solid Waste Solutions, LLC)
170 Glendale Road,
Florence, MA 01062
Phone: (413) 498-0099 Fax: (413) 498-0267
Municipal solid waste, non-hazardous waste, contaminated soil

Northeast Lamp Recycling, Inc.
250 Main Street,
East Windsor, CT 06088
Phone: (860) 292-1992 Fax: (860) 292-1114
CRW solid waste, mercury containing devices & universal waste

Northland Environmental, LLC
(aka PSC Environmental Systems)
275 Allens Ave.,
Providence RI 02905
Phone: (401) 781-6340 Fax: (401) 781-9710
RCRA liquid and solid

Ontario County Landfill
(Managed by Casella Waste)
3555 Post Farm Road,
Stanley, NY 14561
Phone: (585) 526-4420 Fax: (585) 526-5459
Municipal solid waste, non-hazardous waste solid, special wastes including asbestos, ash from boilers/incinerators, contaminated soil, demo debris

Paradise Heating Oil, Inc.
Quimby Street,
Ossining, NY 10562
Phone: (631) 926-2576 Fax: (718) 294-2226
CRW waste oil liquid

Republic Environmental Systems (aka Philip Services Corporation (PSC) Republic)
2869 Sandstone Dr.
Hatfield PA 19440
Phone: (215) 822-8995 Fax: (215) 997-1293
RCRA & TSCA industrial solid & sludge, aqueous waste, contaminated soil, PCB waste, oil & petroleum waste, organic waste

Soil Safe, Inc.
378 Route 130, Logan Township,
Bridgeport NJ 08085
Phone: (410) 872-3990 x1120
Fax: (410) 872-9082
Soil contaminated with petroleum or metals, some industrial waste solids

Stablex Canada, Inc.
760 Industrial Blvd.
Blainville Quebec J7C 3V4
Phone: (450) 430-9230 Fax: (450) 430-4642
RCRA liquid and solid, industrial wastes

Ted Ondrick Company, LLC
58 Industrial Road,
Chicopee, MA 01020
Phone: (413) 592-2566 Fax: (413) 592-7451
Petroleum contaminated soil

Tunnel Hill Reclamation
2500 Township Road, 205 Route 2
New Lexington, OH 43764
Phone: (914) 713-0203 Fax: (914) 713-0672
Municipal solid waste, non-hazardous waste, contaminated soils

United Oil Recovery, Inc.
(aka United Oil Recycling)
136 Gracey Avenue,
Meriden, CT 06451
Phone: (203) 238-6745 Fax: (203) 630-4415
Liquid: RCRA & CRW waste oil & fuel, wastewater

Upton Site Remediation, LLC
(formerly Upton Landfill)
Maple Avenue,
Upton, MA 01568
Phone: (413) 522-3688 Fax: (413) 522-3330
Contaminated soil for use as cover material under MADEP COMM-97 policy

Waste Management Barre
(Martone) Landfill
99 Barre Depot Rd,
Barre, MA 01005
Phone: (978) 355-6821 Fax: (978) 355-6317
MSW, non-hazardous waste, C&D, contaminated soil for use as cover material under MADEP COMM-97 policy

Waste Management of NH
TLR III Refuse Disposal Facility
90 Rochester Neck Road, PO Box 7065
Rochester, NH 03839
Phone: (603) 330-2197 Fax: (603) 330-2130
Solid: MSW, C&D, PCB remediation waste (<50ppm), virgin petroleum contaminated soil, CRW solid waste

Waste Management: (Connecticut Valley Sanitary Waste Disposal, Inc. (CVSWD), Chicopee Sanitary Landfill & Waste Management of MA, Inc.)
161 New Lombard Rd
Chicopee, MA 01020
Phone: (413) 534-8741 x222
Fax: (413) 493-1547
CRW solid waste, contaminated soil

Waste Management
(aka CWM Chemical Services, LLC, Chemical Waste Management of NY) Model City Facility
1550 Balmer Road,
Model City, NY 14107
Phone: (800) 843-3604 Fax: (716) 754-0211
RCRA & TSCA liquid and solid

Waste Management:
Granby Sanitary Landfill
11 New Ludlow Rd., Granby, MA 01033
Phone: (413) 467-3200 Fax: (413) 467-3400
CRW solid waste, contaminated soil

Waste Management: RCI Fitchburg Landfill
101 Fitchburg Princeton Road
Westminster, MA 01473
Phone: (978) 355-6821 Fax: (978) 355-6317
MSW, non-hazardous waste, C&D, contaminated soil for use as cover material under MADEP COMM-97 policy, treated lumber, asbestos

The category of material accepted by each facility listed above is for informational purposes only. The Contractor shall verify facility acceptance of each type of regulated item.

(2) Submittals

Thirty (30) days prior to commencement of work involving the management of regulated items, the Contractor shall submit to the Engineer for approval, the following documentation:

1. Copy of Spill Contractor Permit registration issued by the CTDEEP.
2. Ozone depleting substance service technician certification (as applicable).
3. Hazard communication training for all employees performing this work.
4. Names of the treatment facilities, recycling facilities and/or disposal facilities the Contractor intends to use to receive each type of regulated item.
5. Hazardous Material Transporter USDOT Certificate of Registration for each transporter.
6. Hazardous Waste Transporter Permit for the State of Connecticut, the destination state(s), and all other applicable states for each transporter.
7. Request for an EPA Hazardous Waste Generators ID number, for use in manifesting hazardous waste above conditionally exempt small quantities (as applicable).

Contractor shall provide the Engineer with a minimum of 48 hours notice in advance of scheduling, changing or canceling work activities.

Ten (10) days prior to commencement of microbial remediation, provide the Engineer the following. No remediation shall commence until a copy of all required submittals have been received and found acceptable to the Engineer. Those employees added to the Contractor's original list will be allowed to perform work only upon submittal to, and receipt of, all required paperwork by the Engineer.

1. Name and summary of experience of all proposed Competent Persons.
2. Copies of hazard communication awareness training for all workers on the job site include safe work practices associated with microbial remediation, and health effects of microbial exposure.
3. Copies of medical clearance records for workers who will be wearing respirators.
4. Fit test certifications for workers who will be wearing tight fitting face piece respirators.
5. MSDS sheets on all solvents, cleaners, sanitizers, detergents, disinfectants, encapsulants, etc. proposed to be used on the project including any biocides and fungicides.

(3) Regulated Item Management Provisions

(a) General Requirements

The Contractor's OSHA Competent Person shall be in control on the job site at all times during hazardous material management work activities. This person must be capable of identifying existing hazards, possess the authority to implement corrective measures to reduce/eliminate the hazards, comply with applicable Federal, State and Local regulations that mandate work practices, and be capable of performing the work of this contract. All employees who perform regulated material management related work shall be properly trained and qualified to perform such duties.

All labor, materials, tools, equipment, services, testing, insurance, and incidentals which are necessary or required to perform the work in accordance with applicable governmental regulations, industry standards and codes, and these specifications, shall be provided by the Contractor.

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

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

Inventory data from investigative surveys throughout the buildings are included herein and are presented for informational purposes only. Under no circumstances shall this information be the sole means used by the Contractor for determining the quantities or extent of the regulated items to be managed. The Contractor shall be responsible for verification of all field conditions affecting performance of the work. The Contractor shall submit to the Engineer for concurrence any additional items not listed herein that it believes to be regulated items included under this

item. However, compliance with applicable requirements is solely the responsibility of the Contractor.

The Engineer will provide a Project Monitor to monitor the activities of the Contractor and inspect the work required. Environmental sampling shall be conducted as deemed necessary by the Engineer. Spill areas shall be cleaned by the Contractor until accepted by the Engineer. The Engineer may sample the spill area to demonstrate Contractor compliance with an acceptable standard.

(b) Personnel Protection

Prior to commencing work, the Contractor shall provide hazard communication training to all employees as necessary in accordance with OSHA 29 CFR 1926.59 and 29 CFR 1910.1200 and instruct all workers in all aspects of personnel protection, work procedures, emergency procedures and use of equipment including procedures unique to this project. Worker health and safety protocols that address potential and/or actual risk of exposure to site specific hazards are solely the responsibility of the Contractor.

The Contractor shall provide respiratory protection that meets the requirements of OSHA as required in 29 CFR 1910.134 and 29 CFR 1926.1000. A formal respiratory protection program, including appropriate medical surveillance, must be implemented in accordance with OSHA standards. The Contractor shall, as necessary, conduct exposure assessment air sampling, analysis and reporting to ensure the workers are afforded appropriate respiratory protection.

The Contractor shall provide and require all workers to wear appropriate personnel protective equipment, including protective clothing and respiratory protection, as required, within regulated work areas which exceed OSHA Personnel Exposure Limits (PELs) or when handling hazardous materials.

(c) Regulated Item Management Work Procedures

The Contractor shall not begin work until the Project Monitor is on-site.

Prior to beginning work on-site, the Contractor shall prepare waste characterization profile forms for each type of waste stream to be generated and forward such forms to the Engineer for review, approval and signature. Upon approval, the Contractor shall forward such forms to the appropriate disposal facilities for acceptance.

The Contractor shall utilize all appropriate engineering controls and safety and protective equipment while performing the work in accordance with OSHA, USEPA, USDOT, CTDEEP and Connecticut Department of Public Health DPH regulations.

The Contractor shall employ work practices so as to minimize the disturbance of the constituents in the regulated items, and prevent breakage and spills. In the event of a spill, the Contractor shall cordon off the area and notify the Engineer. The Contractor is responsible to have spills and the effected areas decontaminated to the acceptance of the Engineer by personnel trained in hazardous waste operator emergency response.

The Contractor shall carefully and properly remove, handle, pack, label and manifest all of the regulated items in waste containers specified and suitable to contain the waste in accordance with all federal and state regulations.

Prior to transportation and recycling and/or disposal, all proper USEPA, OSHA, CTDEEP and USDOT labels and placards shall be affixed to the waste containers and hazardous materials shipping papers such as waste manifests/bills of lading shall be completed.

Prior to renovation work that will impact the identified regulated items, properly remove, handle, pack, label, transport, manifest and recycle or dispose of the regulated items from those listed below:

The following hazardous/ regulated materials, wastes and items have been identified at the AMTRAK – Union Station Platform, Hartford, Connecticut.

North Platform

- **Connecticut Regulated Waste (CRW) – PCB ballasts**
- **Universal Waste (UW) – used electronics, Hg lamps**

South Platform

- **Connecticut Regulated Waste (CRW) – PCB ballasts**
- **Universal Waste (UW) – used electronics, Hg lamps**

North Garage

- **Connecticut Regulated Waste (CRW) – PCB ballasts**
- **Universal Waste (UW) – used electronics, Hg lamps**

Elevator Storage

- **Connecticut Regulated Waste (CRW) – PCB ballasts**
- **Universal Waste (UW) – used electronics, Hg lamps & switches**
- **CFC's / Freon – air conditioner unit**

C-S Room

- **Connecticut Regulated Waste (CRW) – PCB ballasts**
- **Universal Waste (UW) – used electronics, Hg lamps & switches**
- **CFC's / Freon – air conditioner unit**

C-S Room

- **Inhalation Hazard – microbial growth**

Using trained and appropriately protected staff, remove and dispose of all microbially contaminated/moisture impacted wallboard and plaster in the designated work areas as specified and until no visible microbial growth or moisture damage/staining is visible. Clean the interior wall cavities, studding, floor surfaces and surrounding areas using

detergent solutions and HEPA vacuuming. The work areas are to be isolated from non-work areas using poly critical barriers/poly wall sheeting and local exhaust HEPA filtered negative pressure to establish negative pressure enclosures. Utilize dust suppression methods such as misting (not soaking) surfaces prior to remediation. Work to be conducted with the work area unoccupied and area access restricted to trained/protected personnel. Poly drop cloths and critical barriers should be used as appropriate to protect objects in direct proximity to the work areas from contamination. After cleaning the area should be left dry and visibly free from contamination and debris. Utilize damp wiping and HEPA filtered vacuuming techniques for final area cleanup. Waste generated from the cleaning process should be removed from the work space in sealed plastic bags to prevent dispersal of mold spores to non-affected building spaces and disposed of as general bulky C&D waste debris. Employees conducting cleaning shall have received hazard communication training and be afforded proper PPE as determined by a Competent Person (N95 respirators, eye protection, protective clothing and gloves minimum). Conduct removal/cleaning as Level IV Extensive Contamination Projects in accordance with OSHA, NYCDOH, USEPA, ACGIH, AIHA and IICRC Guidelines for Mold Remediation.

See Table 6 (1 page) from the "Pre-renovation Investigative Survey for Hazardous Building Materials, AMTRAK –Union Station Platform, Hartford, Connecticut, TRC, July 2014" for the Inventory of HAZMAT Regulated item at the AMTRAK – Union Station Platform, Hartford, Connecticut.

Upon discovery of any previously unidentified regulated items during renovation activities, the Contractor shall immediately notify the Engineer and work shall cease in that area until the Engineer can determine the extent of any impact and proper handling procedures are implemented.

(d) Waste Disposal

Efforts shall be made to recycle the constituents of the regulated items rather than dispose of them in accordance with the waste minimization efforts required under RCRA.

RCRA hazardous waste shall not be stored on the job site in excess of 90 calendar days from the accumulation start date.

Connecticut Regulated Waste shall not be transported to a RCRA or TSCA permitted facility for disposal, unless otherwise allowed by the Engineer in writing.

Waste generated from the remediation of microbial/moisture impacted building materials should be removed from the work space in sealed plastic bags to prevent dispersal of mold spores to non-affected building spaces and disposed of as general bulky C&D waste debris.

All non-RCRA hazardous waste materials, regulated waste materials and recyclable waste items shall be manifested separately from RCRA and TSCA hazardous waste, and documented properly on non-hazardous waste manifests, waste shipment records, bills of lading or other appropriate shipping papers for transportation to the recycling and/or disposal facility.

The Contractor shall prepare each lab pack list and shipping document (manifests, waste shipment records, bills of lading, etc.) with all of the required information completed (including

types of waste, proper shipping name, categories, packing numbers, amounts of waste, etc.) in accordance with applicable federal and state regulations. The document will be signed by an authorized agent representing ConnDOT as the Generator for each load that is packed to leave the site.

The Contractor shall forward the appropriate original copies of shipping papers to the Engineer the same day the regulated items leave the project site.

All vehicles departing the site transporting hazardous materials shall display proper USDOT placards, as appropriate for the type of waste being transported.

(e) Project Closeout Documents:

Within thirty (30) days after completion of the on-site project work, the Contractor shall submit to the Engineer copies of the following completed documents:

1. Hazardous Waste Manifests
2. Waste Shipment Records/Bills of Lading
3. Recycling Receipts

Documents 1. through 3. must include the signature of an authorized disposal facility representative acknowledging receipt of hazardous materials.

Method of Measurement:

The work of "Handling and Disposal of Regulated Items" shall be provided for in accordance with Article 1.04.05 – Extra Work.

Basis of Payment:

The work of "Handling and Disposal of Regulated Items" shall be paid for in accordance with Article 1.04.05 – Extra Work, which price shall include the management, removal, handling, packing, labeling, transport, manifesting, recycling or disposal of the regulated constituents in the specific equipment/items scheduled for impact at the project site, and all equipment, materials, tools and labor incidental to the work.

Final payment will not be made until completed copies of all Manifest(s), Waste Shipment Records, Bills of Lading and/or Recycling Receipts have been provided to the Engineer. Once completed and facility-signed copies have been received in their entirety, the Engineer will make the final payment.

Pay Item	Pay Unit
Handling and Disposal of Regulated Items	Estimate

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 Rail, Connecticut Department of Transportation, 2800 Berlin Turnpike, P.O. Box 317546, Newington, CT 06131-7546.

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 #0969050A – DOCUMENT CONTROL SPECIALIST

Description: Under this item the Contractor shall furnish the services of an administrative employees, entitled Document Control Specialist who will ensure that the Contractor and all other parties as designated by the Engineer will prepare, status, electronically file and send all project correspondence and drawings utilizing a document control system as established and maintained by the Department. The primary function of the document control system is to ensure timely processing of all contract documentation in coordination with the project schedule. This document control system will also provide uniform project information and reporting. The Document Control Specialist shall be designated by name, in writing with a resume of their qualifications, within five (5) calendar days of the award of the Contract and shall not be changed without prior written notice to the Department.

The Document Control Specialist shall be knowledgeable of the status of all contract documentation aspects of the work throughout the length of the Contract. The Contractor shall prepare and maintain the contract documentation utilizing the SharePoint document control system. The document control system will be physically located in a secure location designated by the Department. The Contractor will directly access the document control system via the internet. The Department will provide the Contractor access to the SharePoint Document Control System. All references to the use of SharePoint shall refer to the Engineer's shared document control system as described above. All information that resides on the shared document control system shall become the sole property of the Engineer.

The minimum lump sum bid for this item shall be $50,000. 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.

Documentation Requirements: All correspondence for the project shall be produced and controlled using SharePoint, including, but not limited to: transmittals, meeting minutes, requests for information (RFI's), requests for change (RFC's), submittals, field memos, notices, letters, and punch lists. All common correspondence files (submittals, requests, answers, changes, reports, minutes, agendas, letters, etc) shall be generated from, and stored within the common file server, including any and all file attachments. Submittals, including shop drawings, working drawings, catalog cuts, material certifications, and all documentation required by contract, shall be submitted electronically via SharePoint. Original hardcopy documents may still be required as determined by the Engineer. The Contractor is responsible to coordinate the overall creation and submission of all project documentation to meet the requirements of the project schedule and Technical Specifications. The Contractor is encouraged to supply the Engineer with corporate logos and letter templates to facilitate the creation and utilization of custom forms and reports.

The named Document Control Specialist shall be designated as the Submittal Coordinator and will be responsible for maintaining information related to the responsibility, status, elapsed time since submission, held time, start/finish times, and a history of all submittal revisions. A

submittal log must be maintained to indicate the latest construction submittals sent and received and the distribution of these drawings to the Department. Each submittal (shop drawing, working drawing, product data, samples, etc) must be individually entered, tracked, and the status maintained, including all revisions. The Contractor is responsible to utilize the latest drawings marked "Conforms" or "Conforms as Noted" as identified in the control system. All revisions are to be logged into the control system, describing each change.

All meeting minutes shall be logged into the control system. The Contractor is responsible to utilize meeting minutes and respond (electronically) to meeting minute items assigned to the Contractor.

Documents (letters, logs, shop or working drawings, sketches, payrolls, etc) to be transmitted to the Department by the Contractor, for which the Contractor does not have an electronic version, shall be scanned, converted into an Adobe Acrobat PDF format, and attached accordingly in SharePoint.

The document control system shall be available for Contractor use at all times unless system maintenance (i.e. backups, upgrades, etc) is being performed. System maintenance will generally be limited to 10 PM – 6AM, Monday - Friday and at various times on weekends. In the event a Contractor's authorized user cannot access the control system, the Contractor shall notify the Department's control system representative. In the event the control system becomes unavailable during normal business hours for an extended period of time, the Contractor may issue correspondence requiring immediate attention by the Department in hard copy format. The hard copy correspondence must be entered into the control system immediately upon becoming available again. Inability by the Contractor to gain access to the document control system for any reason shall not be grounds for claim. The use of the database is not required for proprietary cost and contract information.

The Department shall be allocated a minimum of ten (10) calendar days (using a 7-day calendar, exclusive of holidays) for review and response to each RFI submitted. RFI's requiring information from outside agencies shall be allocated twenty-one (21) days (using a 7-day calendar, exclusive of holidays).

The Department shall be allocated a minimum of thirty (30) calendar days (using a 7-day calendar, exclusive of holidays) for review and response to each RFC submitted. RFC's requiring information from outside agencies shall be allocated sixty (60) days (using a 7-day calendar, exclusive of holidays).

The Department reserves the right to reject any RFC submitted in the form of an RFI for the purpose of reducing the Department's review and response time. Such documents will not be considered for review by the Department and will be returned to the Contractor for resubmission. Review and response time for such document will commence upon resubmission in the correct format.

The Department shall be allocated a minimum of twenty-one (21) calendar days (using a 7-day calendar, exclusive of holidays) for review and approval of each submittal, unless specified

otherwise within the contract documents. Any submittals requiring approval by an outside Agency (ConnDEP, Amtrak, etc.) shall be allocated a minimum of sixty (60) calendar days (using a 7-day calendar, exclusive of holidays). A schedule of submittals shall be submitted to The Department for review prior to the start of construction. These durations are a MINIMUM, and will likely increase with the number of outstanding submittals in The Department's possession. Therefore, whenever multiple Contractor submittals are under review by the Department, the Contractor shall prioritize the submittals and notify the Department thereof. The submittal schedule must be submitted early for review as a subset of the baseline schedule. 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.

Submittal and review activities are required in the Project Schedule per Item No. 0969000A, Project Coordinator. Submittal activities must be coordinated between the Project Coordinator and Document Control Specialist such that submittal information common to both the project schedule and the document control system (required and actual dates, sequence of submission, resubmissions if required) correspond with one another. All resubmissions shall be numbered with the original submittal number but designated a new revision number. All resubmissions shall be logged into the control system to properly calculate the entire duration required for the submittal process from the original submission date to final approval to indicate total days to process the submittal through all review cycles. Coordination of submittals is required for same work and interfacing work so that one submittal will not delay another.

Refer to the following Notices to Contractor for additional submittal requirements:

- Submittals
- Early Submittals
- FM Global Submittals
- Closeout Documents

The submittal log will be developed according to the following format:

Submittal Package

The Package name shall be the seven digit Item Number. The Package Title shall be the corresponding Item Name. Instances where contract items require an extensive number of submittals (i.e. rebar, structural steel, etc), packages shall be further separated by structure components or location. For example:

Package	Title
0602006-01	Deformed Steel Bars – Epoxy Coated / Abutment 2
0602006-02	Deformed Steel Bars – Epoxy Coated / PN-13
0602006-03	Deformed Steel Bars – Epoxy Coated / PN-14

Instances where a submittal requires review by more then one department or agency (i.e. requiring both ConnDOT and Amtrak reviews), the multiple reviewers option must be checked

so that the individual reviewers can be designated, with each receiving a copy of the submittal for review.

The Package status shall initially be "Unsubmitted". Upon submission of any submittal within the package, the status should be changed to "Open". Upon receipt of all final review comments for all package submittals, the status should be changed to "Closed". Submittals that do not require review and approval (i.e. certified payrolls, backup information, etc) shall have a status of "SAC" (submitted and closed).

Submittal Item

All submittal items, as required by contract, must be individually entered, including shop & working drawings, product data, samples, etc. All submittals shall be associated with and generated within a specific package. The submittal number shall be the package name followed by a three digit incremental number (i.e. 1205201-01-001, 0602006-03-001). The Title shall be a clear description of the submittal item. In the case of a drawing submittal, the title shall be the exact name of the drawing and the drawing number shall be entered in the Details section. The appropriate Category and Type shall then be selected.

The Contractor shall examine and check each submittal for accuracy, completeness, coordination with related submittals and compliance with the Contract before it is transmitted to the Designer for review. The Contractor shall sign and submit the Submittal Register Form (sample attached to this section) with each submittal which includes the following statement: "Having reviewed this submittal, I certify that it is complete, accurate, coordinated in all aspects of the item being submitted and conforms to the requirements of the Contract in all respects, including all Federal requirements such as "Buy America", except as otherwise noted." By reviewing and certifying each submittal, the Contractor represents that he has determined and verified materials, field measurements and field construction criteria related thereto, and has checked and coordinated information contained within such submittals with requirements of the Work and the Contract. Shop drawings submitted without this signed statement will be rejected immediately and returned to the Contractor.

Shop drawings shall be submitted in Adobe Acrobat PDF Package format. Each drawing will be included as a separate file within the package and named in kind with the drawing number. The PDF package shall be listed and attached in SHAREPOINT to the first submittal. The drawings shall be listed individually thereafter.

Working drawings shall be submitted in Adobe Acrobat PDF format. The PDF package shall be listed and attached in SharePoint to a single submittal. The drawings shall be listed individually thereafter.

Electronic submittal attachments shall be named in kind with the submittal to which they are attached and include the revision number (ie. Submittal 0602006-03-001 would have a PDF attachment named 0602006-03-001-1.pdf).

Submittal of samples for review and approval by the Designer shall be submitted using a SharePoint-generated transmittal. The Contractor shall ship the quantity of physical samples required by the contract to the Designer with the hard copy of the transmittal. The Designer shall generate the return transmittal in SharePoint (indicating the sample's review status as to Conforms, Conforms as Noted, Revise and Resubmit, Rejected, or No Action Required) and transmit it to the Contractor. The Designer shall retain one set of samples marked "Conforms" or "Conforms as Noted", transmit one set of same to the Engineer, and transmit the remaining sets of same to the Contractor.

Submittals requiring a signature by a licensed engineer or other party shall be digitally signed utilizing a digital ID obtained from an Adobe partner Certified Document Service (CDS) provider (see adobe.com for the list of CDS providers).

Required Start & Expected Finish shall represent the date range for the review process. Required Start shall be the date the submittal is issued by the Contractor for review. Expected Finish shall be the completion date for the review cycle (either 21 or 60 days later, as appropriate).

Workflow must be completed for each submittal. Received From shall be the party from which the submittal originated (prime contractor, subcontractor, fabricator, vendor, etc). Sent To and Returned By shall be the primary reviewer as designated by the contract documents. Forwarded To shall be the Contractor's designated submittal coordinator.

Review cycles will be numbered 001, 002, 003, etc. according to the number of resubmissions. Distributions (submittal recipients) must be listed on the transmittal.

Hard copies of all submittals marked "Conforms" or "Conforms as Noted" shall be transmitted within 5 working days. The Contractor shall submit hard copies of all letters signed in ink with any attachments to the addressee (original) and the ConnDOT District Office (copies) for their records. Scans of signed letters and their attachments shall be stored in SharePoint by the Contractor. The Contractor shall submit wet stamped hard copies of all conformed shop drawings requiring the signature of a professional engineer (eg, steel bar joists, etc.) to the Department for their records. Scanned copies of these conformed shop submittals or other electronic copies will be stored by the Contractor in SharePoint. The Contractor shall submit hard copies and electronic copies of Maintenance Manuals and Warranties.

Submittal Forecast

In order to facilitate the Department's review of the large number of submittals anticipated for this project, the Contractor is to provide a submittal schedule in accordance with the Standard Specifications (Form 816) Section 1.20-1.05.02 Subsection 3, and as described herein. The submittal schedule will be created and maintained in SharePoint as follows:

A submittal package must be created for each contract item requiring a submittal (note that large submittal items must be broken out as prescribed above). Within each package, a single submittal, numbered 001, will be generated from the submittal package which will be utilized to approximate when submittals for that package will be submitted for review. At a minimum, the

submittal Number, Title, Status, Required Start, and Required Finish must be entered, where the Status is "Unsubmitted" and the Required Start and Required Finish represents the review period for all submittals within this package. The Required Start and Required Finish dates must be coordinated with the project CPM schedule.

Additionally, the Contractor shall prepare and distribute a 60 day "Look Ahead Submittal Schedule", to be updated weekly and presented and discussed at the project coordination meeting as part of the standing meeting agenda. The Look Ahead Submittal Schedule will be based on the CPM schedule (without limitation on early submittals), and will provide the following in matrix/spreadsheet format:

- Contract Item No. (Note - for the MLSI, provide CSI Division No. & Specification Section No.)
- Contractor's best estimate to identify the actual submittals to be made for those Contract Items or specification sections with multiple submittals
- Contractor's best estimate of a target date the identified submittals will be made
- Identification of planned "Hot Submittals" needed to support near-term construction activities
- Identification of planned "Major Submittals" which are anticipated to require significant review effort (e.g., coordination drawings)

Documentation Control System Access Requirements: Within five (5) days of Contract Award, the Contractor shall designate, in writing, up to five (5) named Contractor personnel, to be approved and authorized by the Engineer to access the document control system. The Contractor shall designate one of the five authorized personnel to be the Document Control Specialist and act as the document control system contact person for the Contractor. That person shall be experienced and trained in the use of SHAREPOINT. All Contractor personnel requesting access authorization must complete the minimum training requirements described below and submit a certificate of completion to the Department. Upon receipt of the request (with training certificate(s)) and approval thereof, the Department will issue a username and password to each of the authorized Contractor personnel. The Contractor will ensure that only authorized Contractor personnel access and utilize the control system in a responsible, non-destructive manner. The Contractor shall make every reasonable effort to prevent the disclosure of access information for unauthorized use of the control system. The Department, at its discretion, may revoke access authorization from any user if it is determined that the user: a) has used the control system for any other reason then is intended by this specification; b) is no longer in the Contractor's employ or associated with the project or c) has disclosed their access authorization for use by another person or party for any reason. The Contractor is responsible to ensure their authorized users have access to the public internet from a computer system running any currently supported Microsoft Windows Operating System and Microsoft Internet Explorer Web Browser with a minimum Cipher Strength of 128 bit, version 8.0. Minimum modem speed shall be 768K (business DSL). The Contractor is responsible to ensure that anti-virus software is installed and maintained on any computer accessing the Department's document control system. Additionally, it is the Contractor's sole responsibility to maintain a compatible software system. Compatibility is defined as the ability to send and receive documents in a format viewable by the

Department. The Contractor must provide valid individual email addresses for each authorized user to the Department based upon a MAPI compliant email system, such as Microsoft Outlook or Exchange.

Training Requirements: Contractor personnel accessing the document control system must fulfill minimum training requirements. Personnel must attend a two (2) day project specific SharePoint training class provided by the Department. Training requests are to be made through the Engineer. The Department will provide the training facility and will supply all hardware, software, etc. required for the class. The costs of all Contractor personnel's training time are the responsibility of the Contractor.

Any additional training required, as a result of adding additional or replacing existing Contractor staff, shall be included in the total cost of this item.

Submittals: Within thirty (30) calendar days after award, the Submittal Coordinator shall prepare, in accordance with all requirements of this specification, and submit for review and acceptance, a Submittal Forecast and shall have the following requirements attached:

- Submittal Summary Report
- Submittal Bar Chart Report

Method of Measurement: Within ten (10) calendar days of the award of the Contract, the Contractor shall submit to the Engineer for approval a cost breakdown of his lump sum bid price. The submission must include substantiation showing that the costs breakdown submitted are reasonable based on the Contractor's lump sum bid. The cost breakdown shall be in accordance with the following payment schedule:

1) The cost to successfully complete all training to utilize the document control system, in accordance with these specifications, shall not exceed 5% of the total cost of the item.

2) The development cost to prepare the Submittal Forecast in accordance with these specifications shall not exceed 5% of the total cost of the item. Payment for this work will be made upon acceptance of the Submittal Forecast by the Engineer.

3) The cost to provide services of the Document Control Specialist, including costs to maintain the Submittal Forecast; coordinating the Document Control System submittal information with the CPM Schedule submissions; preparing, submitting, utilizing, maintaining, coordinating and updating document control system items as required by all Contractor personnel with access rights to the system, shall be paid as a per month cost. This cost shall be derived by taking the remaining item cost and dividing it by the number of contract months.

Basis of Payment: This service shall be paid for at the contract lump sum price for "Document Control Specialist" complete, which price shall include the Contractor personnel's training time, preparation, statusing, electronically scanning, filing, and sending all project correspondence, and the furnishing, maintenance, and supply costs for all services as noted above in the

utilization of the document control system as established and maintained by the Department. The lump sum price will be certified for payment as described in "Method of Measurement" subject to the following conditions:

1) Failure by the Contractor to utilize and regularly update the specified SharePoint database in a manner acceptable to the Department or failure to utilize the common file server for the storage of all project related files may result in the withholding of all contract payments until such time as all specification requirements have been satisfied. Failure by the designated Document Control Specialist to update submittal statuses on a regular basis shall result in the replacement of the Document Control Special at the Engineer's request. Additionally, the Contractor may be found in violation of Article 1.02.02 of the Standard Specifications "for having failed to prosecute work continuously, diligently and cooperatively in an orderly sequence".

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 the continued utilization of the Document Control System which shall be paid at the per month cost for the services of the Document Control Specialist.

Pay Item	Pay Unit
Document Control Specialist	L.S.

SUBMITTAL REGISTER FORM

The use of this Submittal Register Form is required for all submittals

Project Name: NEW HAVEN-HARTFORD-SPRINGFIELD HIGH SPEED RAIL PROGRAM
Hartford Station
State Project No. 170-3261
Connecticut Department of Transportation

Design Engineer: Michael Baker Jr., Inc.

Contractor: _____

Address: _____

Telephone No.: _____

Subcontractor: _____

Address: _____

Telephone No.: _____

Submittal Number: _____

Submittal Title: _____

Specification Section and Paragraph Number: _____

Contract Drawing and Detail Reference: _____

Date of Initial Submittal: _____

Date of this Submittal: _____

CPM Activity Number: _____

This Submittal Prepared By: _____

Having reviewed this submittal, I certify that it is complete, accurate, coordinated in all aspects of the item being submitted and conforms to the requirements of the Contract in all respects, including all Federal requirements such as "Buy America" except as otherwise noted.

By: _____
Signature

_____
Printed or Typed Name

_____
Title

_____
Date

ITEM # 0969062A - CONSTRUCTION FIELD OFFICE, MEDIUM

Description: Under the item included in the bid document, adequate weatherproof office quarters will be provided by the Contractor for the duration of the work, and if required, for a maximum of ninety days thereafter for the exclusive use of ConnDOT forces and others who may be engaged to augment ConnDOT forces with relation to the contract. The office quarters shall be located convenient to the work site and installed in accordance with Article 1.08.02, these offices 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 one (1) office quarters and corresponding equipment for each office as described below.

The Medium Field Office shall include:

	Description:
400 SF	Sq. Ft. of floor space with a minimum ceiling height of 7 ft. and shall be partitioned as shown on building floor plan as provided by the Engineer.
2 EA	Minimum number of exterior entrances.
7 EA	Minimum number of parking spaces.

Office layout: The office shall have a minimum square footage as indicated in the table above, and shall be partitioned as shown on building floor plan as provided by the Engineer. The underside of the office shall be fully skirted to the ground.

Lavatory Facilities: The Contractor shall furnish lavatory and toilet facilities at a location convenient to the office quarters for the use of Department personnel and such assistants as they may engage. He shall also supply lavatory and sanitary supplies as required.

Windows and Entrances: The windows shall be of a type that will open and close conveniently, shall be sufficient in number and size to provide adequate light and ventilation, and shall be fitted with locking devices, blinds and screens. The entrances shall be secure, screened, and fitted with a lock for which four keys shall be furnished. All keys to the construction field office shall be furnished to the Department and will be kept in their possession while State personnel are using the office. Any access to the entrance ways shall meet applicable building codes and be slip resistant, with appropriate handrails.

Lighting: The Contractor shall equip the office interior with electric lighting that provides a minimum illumination level of 100 foot-candles at desk level height, and electric outlets for each desk and drafting table. The Contractor shall also provide exterior lighting that provides a minimum illumination level of 2 foot-candles throughout the parking area and for a minimum distance of 10 ft. on each side of the field office.

The Contractor shall provide the following additional equipment, facilities, and/or services at the Field Office on this project to include at least the following to the satisfaction of the Engineer:

Parking Facility: Adequate parking spaces with adequate illumination on a paved surface, with surface drainage if needed. If paved parking does not exist adjacent to the field office, the Contractor shall provide a parking area of sufficient size to accommodate the number of vehicles indicated in the table above. Construction of the parking area and driveway, if necessary, will consist of a minimum of 6 inches of processed aggregate base graded to drain. The base material will be extended to the office entrance.

Field Office Security: Physical Barrier Devices - This shall consist of physical means to prevent entry, such as: 1) All windows shall be barred or security screens installed; 2) All field office doors shall be equipped with dead bolt locks and regular day operated door locks; and 3) Other devices as directed by the Engineer to suit existing conditions.

Electric Service: The field office shall be equipped with an electric service panel to serve the electrical requirements of the field office, including: lighting, general outlets, computer outlets, calculators etc., and meet the following minimum specifications:

A. 120/240 volt, 1 phase, 3 wire.
B. Ampacity necessary to serve all equipment. Service shall be a minimum 100 amp dedicated to the construction field office.
C. The electrical panel shall include a main circuit breaker and branch circuit breakers of the size and quantity required.
D. Additional 120 volt, single phase, 20 amp, isolated ground dedicated power circuit with dual NEMA 5-20 receptacles will be installed at each computer workstation location.
E. Additional 120 volt, single phase, 20 amp, isolated ground dedicated power circuit with dual NEMA 5-20 receptacles will be installed, for use by the Telephone Company.
F. Additional 120-volt circuits and duplex outlets as required meeting National Electric Code requirements.
G. One exterior (outside) wall mounted GFI receptacle, duplex, isolated ground, 120 volt, straight blade.
H. After work is complete and prior to energizing, the State's ConnDOT electrical inspector, must be contacted at 860-594-2240. (Do Not Call Local Town Officials)
I. Prior to field office removal the ConnDOT Data Communications office must be notified to deactivate the communications equipment.

Heating, Ventilation and Air Conditioning (HVAC): The field office shall be equipped with sufficient heating, air conditioning and ventilation equipment to maintain a temperature range of 68°-80° Fahrenheit within the field office.

The Following Furnishings and Equipment Shall Be Provided In The Medium Field Office:

Qty	Description:
3 EA	Office desks (2.5 ft x 5 ft) with drawers, locks, and matching desk chairs that have

Qty	Description:
	pneumatic seat height adjustment and dual wheel casters on the base.
2 EA	Office Chairs.
1 EA	Fire resistant cabinets (legal size/4 drawer), locking.
1 EA	Drafting type tables (3 ft x 6 ft) and supported by wall brackets and legs; and matching drafters stool that have pneumatic seat height adjustment, seat back and dual wheel casters on the base.
2 EA	Personal computer tables (4 ft x 2.5 ft).
1 EA	Hot and cold water dispensing unit and supply of cups and bottled water shall be supplied by the Contractor for the duration of the project.
2 EA	Electronic office type printing calculators capable of addition, subtraction, multiplication and division with memory and a supply of printing paper.
2 EA	Telephone.
1 EA	Telephone answering machine.
1 EA	B/W Multi-function Printer/Copier/Scanner/Fax- dry, plain paper with automatic feeder and reducing capability. All supplies, paper and maintenance shall be provided by the Contractor.
2 EA	Computer systems as specified below under Computer Hardware and Software. All supplies and maintenance shall be provided by the Contractor.
2 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.
3 EA	Wastebaskets - 5 gal., including plastic waste bags.
2 EA	Electric pencil sharpeners.
* EA	Fire extinguishers - provide and install type and number to meet applicable State and local codes for size of office indicated, including a fire extinguisher suitable for use on a computer terminal fire.
1 EA	Vertical plan racks for 2 sets of 2 ft x 3 ft plans for each rack.
1 EA	Infrared Thermometer, including certified calibration, case, cleaning wipes.
1 EA	Concrete Curing Box as specified below under 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 the installation of two (2) telephone lines: one (1) line for phone/voice service and one (1) line dedicated for the facsimile machine. The Contractor shall pay all charges except for out-of-state toll calls made by State personnel.

Data Communications Facility Wiring: Contractor shall install a Category 5e 468B patch panel in a central wiring location and Cat 5e cable from the patch panel to each networked device (includes PCs station, printer, etc.) terminating in a (category 5e 468B) wall or surface mount data jack. The

central wiring location shall also house either the data circuit with appropriate power requirements or a category 5 cable run to the location of the installed data circuit. The central wiring location will be determined by the ConnDOT Data Center staff in coordination with the designated field office personnel as soon as the facility is in place. The ConnDOT Project Engineer will provide the Contractor with a copy of the current PC specifications, approved printer list and data wiring schematic as soon as possible after the contract is awarded.

Contractor to run a CAT 5e LAN cable a minimum length of 25 feet for each computer to LAN switch area leaving an additional 10 feet of cable length on each side with terminated RJ45 connectors. Each run / jack shall be clearly labeled with an identifying Jack Number.

The installation of a data communication circuit between the field office and the ConnDOT Data Communication Center in Newington will be coordinated between the ConnDOT District staff, ConnDOT Office of Information Systems and the local phone company. The ConnDOT District staff will coordinate the installation of the data communication service with ConnDOT PC Support once the field office phone number is issued. The Contractor shall provide the field office telephone number(s) to the ConnDOT Project Engineer as soon as possible to facilitate data line and computer installations.

Computer Hardware and Software:

The ConnDOT Project Engineer will provide the Contractor with a copy of the current PC specifications, approved printer list and data wiring schematic as soon as possible after the contract is awarded.

Before ordering the computer hardware and software, the Contractor must submit a copy of their proposed PC specifications and the type of printer to the ConnDOT Project Engineer for review by the ConnDOT Data Center. If the specification meets or exceeds the minimum specifications listed below, then the Contractor will be notified that the order may be placed.

Before any equipment is delivered to the Data Center, arrangements must be made a minimum of 24 hours in advance by contacting 860-594-3500. All software, hardware and licenses listed below shall be clearly labeled, specifying the (1) Project No., (2) Contractor Name, (3) Project Engineer’s Name and (4) Project Engineer’s Phone No., and shall be delivered to the ConnDOT Data Center, 2710 Berlin Turnpike, Newington, CT, where it will be configured and prepared for field installation. Installation will then be coordinated with ConnDOT field personnel and the computer system specified will be stationed in the Department’s project field office.

The computer system furnished shall have all software and hardware necessary for the complete installation of the latest versions of the software listed, and therefore supplements the minimum specifications below. The Engineer reserves the right to expand or relax the specification to adapt to the software and hardware limitations and availability, the compatibility with current agency systems, and to provide the Department with a computer system that can handle the needs of the project. This requirement is to ensure that the rapid changing environment that computer systems have experienced does not leave the needs of the project orphan to what has

been specified. There will not be any price adjustment due to the change in the minimum system requirements.

The Contractor shall provide the Engineer with a licensed copy registered in the Department's name of the latest versions of the software listed and maintain customer support services offered by each software producer for the duration of the Contract. The Contractor shall deliver to the Engineer all supporting documentation for the software and hardware including any instructions or manuals. The Contractor shall provide original backup media for the software.

The Contractor shall provide the computer system with all required supplies, maintenance and repairs (including labor and parts) throughout the Contract life.

Once the Contract has been completed, the computer will remain the property of the Contractor. Prior to the return of any computer(s) to the Contractor, field personnel will coordinate with the Data Center personnel for the removal of Department owned equipment, software, data, and associated equipment.

A) Computer – Minimum Specification *(revised 7-15-13):*

Processor – Intel® Core i3 Processor (2.93 GHz, 1066 MHz FSB 3MB L2 Cache) to include Intel vPro™ Technology's Advanced Management Features
Memory – 4 GB DIMM DDR3 1333MHz.
Monitors – Dual 24.0 inch LCD color monitors.
Graphics – Intel Graphics Media Accelerator 4500 or equivalent.
Hard Drive – 500 GB Ultra ATA/SATA hard drive (Western Digital, IBM or Seagate).
Optical Drive – CD-RW/DVD-RW Combo.
Multi-Card Reader – Must include SD
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 10/100/1000 twisted pair Ethernet.
Keyboard – 104+ Keyboard.
Mouse – Optical 2-button mouse with scroll wheel.
Operating System – Windows 7 Professional.
Application Software – MS Office Professional Edition 2010.
Additional Software (Latest Releases, including subscription services for the life of the Contract) –

- Norton Anti-Virus,
- Adobe Acrobat Professional – Digital Download is not acceptable. Must be original purchased Licensed Media CD/DVD.

Resource or Driver CD/DVD – CD/DVD with all drivers and resource information so the 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 7 Professional, Microsoft

Office 2010 Professional Edition, and other software required software must be provided. Computer Brands are limited to Dell (preferred) and HP (acceptable) 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.

B) B/W Multi-Function Printer/Copier/Scanner/Fax – Minimum Specification:

Savin 920SPF, or other approved networked Savin multi-function on the approved list provided by the Project Engineer.
Print speed – 20 ppm.
Resolution – 1,200 x 1,200 dpi.
Paper size – 8.5in x 11in, 8.5 in x 14 in, and 11in x 17in.
RAM – 640 MB.
Print Drivers – Must support HP PCL6 and HP PCL5e.
Network interface requirements:

- Network ready (MIN 10/100 RJ45)
- Network/OS – Windows XP/Windows 7/Server 2008R2
- Network Protocols - TCP/IP (IPv4, IPv6)
- User interface - Built in display window.

Note: Before ordering the Multi-function Printer/Copier/Scanner/Fax, the Contractor must submit a copy of their proposed specifications to the ConnDOT Project Engineer for review. If the specification meets or exceeds the listed minimum specifications, then the Contractor will be notified that the order may be placed.

The Contractor is responsible for service and repairs for the Multi-function Printer/Copier/Scanner/Fax. 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 Multi-function Printer/Copier/Scanner/Fax shall be provided by the Contractor.

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 7.
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 and associated equipment provided shall be in good working order and will meet the requirements of AASHTO T 152.

C) Slump Cone Mold – Slump cone, base plate, and tamping rod shall be provided in like-new condition and meet the requirements of AASHTO T119, Standard Test Method for Slump of Hydraulic-Cement Concrete.

Insurance Policy: The Contractor shall provide a separate insurance policy, with no deductible, in the minimum amount of twenty thousand dollars ($20,000.00) in order to insure all State-owned data equipment and supplies used in the office against all losses. The Contractor shall be named insured on that policy, and the Department shall be an additional named insured on the policy. These losses shall include, but not be limited to: theft, fire, and physical damage. The Department will be responsible for all maintenance costs of Department owned computer hardware. In the event of loss, the Contractor shall provide replacement equipment in accordance with current Department equipment specifications, within seven days of notice of the loss. If the Contractor is unable to provide the required replacement equipment within seven days, the Department may provide replacement equipment and deduct the cost of the equipment from monies due or which may become due the Contractor under the contract or under any other contract. The Contractor's financial liability under this paragraph shall be limited to the amount of the insurance coverage required by this paragraph. If the cost of equipment replacement required by this paragraph should exceed the required amount of the insurance coverage, the Department will reimburse the Contractor for replacement costs exceeding the amount of the required coverage.

Maintenance: During the occupancy by the Department, the Contractor shall maintain all facilities and furnishings provided under the above requirements, and shall maintain and keep the office quarters clean through the use of weekly professional cleaning to include, but not limited to, washing & waxing floors, cleaning restrooms, removal of trash, etc. Exterior areas shall be mowed and clean of debris. A trash receptacle (dumpster) with weekly pickup (trash removal) shall be provided. Snow removal, sanding and salting of all parking, walkway, and entrance ways areas shall be accomplished during a storm if on a workday during work hours, immediately after a storm and prior to the start of a workday. If snow removal, salting and sanding are not completed by the specified time, the State will provide the service and all costs incurred will be deducted from the next payment estimate.

Method of Measurement: The furnishing and maintenance of the construction field office will be measured for payment by the number of calendar months that the office is in place and in operation, measured to the nearest month.

There will not be any price adjustment due to any change in the minimum computer system requirements.

Basis of Payment: The furnishing and maintenance of the construction field office will be paid at the listed unit price per month for the item "Construction Field Office, Medium", which price shall include all material, equipment, labor, utility services and work incidental thereto.

The cost of providing the parking area, external illumination, trash removal and snow and ice removal shall be included in the monthly unit price bid for the respective item "Construction Field Office, Medium".

Pay Item	Pay Unit
Construction Field Office, Medium	Month

ITEM #0970006A - TRAFFICPERSON (MUNICIPAL POLICE OFFICER)
ITEM #0970007A - TRAFFICPERSON (UNIFORMED FLAGGER)

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

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

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

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

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

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

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

Trafficpersons shall consist of the following types:

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

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

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

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

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

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

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

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

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

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

9.70.05—Basis of Payment: Trafficpersons will be paid in accordance with the schedule described herein.
There will be no direct payment for safety garments or STOP/SLOW paddles. All costs associated with furnishing safety garments and STOP/SLOW paddles shall be considered included in the general cost of the item.

1. Uniformed Law Enforcement Personnel: The sum of money shown on the Estimate and in the itemized proposal as "Estimated Cost" for this work will be considered the bid price even though payment will be made as described below. The estimated cost figure is not to be altered in any manner by the bidder. Should the bidder alter the amount shown, the altered figures will be disregarded and the original price will be used to determine the total amount for the contract.

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

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

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

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

ITEM NO. 971001A – 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 all existing through traffic on roadways within the project limits.

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 in width. The length of the alternating one-way traffic operation shall not exceed 300 feet.

Church Street

When the Contractor is performing work above Church Street, and during the allowable periods, the Contractor shall close the area of Church Street immediately below and maintain and protect at least an alternating one-way traffic operation, on a paved travel path not less than 12 feet in width. The length of the alternating one-way traffic operation shall not exceed 300 feet and there shall be no more than one alternating one-way traffic operation within the project limits without prior approval of the Engineer. The Contractor shall not reopen the street to two-way traffic until all work above has been completed and the area is safe and secure for vehicular and pedestrian traffic to pass.

Parking Areas

The Contractor shall maintain and protect all traffic in parking areas within the project limits, except for those times that the Contractor is actively working in the parking area. During those periods, the Contractor shall close the affected areas to traffic such that the work can be performed. The Contractor shall not re-open the parking areas until all work is completed and the area is safe and secure for vehicular and pedestrian use.

Commercial Driveways

The Contractor shall maintain access to, and egress from, all commercial driveways throughout the project limits. Since the project site is an active intermodal facility, operating 24/7, the Contractor will only be allowed to close said driveways during business hours if permission is granted from the Greater Hartford Transit District.

Article 9.71.03 - Construction Method is supplemented as follows:

General

When the Contractor is excavating adjacent to the roadway, the Contractor shall provide a 3-foot shoulder between the work area and travel lanes, with traffic drums spaced every 50 feet. At the end of the workday, if the vertical drop-off exceeds 3 inches, the Contractor shall provide a temporary traversable slope of 4:1 or flatter that is acceptable to the Engineer.

The Contractor, during the course of active construction work, shall close the lanes and/or parking areas directly below the work area for the entire length of time overhead work is being undertaken.

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

Construction vehicles entering travel lanes at speeds less than the posted speed are interfering with traffic, and shall not be allowed without a lane closure. The lane closure shall be of sufficient length to allow vehicles to enter or exit the work area at posted speeds, in order to merge with existing traffic.

Signing

The Contractor shall maintain all existing signage 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/or as directed by the Engineer.

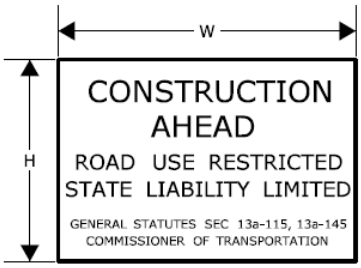
Pavement Markings

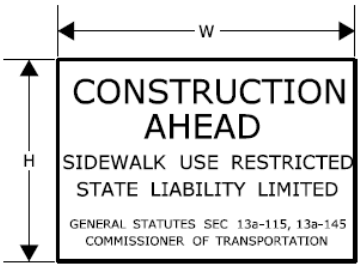
During construction, the Contractor shall maintain all pavement markings on paved surfaces on all roadways throughout the limits of the project.

TRAFFIC CONTROL DURING CONSTRUCTION OPERATIONS

The following guidelines shall assist field personnel in determining when and what type of traffic control patterns to use for various situations. These guidelines shall provide for the safe and efficient movement of traffic through work zones and enhance the safety of work forces in the work area.

SERIES 16 SIGNS





		W H
16-E	80-1605	84" x 60"
16-H	80-1608	60" x 42"
16-M	80-1613	30" x 24"

		W H
16-S	80-1619	48" x 30"

THE 16-S SIGN SHALL BE USED ON ALL PROJECTS THAT REQUIRE SIDEWALK RECONSTRUCTION OR RESTRICT PEDESTRIAN TRAVEL ON AN EXISTING SIDEWALK.

SERIES 16 SIGNS SHALL BE INSTALLED IN ADVANCE OF THE TRAFFIC CONTROL PATTERNS TO ALLOW MOTORISTS THE OPPORTUNITY TO AVOID A WORK ZONE. SERIES 16 SIGNS SHALL BE INSTALLED ON ANY MAJOR INTERSECTING ROADWAYS THAT APPROACH THE WORK ZONE. ON LIMITED-ACCESS HIGHWAYS, THESE SIGNS SHALL BE LOCATED IN ADVANCE OF THE NEAREST UPSTREAM EXIT RAMP AND ON ANY ENTRANCE RAMPS PRIOR TO OR WITHIN THE WORK ZONE LIMITS.

THE LOCATION OF SERIES 16 SIGNS CAN BE FOUND ELSEWHERE IN THE PLANS OR INSTALLED AS DIRECTED BY THE ENGINEER.

SIGNS 16-E AND 16-H SHALL BE POST-MOUNTED.

SIGN 16-E SHALL BE USED ON ALL EXPRESSWAYS.

SIGN 16-H SHALL BE USED ON ALL RAMPS, OTHER STATE ROADWAYS, AND MAJOR TOWN/CITY ROADWAYS.

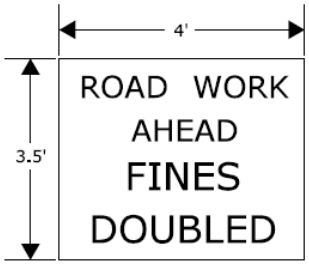
SIGN 16-M SHALL BE USED ON OTHER TOWN ROADWAYS.

REGULATORY SIGN "ROAD WORK AHEAD, FINES DOUBLED"

THE REGULATORY SIGN "ROAD WORK AHEAD FINES DOUBLED" SHALL BE INSTALLED FOR ALL WORK ZONES THAT OCCUR ON ANY STATE HIGHWAY IN CONNECTICUT WHERE THERE ARE WORKERS ON THE HIGHWAY OR WHEN THERE IS OTHER THAN EXISTING TRAFFIC OPERATIONS.

THE "ROAD WORK AHEAD FINES DOUBLED" REGULATORY SIGN SHALL BE PLACED AFTER THE SERIES 16 SIGN AND IN ADVANCE OF THE "ROAD WORK AHEAD" SIGN.

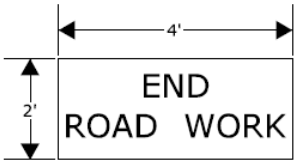
31-1906



"END ROAD WORK" SIGN

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

80-9612



SCALE: NONE

CONSTRUCTION TRAFFIC CONTROL PLAN

REQUIRED SIGNS

CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION

APPROVED Charles S. Harlow 2012.06.05 11:35:43-04'00'
PRINCIPAL ENGINEER

NOTES FOR TRAFFIC CONTROL PLANS

1. IF A TRAFFIC STOPPAGE OCCURS IN ADVANCE OF SIGN (A), THEN AN ADDITIONAL SIGN (A) SHALL BE INSTALLED IN ADVANCE OF THE STOPPAGE.

2. SIGNS (AA), (A), AND (D) SHOULD BE OMITTED WHEN THESE SIGNS HAVE ALREADY BEEN INSTALLED TO DESIGNATE A LARGER WORK ZONE THAN THE WORK ZONE THAT IS ENCOMPASSED ON THIS PLAN.

3. SEE TABLE 1 FOR ADJUSTMENT OF TAPERS IF NECESSARY.

4. IF THIS PLAN REMAINS IN CONTINUOUS OPERATION FOR MORE THAN 36 HOURS, THEN TRAFFIC DRUMS SHALL BE USED IN PLACE OF TRAFFIC CONES.

5. ANY LEGAL SPEED LIMIT SIGNS WITHIN THE LIMITS OF A ROADWAY / LANE CLOSURE AREA SHALL BE COVERED WITH AN OPAQUE MATERIAL WHILE THE CLOSURE IS IN EFFECT, AND UNCOVERED WHEN THE ROADWAY / LANE CLOSURE IS RE-OPENED TO ALL LANES OF TRAFFIC.

6. IF THIS PLAN REMAINS IN CONTINUOUS OPERATION FOR MORE THAN 36 HOURS, THEN ANY EXISTING CONFLICTING PAVEMENT MARKINGS SHALL BE ERADICATED OR COVERED, AND TEMPORARY PAVEMENT MARKINGS THAT DELINEATE THE PROPER TRAVELPATHS SHALL BE INSTALLED.

7. DISTANCES BETWEEN SIGNS IN THE ADVANCE WARNING AREA MAY BE REDUCED TO 100' ON LOW-SPEED URBAN ROADS (SPEED LIMIT < 40 MPH).

8. IF THIS PLAN IS TO REMAIN IN OPERATION DURING THE HOURS OF DARKNESS, INSTALL BARRICADE WARNING LIGHTS - HIGH INTENSITY ON ALL POST-MOUNTED DIAMOND SIGNS IN THE ADVANCE WARNING AREA.

9. A CHANGEABLE MESSAGE SIGN SHALL BE INSTALLED ONE HALF TO ONE MILE IN ADVANCE OF THE LANE CLOSURE TAPER.

10 SIGN (P) SHALL BE MOUNTED A MINIMUM OF 7 FEET FROM THE PAVEMENT SURFACE TO THE BOTTOM OF THE SIGN.

TABLE 1 - MINIMUM TAPER LENGTHS

POSTED SPEED LIMIT (MILES PER HOUR)	MINIMUM TAPER LENGTH FOR A SINGLE LANE CLOSURE
30 OR LESS	180' (55m)
35	250' (75m)
40	320' (100m)
45	540' (165m)
50	600' (180m)
55	660' (200m)
65	780' (240m)

METRIC CONVERSION CHART (1" = 25mm)

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

SCALE: NONE

CONSTRUCTION TRAFFIC CONTROL PLAN

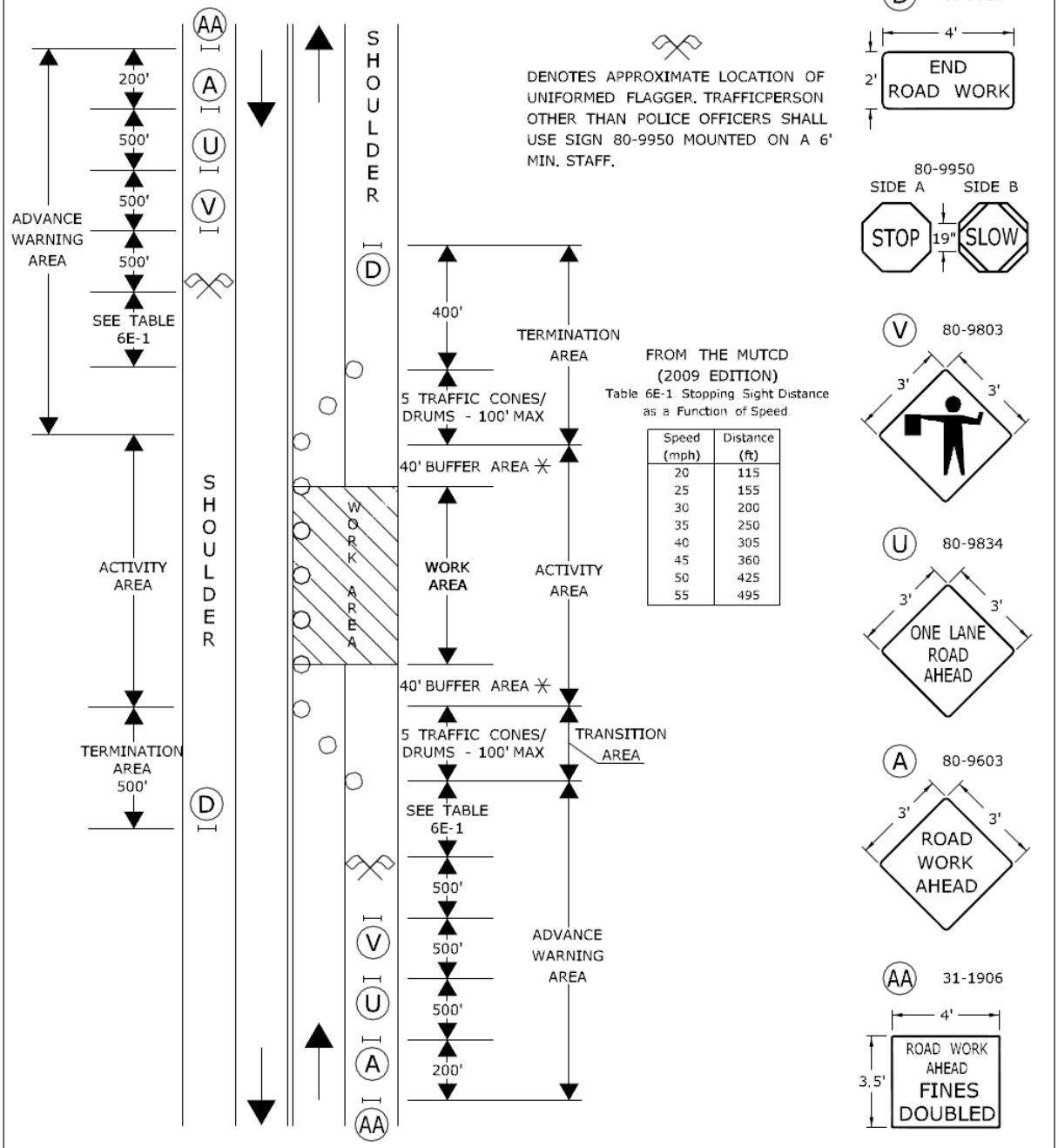
NOTES

CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION

APPROVED Charles S. Harlow 2012.06.05 15:50:35-04'00'
PRINCIPAL ENGINEER

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

SIGN FACE
108 SQ. FT (MIN.)



TRAFFIC CONE **OR** TRAFFIC DRUM
OPTIONAL TRAFFIC DRUM PORTABLE SIGN SUPPORT
HIGH MOUNTED INTERNALLY ILLUMINATED FLASHING ARROW

SCALE: NONE

CONSTRUCTION TRAFFIC CONTROL PLAN

PLAN 13 - SHEET 1 OF 2

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

CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION

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

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

SIGN FACE
108 SQ. FT (MIN.)

HAND SIGNAL METHODS TO BE USED BY UNIFORMED FLAGGERS

THE FOLLOWING METHODS FROM SECTION 6E.07, FLAGGER PROCEDURES, IN THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES," SHALL BE USED BY UNIFORMED FLAGGERS WHEN DIRECTING TRAFFIC THROUGH A WORK AREA. THE STOP/SLOW SIGN PADDLE (SIGN NO. 80-9950) SHOWN ON THE TRAFFIC STANDARD SHEET TR-1220 01 ENTITLED, "SIGNS FOR CONSTRUCTION AND PERMIT OPERATIONS" SHALL BE USED.

A. TO STOP TRAFFIC

TO STOP ROAD USERS, THE FLAGGER SHALL FACE ROAD USERS AND AIM THE STOP PADDLE FACE TOWARD ROAD USERS IN A STATIONARY POSITION WITH THE ARM EXTENDED HORIZONTALLY AWAY FROM THE BODY. THE FREE ARM SHALL BE HELD WITH THE PALM OF THE HAND ABOVE SHOULDER LEVEL TOWARD APPROACHING TRAFFIC.

B. TO DIRECT TRAFFIC TO PROCEED

TO DIRECT STOPPED ROAD USERS TO PROCEED, THE FLAGGER SHALL FACE ROAD USERS WITH THE SLOW PADDLE FACE AIMED TOWARD ROAD USERS IN A STATIONARY POSITION WITH THE ARM EXTENDED HORIZONTALLY AWAY FROM THE BODY. THE FLAGGER SHALL MOTION WITH THE FREE HAND FOR ROAD USERS TO PROCEED.

C. TO ALERT OR SLOW TRAFFIC

TO ALERT OR SLOW TRAFFIC, THE FLAGGER SHALL FACE ROAD USERS WITH THE SLOW PADDLE FACE AIMED TOWARD ROAD USERS IN A STATIONARY POSITION WITH THE ARM EXTENDED HORIZONTALLY AWAY FROM THE BODY. TO FURTHER ALERT OR SLOW TRAFFIC, THE FLAGGER HOLDING THE SLOW PADDLE FACE TOWARD ROAD USERS MAY MOTION UP AND DOWN WITH THE FREE HAND, PALM DOWN.

◯ TRAFFIC CONE **OR** TRAFFIC DRUM
✳ OPTIONAL ⊗ TRAFFIC DRUM ⊢⊣ PORTABLE SIGN SUPPORT
⟵ HIGH MOUNTED INTERNALLY ILLUMINATED FLASHING ARROW

SCALE: NONE

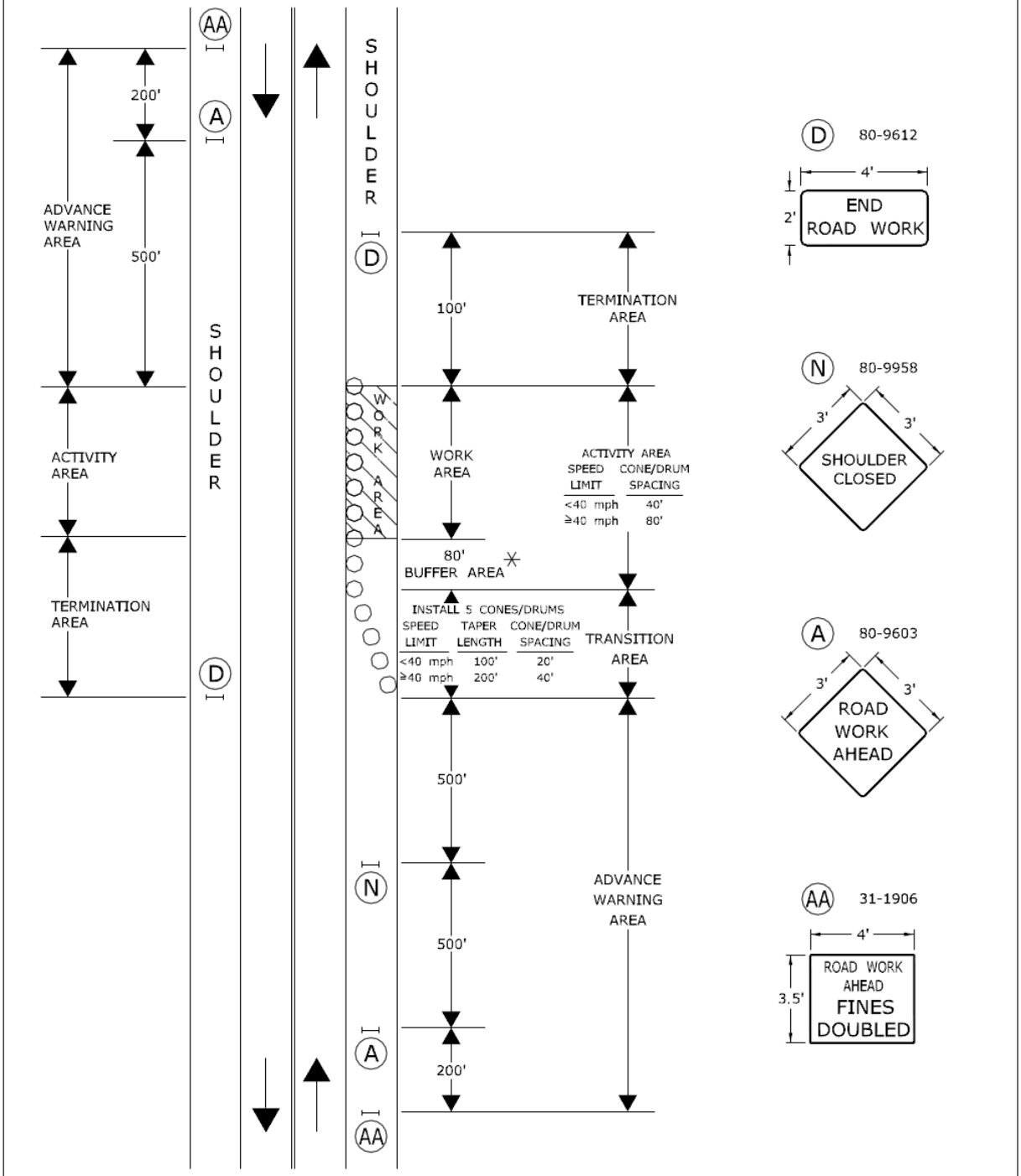
CONSTRUCTION TRAFFIC CONTROL PLAN
PLAN 13 - SHEET 2 OF 2
SEE NOTES 1, 2, 4, 6, 7, 8

CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION

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

WORK IN SHOULDER - TWO LANE HIGHWAY

SIGN FACE
71 SQ. FT (MIN.)



TRAFFIC CONE **OR** TRAFFIC DRUM
OPTIONAL TRAFFIC DRUM PORTABLE SIGN SUPPORT
HIGH MOUNTED INTERNALLY ILLUMINATED FLASHING ARROW

SCALE: NONE

CONSTRUCTION TRAFFIC CONTROL PLAN
PLAN 14
SEE NOTES 1, 2, 4, 7, 8

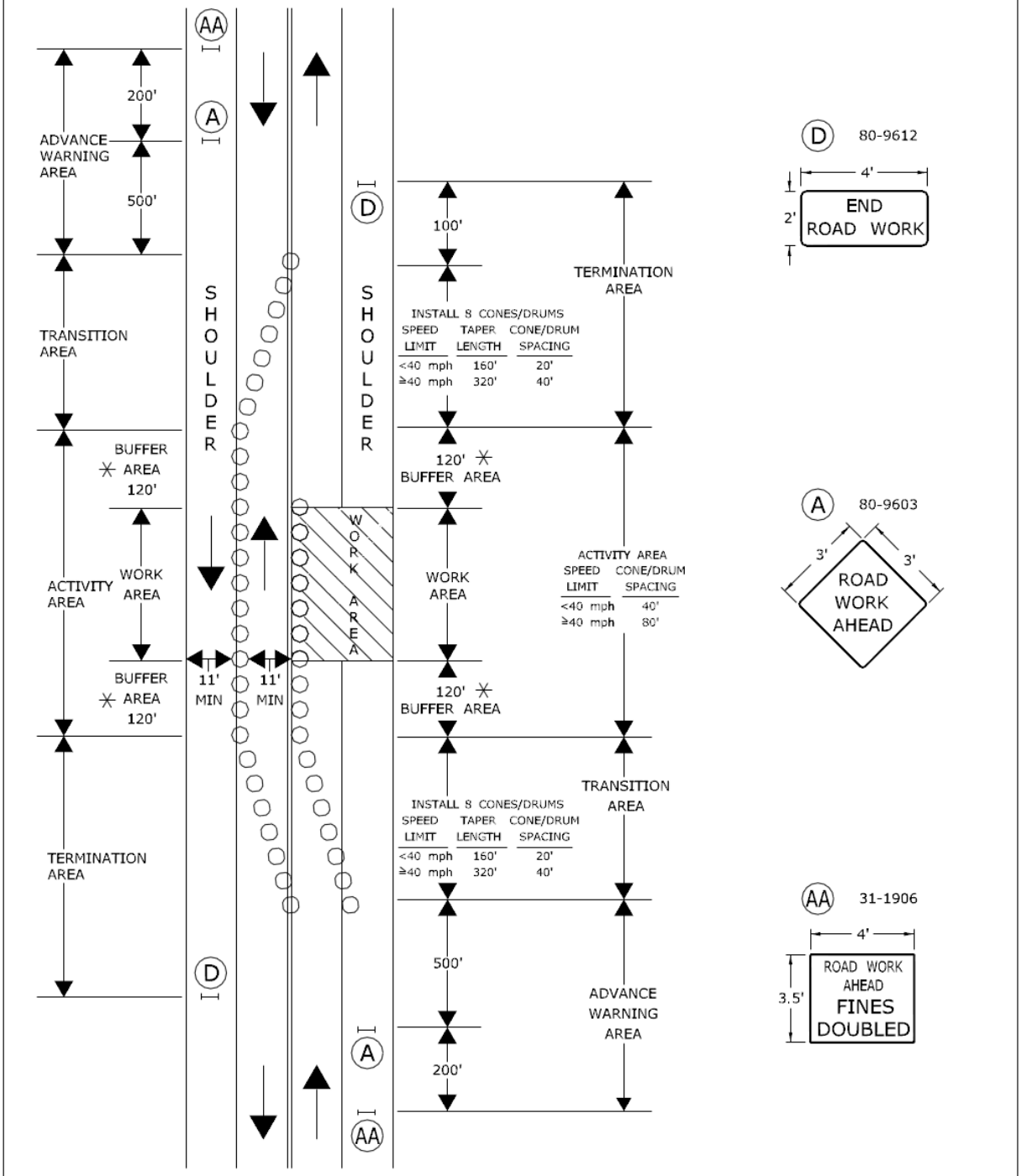
CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION

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

ITEM #0971001A

WORK IN TRAVEL LANE AND SHOULDER
TWO LANE HIGHWAY

SIGN FACE
62 SQ. FT (MIN.)



TRAFFIC CONE **OR** TRAFFIC DRUM
OPTIONAL TRAFFIC DRUM PORTABLE SIGN SUPPORT
HIGH MOUNTED INTERNALLY ILLUMINATED FLASHING ARROW

SCALE: NONE

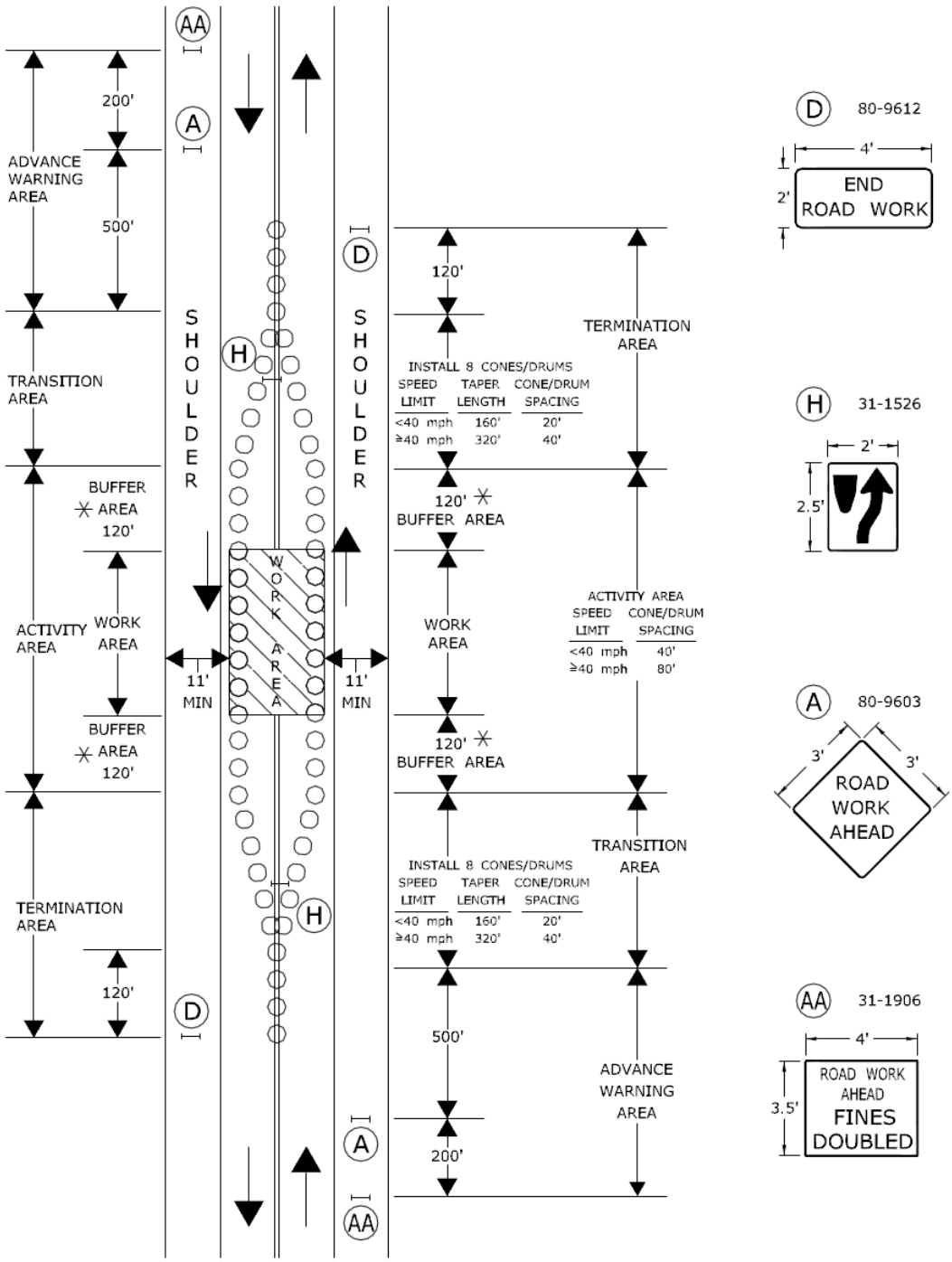
CONSTRUCTION TRAFFIC CONTROL PLAN
PLAN 15
SEE NOTES 1, 2, 4, 6, 7, 8

CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION

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

WORK IN MIDDLE OF ROADWAY
TWO LANE HIGHWAY

SIGN FACE
72 SQ. FT (MIN.)



◯ TRAFFIC CONE **OR** TRAFFIC DRUM
✳ OPTIONAL ⊗ TRAFFIC DRUM ⊢⊣ PORTABLE SIGN SUPPORT
⟵ HIGH MOUNTED INTERNALLY ILLUMINATED FLASHING ARROW

SCALE: NONE

CONSTRUCTION TRAFFIC CONTROL PLAN
PLAN 16
SEE NOTES 1, 2, 4, 6, 7, 8

CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION

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

Article 9.71.05 – Basis of Payment is supplemented by the following:

The temporary relocation of signs and supports, and the furnishing, installation and removal of any temporary supports shall be paid for under the item "Maintenance and Protection of Traffic".

The cost of furnishing, installing, and removing the material for the 4H:1V traversable slope shall be paid for under the item "Maintenance and Protection of Traffic."

ITEM #0979003A - CONSTRUCTION BARRICADE TYPE III

Article 9.79.01 – Description: The Contractor shall furnish construction barricades to conform to the requirements of NCHRP Report 350 (TL-3) and to the requirements stated in Article 9.71 "Maintenance and Protection of Traffic," as shown on the plans and/or as directed by the Engineer.

Article 9.79.02 – Materials: Prior to using the construction barricades, the Contractor shall submit to the Engineer a copy of the Letter of Acceptance issued by the FHWA to the manufacturer documenting that the devices conform to NCHRP Report 350 (TL-3).

Alternate stripes of white and orange Type III or Type VI reflective sheeting shall be applied to the horizontal members as shown on the plans. Application of the reflective sheeting shall conform to the requirements specified by the reflective sheeting manufacturer. Only one type of sheeting shall be used on a barricade and all barricades furnished shall have the same type of reflective sheeting. Reflective sheeting shall conform to the requirements of Article M.18.09.01.

Construction barricades shall be designed and fabricated so as to prevent them from being blown over or displaced by the wind from passing vehicles. Construction barricades shall be approved by the Engineer before they are used.

Article 9.79.03 – Construction Methods: Ineffective barricades, as determined by the Engineer and in accordance with the ATSSA guidelines contained in "Quality Standards for Work Zone Traffic Control Devices", shall be replaced by the Contractor at no cost to the State.

Barricades that are no longer required shall be removed from the project and shall remain the property of the Contractor.

Article 9.79.04 – Method of Measurement: Construction Barricade Type III will be measured for payment by the number of construction barricades required and used.

Article 9.79.05 – Basis of Payment: "Construction Barricade Type III" required and used will be paid for at the Contract unit price per each. Each barricade will be paid for once, regardless of the number of times it is used.

Pay Item	Pay Unit
Construction Barricade Type III	EA.

ITEM NO. 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.

For work along and within the Amtrak right-of-way:

Refer to the following:

Notice to Contractor – Work on Railroad Property
Notice to Contractor – Amtrak Specifications
Notice to Contractor – Track Monitoring
Notice to Contractor – Railroad Safety Training
Notice to Contractor – Platform Construction
Divisions 1 and 2 – General Requirements of the CSI-Formatted Specifications

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

PERMITS AND/OR SUPPLEMENTAL TO FORM 816 AND REQUIRED PROVISIONS:

The following Permits and/or Supplemental to Form 816 and Required Provisions follow this page and are hereby made part of this Contract.

- **PERMITS AND/OR PERMIT APPLICATIONS**

  No Permits are required for this contract

- **SUPPLEMENTAL SPECIFICATIONS TO STANDARD SPECIFICATIONS FORM 816**

- **Construction Contracts - Required Contract Provisions (FTA Funded Contracts)**

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.

DIVISION 1 and DIVISION 2 – GENERAL REQUIREMENTS

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)

DIVISION 3 - CONCRETE

033000 Cast-in-Place Concrete

DIVISION 5 - METALS

051200 Structural Steel Framing

051213 Architecturally Exposed Structural Steel Framing

051300 Retractable Platform Edge

055000 Metal Fabrications

055100 Metal Stairs

055213 Pipe and Tube Railings

057500 Decorative Formed Metal

DIVISION 6 – WOOD, PLASTICS AND COMPOSITES

061000 Rough Carpentry

061533 Wood Decking

066000 Pre-Engineered Reinforced Composite Transit Platforms

066400 Polyethylene Platform Edge Units

DIVISION 8 – OPENINGS

087100 Door Hardware

DIVISION 9 – FINISHES

096519 Resilient Tile Flooring

099600 High-Performance Coatings

DIVISION 10 - SPECIALTIES

102213 Wire Mesh Partitions

104060 Benches and Trash Receptacles

104250 Site Wayfinding and Identification Signage

108100 Pest Control Devices

DIVISION 23 – HEATING VENTILATION AND AIR CONDITIONING (HVAC)

230500 Basic Mechanical Materials and Methods

230523 HVAC Valves

230529 Hangers and Supports

230553 Mechanical Identification

230584 Through-Penetration Firestop Systems

230598 Mechanical Seismic Restraints

230700 HVAC Piping Insulation

232300 Refrigerant Piping

238240 DX Mini-Splits System

DIVISION 26 – ELECTRICAL

260500 Common Work Results for Electrical

260519 Low-Voltage Electrical Power Conductors and Cables

260526 Grounding and Bonding for Electrical Systems

260529 Hangers and Supports for Electrical Systems

260533 Raceways and Boxes for Electrical Systems

260548 Vibration and Seismic Controls for Electrical Systems

260553 Identification for Electrical Systems

260800 Commissioning of Electrical Systems

260923 Lighting Control Devices

262200 low-Voltage Transformers

262416 Panelboards

262726 Wiring Devices

262813 Fuses

262816 Enclosed Switches and Circuit Breakers

263353 Static Uninterruptible Power Supply

264313 Surge Protective Devices for Low Voltage

265200 Emergency Lighting

265600 Exterior Lighting

DIVISION 27 – COMMUNICATIONS

271116 Communications Cabinets, Rocks, Frames and Enclosures

273226 Blue Light / Emergency Telephone (BL/ETEL) System

274216 Passenger Information Display (PID) Systems

275116 Public Address Systems

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

282301 Video Surveillance System

283101 Fire Alarm System

DIVISION 32 – EXTERIOR IMPROVEMENTS

323113 Chain Link Fences and Gates

323119 Decorative Metal Fences and Gates

END OF INDEX OF CSI FORMATTED SPECIFICATIONS

SECTION 01141-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 01141

SECTION 01142 - 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 01142

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 01520

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. Slabs-on-grade.
4. Suspended slabs.
5. Concrete toppings.

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. 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.

D. 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.

E. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.

1. Location of construction joints is subject to approval of the Architect.

F. Samples: For vapor retarder.

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, manufacturer, testing agency, and professional engineer.

C. Welding certificates.

D. Material Certificates: For each of the following, signed by manufacturers:

E. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:

1. Aggregates.

F. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.

G. Minutes of preinstallation conference.

1.6 QUALITY ASSURANCE

A. 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.

B. 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."

C. 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 in accordance with Form 816 Article 1.20-1.06.01

D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D 1.4M, "Structural Welding Code - Reinforcing Steel."

E. 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."

F. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

G. 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.
e. Special concrete finish subcontractor.

2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, forms and form removal limitations, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage. Avoid damaging coatings on steel reinforcement.

B. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

C. 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 BUY AMERICA COMPLIANCE

A. Products must meet Buy America requirements. Refer to NOTICE TO CONTRACTOR – BUY AMERICA for additional information.

2.2 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: 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. Structural 1, B-B or better; mill oiled and edge sealed.

B. Rough-Formed Finished Concrete: 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. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.

E. 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.

F. 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.

2.3 STEEL REINFORCEMENT

A. 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.

B. Epoxy-Coated Welded Wire Reinforcement: ASTM A 884/A 884M, Class A coated, Type 1, plain steel.

2.4 REINFORCEMENT ACCESSORIES

A. Epoxy-Coated Joint Dowel Bars: ASTM A 615/A 615M, Grade 60, plain-steel bars, ASTM A 775/A 775M epoxy coated.

B. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating; compatible with epoxy coating on reinforcement and complying with ASTM A 775/A 775M.

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.

2.5 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 or Type III, gray. ASTM C 150, Type II for concrete in contact with the earth.

B. Normal-Weight Aggregates: ASTM C 33, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source.

1. Maximum Coarse-Aggregate Size: 3/4 inch nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Water: ASTM C 94/C 94M and potable.

2.6 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. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
2. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.

2.7 WATERSTOPS

A. Flexible Rubber Waterstops: CE CRD-C 513, for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections, and directional changes.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Greenstreak Group, Inc.
b. Williams Products, Inc.
c. West American Rubber Company, LLC.

2. Profile: Ribbed with center bulb.
3. Dimensions: As indicated.

2.8 VAPOR RETARDERS

A. Sheet Vapor Retarder: ASTM E 1745, Class C. Include manufacturer's recommended adhesive or pressure-sensitive joint tape.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Fortifiber Building Systems Group; Moistop Ultra 6.
b. Raven Industries Inc.; Vapor Block 6.
c. Stego Industries, LLC; Stego Wrap, 10 mil Class C.

B. Granular Fill: Clean mixture of crushed stone or crushed or uncrushed gravel; ASTM D 448, Size 57, with 100 percent passing a 1-1/2-inch sieve and 0 to 5 percent passing a No. 8 sieve.

2.9 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 No. 8 sieve.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Anti-Hydro International, Inc.; Emery Non-Slip.
b. Dayton Superior Corporation; Emery Tuff Non-Slip.
c. L&M Construction Chemicals, Inc.; Grip It.

2.10 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

2.11 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.

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:

C. Limit water-soluble, chloride-ion content in hardened concrete to 0.10 percent by weight of cement.

D. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use high-range water-reducing admixture in concrete, as required, for placement and workability.

2.13 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Footings and 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 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch.

4. Air Content: 4.5 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size.

B. Slabs-on-Grade: 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: 4.5 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.

C. 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: 4.5 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. Concrete Toppings: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: **)**] [**4000 psi (27.6 MPa)**] > at 28 days.
2. Minimum Cementitious Materials Content: [[**540 lb/cu. yd. (320 kg/cu. m)**].
3. Slump Limit: [**4 inches (100 mm)**, plus or minus 1 inch (25 mm).
4. Air Content: [**5.5**] percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch (38-mm) nominal maximum aggregate size.
5. Air Content: Do not allow air content of trowel-finished toppings 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 B, 1/4 inch for smooth-formed finished surfaces.
2. Class C, 1/2 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."

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.

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 Architect.

3.4 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 12 inches and seal with manufacturer's recommended tape.

B. Granular Course: Cover vapor retarder with granular fill, moisten, and compact with mechanical equipment to elevation tolerances of plus 0 inch or minus 3/4 inch.

3.5 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 or 6" (whichever is greater). 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.

3.6 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 horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
4. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints at intervals not greater than 32 feet, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. 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.

3.7 WATERSTOPS

A. Flexible Waterstops: Install in construction joints and at other joints indicated to form a continuous diaphragm. Install in longest lengths practicable. Support and protect exposed waterstops during progress of the Work. Field fabricate joints in waterstops according to manufacturer's written instructions.

3.8 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. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

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 ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.9 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, to be covered with a coating or covering material applied directly to concrete.

C. 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.

3.10 FINISHING FLOORS AND SLABS

A. 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 receive trowel finish.

B. 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 or to be covered with paint or another thin-film-finish coating system.
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) 45; and of levelness, F(L) 35; with minimum local values of flatness, F(F) 30; and of levelness, F(L) 24 at exposed to view areas.

C. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces indicated. While concrete is still plastic, slightly scarify surface with a fine broom.

1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

D. Slip-Resistive Finish: Before final floating, apply slip-resistive aggregate finish where indicated. 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.

3.11 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 the Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.

3.12 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. All concrete shall be protected and cured in strict accordance with ACI 318.

B. 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.

C. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

3.13 JOINT FILLING

A. Prepare, clean, and install joint filler according to manufacturer's written instructions.

3.14 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.

3.15 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage a special inspector and 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.

6. Compressive-Strength Tests: ASTM C 39/C 39M; test one laboratory-cured specimen at 7 days and 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. 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.
8. 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.
9. 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.
10. 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.
11. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
12. 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 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. .
3. Grout.

B. Related Requirements:

1. Section 051213 "Architecturally Exposed Structural Steel Framing" for additional requirements for architecturally exposed structural steel.
2. Section 055000 "Metal Fabrications" for steel lintels and shelf angles not attached to structural-steel frame, miscellaneous steel fabrications and other steel 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 the structural frame indicated on Drawings and as described in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

B. Seismic-Load-Resisting System: Elements of structural-steel frame designated as "SLRS" or along grid lines designated as "SLRS" on Drawings, including columns, beams, and braces and their connections.

C. Heavy Sections: Rolled and built-up sections as follows:

1. Shapes included in ASTM A 6/A 6M with flanges thicker than 1-1/2 inches.
2. Welded built-up members with plates thicker than 2 inches.

3. Column base plates thicker than 2 inches

D. Protected Zone: Structural members or portions of structural members indicated as "Protected Zone" on Drawings. Connections of structural and nonstructural elements to protected zones are limited.

E. Demand Critical Welds: Those welds, the failure of which would result in significant degradation of the strength and stiffness of the Seismic-Load-Resisting System and which are indicated as "Demand Critical" or "Seismic Critical" on Drawings.

1.4 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 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.

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.

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. Identify members and connections of the Seismic-Load-Resisting System.
6. Indicate locations and dimensions of protected zones.
7. Identify demand critical welds.

D. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Provide according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for each welded joint [whether prequalified or qualified by testing, including the following:

1. Power source (constant current or constant voltage).
2. Electrode manufacturer and trade name, for demand critical welds.

E. Delegated-Design Submittal: For structural-steel connections indicated to comply with design loads, include 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, fabricator, professional engineer and testing agency.

C. Welding certificates.

D. Mill test reports for structural steel, including chemical and physical properties.

E. 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. Nonshrink grout.

1.7 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD.

B. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category ACSE.

C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1. Welders and welding operators performing work on bottom-flange, demand-critical welds shall pass the supplemental welder qualification testing, as required by AWS D1.8/D1.8M. FCAW-S and FCAW-G shall be considered separate processes for welding personnel qualification.

D. Comply with applicable provisions of the following specifications and documents:

1. AISC 303.
2. AISC 341 and AISC 341s1.
3. AISC 360.
4. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

E. Source limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

1.8 DELIVERY, STORAGE, AND HANDLING

A. 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.

B. 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.

C. 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 BUY AMERICA COMPLIANCE

A. Products must meet Buy America requirements. Refer to NOTICE TO CONTRACTOR – BUY AMERICA for additional information.

2.2 PERFORMANCE REQUIREMENTS

A. Connections: Provide details of connections required by the Contract Documents to be selected or completed by structural-steel fabricator**,** including comprehensive engineering analysis by a qualified professional engineer**,** to withstand loads indicated and comply with other information and restrictions indicated.

1. Select and complete connections using schematic details indicated and AISC 360.
2. Use Allowable Stress Design; data are given at service-load level.

B. Moment Connections: Type PR, partially restrained.

C. Construction: Moment frame.

2.3 STRUCTURAL-STEEL MATERIALS

A. W-Shapes: ASTM A 992/A 992M, Grade 50.

B. Channels and Angles: ASTM A 36/A 36M.

C. Plate and Bar: ASTM A 36/A 36M.

D. Cold-Formed Hollow Structural Sections: ASTM A 500/A 500M, Grade B, structural tubing.

E. Steel Pipe: ASTM A 53/A 53M, Type E, Grade B.

1. Weight Class: Standard
2. Finish: Black.

F. Welding Electrodes: Comply with AWS requirements.

2.4 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. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1 [**round**] head assemblies consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.

1. Finish: Plain.

C. Headed Anchor Rods: ASTM F 1554, Grade 55, weldable, 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: Plain.

2.5 PRIMER

A. Primer: Comply with Section 099600 "High-Performance Coatings."

2.6 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.7 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," and to 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, or punch standard bolt holes perpendicular to metal surfaces.

D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 3, "Power Tool Cleaning."

F. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.

1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
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.

2.8 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 unless noted as slip critical.

B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.

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 are exposed in the finished Work unless they function as weep holes, by plugging with zinc solder and filing off smooth.
2. Galvanize lintels and shelf angles attached to structural-steel frame and located in exterior walls.

2.10 SOURCE QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform shop tests and inspections.

1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.

B. **Bolted Connections: Inspect shop-bolted connections according to RCSC's "Specification for** Structural Joints Using ASTM A 325 or A 490 Bolts."

C. Welded Connections: Visually inspect shop-welded connections 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 are not accepted.
3. Ultrasonic Inspection: ASTM E 164.
4. Radiographic Inspection: ASTM E 94.

D. In addition to visual inspection, test and inspect shop-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:

1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
2. Conduct tests according to requirements in AWS D1.1/D1.1M on additional shear connectors if weld fracture occurs on shear connectors already tested.

E. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify, with certified 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 existing conditions. Include 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. Baseplates 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 or pretension 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 303, "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 are 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.

G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

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 unless noted as slip critical.

B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
2. Remove backing bars or runoff tabs where indicated, back gouge, and grind steel smooth.
3. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," for mill material.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Bolted Connections: Inspect bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

C. Welded Connections: Visually inspect field welds according to AWS D1.1/D1.1M.

1. In addition to visual inspection, test and inspect field welds 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 are not accepted.
c. Ultrasonic Inspection: ASTM E 164.
d. Radiographic Inspection: ASTM E 94.

D. In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:

1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
2. Conduct tests according to requirements in AWS D1.1/D1.1M on additional shear connectors if weld fracture occurs on shear connectors already tested.

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/A 780M.

B. Touchup Painting: Cleaning and touchup painting are specified in Section 099600-"High Performance Coatings."

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 (AESS).

1. Requirements in Section 051200 "Structural Steel Framing" also apply to AESS.

B. Related Requirements:

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. AESS: Structural steel designated as "architecturally exposed structural steel" or "AESS" in the Contract Documents.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

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. Shop Drawings: Show fabrication of AESS components. Shop Drawings for structural steel may be used for AESS provided items of AESS are specifically identified and requirements below are met for AESS.

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. Indicate grinding, finish, and profile of welds.
4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections. Indicate orientation of bolt heads.
5. Indicate exposed surfaces and edges and surface preparation being used.
6. Indicate special tolerances and erection requirements.

C. Samples: Submit Samples of AESS to set quality standards for exposed welds.

1. Two steel plates, 3/8 by 8 by 4 inches, with long edges joined by a groove weld.

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.

1.7 DELIVERY, STORAGE, AND HANDLING

A. 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.

B. Refer to Form 816 Article 1.06.03 and Form 816 Article 1.20-1.06.03 for additional information.

1.8 FIELD 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 BUY AMERICA COMPLIANCE

A. Products must meet Buy America requirements. Refer to NOTICE TO CONTRACTOR – BUY AMERICA for additional information.

2.2 BOLTS, CONNECTORS, AND ANCHORS

A. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, round-head assemblies, consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.

1. Finish: Plain.

2.3 FILLER

A. Filler: Polyester filler intended for use in repairing dents in automobile bodies.

2.4 PRIMER

A. Primer: Comply with Section 099600 "High-Performance Coatings."

2.5 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. Curved Members: Fabricate indicated members to curved shape by rolling to final shape in fabrication shop.

1. Distortion of webs, stems, outstanding flanges, and legs of angles shall not be visible from a distance of 20 feet under any lighting conditions.
2. Tolerances for walls of hollow steel sections after rolling shall be approximately 1/2 inch.

D. Coping, Blocking, and Joint Gaps: Maintain uniform gaps of 1/8 inch with a tolerance of 1/32 inch for AESS.

E. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.

F. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.

1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
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.

2.6 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 unless noted as slip critical.

B. Weld Connections: Comply with AWS D1.1/D1.1M 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. Grind butt and groove welds flush to adjacent surfaces within tolerance of plus 1/16 inch, minus zero inch for AESS.
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 oversize and grind to uniform profile with smooth face and transition.

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. 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 unless noted as slip critical.
2. Orient bolt heads in same direction for each connection and to maximum extent possible in same direction for similar connections.

B. 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. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect AESS as specified in Section 051200 "Structural Steel Framing." The testing agency is not responsible for enforcing requirements relating to aesthetic effect.

B. Architect 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.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780/A 780M.

C. Touchup Painting: Cleaning and touchup painting are specified in Section 099600-"High Performance Coatings."

END OF SECTION 051213

SECTION 051300 - RETRACTABLE PLATFORM EDGE

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.

C. This work includes the use of a sole-source product. No "or equals" will be permitted. Refer to the NOTICE TO CONTRACTOR – SOLE SOURCE PRODUCTS for additional information.

1.2 DESCRIPTION

1. This Section includes specifications for designing, furnishing and installing a complete Retractable Platform Edge system with Detectable Warning Strip, fabricated in eight (8) foot modules where possible with alternate lengths as necessary due to varying composite platform panel widths, along the new high-level platforms, as shown on the Contract Drawings.

2. The Contract Drawings show the general arrangement and basic details for the Retractable Platform Edge system. The drawings are not intended to show all design and dimensional details. It shall be the Contractors responsibility to produce final design documents and to perform design calculations. The final installation and operational integrity of the design shall be the sole responsibility of the Contractor.

3. The purpose of the Retractable Platform Edge is to provide additional clearance for wide bodied freight trains. When such a train is scheduled to pass through the station the retractable edge will be raised manually, section by section, to increase the clearance from 5'-7" to 6'-6", measured to the track center line on tangent track.

4. Each section of retractable platform edge must include provisions for locking in both the open and closed positions. To keep the retractable platform edge panels in the open position, a stainless steel pin (Type 316) on a chain must be attached to the panels adjacent to each angle tab, which would be inserted through a hole in the angle tab at each panel. To keep the panels in the down position, only the end panels need to be pad-locked due to the shiplap design which does not allow the panels to be raised individually. They must be raised in order, so the end panel must be raised first. There can be a stainless pin on a chain attached to the panel instead of a loose piece of rebar.

1.3 RELATED WORK SPECIFIED ELSEWHERE

1. Section 066400 “Polyethylene Platform Edge Units”.
2. Section 066000 “Pre-Engineered Reinforced Composite Transit Platforms”.

1.4 QUALITY ASSURANCE

1. Source Limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

2. References:

    1. Aluminum Association (AA) Specification for Aluminum Structures.

    2. American Institute of steel Construction (AISC).

    3. American Railway Engineering Association (AREA) Manual, Chapter 15.

    4. American Society for Testing and Materials (ASTM)

        1. A 36 Structural Steel.

        2. A 588 High Strength Low-Alloy Structural Steel.

        3. A 276 Stainless and Heat-Resisting Bars and Shapes.

        4. B 209 Aluminum and Aluminum Alloy Sheet and Plate.

        5. B 210 Aluminum Alloy Drawn Seamless Tubes.

        6. B 308 Aluminum Alloy 6061-T6 Standard Structural Shapes, Rolled or Extruded.

        7. F 593 Stainless Steel Bolts, Hex Cap Screws, and Studs.

        8. F 594 Stainless Steel Nuts.

3. Manufacturer Qualifications:

    1. Employ welders, who have been qualified previously by the test as described in the American Welding Society's Standard D.1.1 Structural Welding code, to perform welding. Furnish certification that each welder has passed the test.

    2. At the Architect’s discretion, the Manufacturer's facility shall be inspected and approved by the Architect before commencing manufacturing operations. The Contractor shall notify the Construction Manager, in writing, at least 2 weeks prior to the start of manufacturing operation. All manufacturing operations shall be conducted by the approved manufacturer at the approved facility.

3. The Retractable Platform Edge shall be fully compliant with the "Buy America" provisions governing the ADAAG regulations. Manufacturer shall offer evidence and certification that the Retractable Platform Edge system is entirely manufactured within the U.S.

4. The Manufacturer shall provide certified test data to demonstrate that their Retractable Platform Edge system meets all of the Product Requirements stipulated in Part 2 of this Specification.

5. The Manufacturer shall provide the Contractor and Amtrak personnel training on the proper operation of the retractable platform edge panels.

4. Tolerances:

1. Manufacture Tolerances:

1. Flatness: 1/8 inch in eight feet.
2. Hinge Alignment: 1/16 inch in eight feet.
3. Fabrication: ±1/8 inch.
4. Machined parts: ±1/16 inch or less as required for hinge components.

2. Installation Tolerances:

1. Vertical variation from embedded metal angle at back of Retractable Platform Edge shall not exceed 1/8 inch.
2. Horizontal clearance from embedded metal angle at back of Retractable Platform Edge shall be 1/8 inch to 1/4 inch.
3. Vertical variation between platform sections shall not exceed 1/8 inch at platform edge.

1.5 SUBMITTALS

1. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

2. Design Calculations: The Contractor shall submit five sets of design calculations, signed and sealed by a Professional Engineer licensed in Connecticut. Design calculations shall comply with the requirements of these Specifications. No work shall start prior to approval of the design calculations and shop drawings.

3. Shop Drawings and Installation Drawings:

1. Submit shop drawing showing complete information for the manufacture and fabrication of the Platform Retractable Edge. Indicate member materials and dimensions, cross sections, details of all components and fasteners, welding and finishing requirements. Indicate module weight and lifting force at leading edge.

2. Shop drawings shall include a numbered module layout for erection purposes. They shall include the horizontal and vertical alignment of the platforms as shown in the Contract Drawings. The shop drawings shall also reflect all information needed to erect the Platform Retractable edge including the shape and dimensions of modules, the size and details of the joint, the size of leveling shims, and any additional details necessary pertaining to installation.

3. Provide complete details of plates, sleeves or anchorage devices that are to be embedded in the composite transit platform panels.

4. Manufacturer's Data:

1. Submit three copies of manufacturer's specifications and product data for all manufactured materials and products. Include manufacturer's certifications and laboratory reports as required.

2. Include erection procedure for attachment to pre-engineered composite platform panel units, sequence of erection, and required handling equipment. Indicate that copy of each instruction has been transmitted to the erector.

5. Pre-Production Modules: The manufacturer shall fabricate at least three eight foot modules and completely assemble them on mock-up composite transit platform panels at their facilities so as to adequately demonstrate to the satisfaction of the Architect, installation and set-up procedures, conformance to required tolerances, satisfactory operation and final appearance. Any design or fabrication defect shall be corrected on the Pre-Production Modules to the satisfaction of the Architect, prior to manufacture and delivery of production units.

6. Installation Schedule: Prior to installation of any unit, submit a schedule indicating the sequence of installation of the modules and anchoring system.

1.6 DELIVERY, STORAGE AND HANDLING

1. Refer to Form 816 Article 1.06.03 and Form 816 Article 1.20-1.06.03 for additional information.

2. Pack fabricated modules and components in a manner to avoid damage from handling, shipping and storage after leaving factory.

3. Examine all parts of the supporting structure and the conditions under which the composite transit platform work is to be erected. Do not proceed with the installation until unsatisfactory conditions have been corrected.

4. Verify dimensions of supporting structure at the project Site and adjust final shop drawings to reflect actual field dimensions.

5. Design modifications may be made only as necessary to meet field conditions and ensure proper fitting of work, and only as approved by the Engineer in writing.

1.7 DESIGN CRITERIA

1. Minimum design loads shall be:

   Dead Load: Material Weight

   Live Load: 150 PSF

   Snow: 30 PSF or Snow Drift

   Wind: As per IBC Code

   SEISMIC: Seismic performance category-B

2. Design Concept shall conform to Contract Drawings.

3. Comply with AISC Specifications for design, fabrication & installation.

1.8 WARRANTY

A. Refer to Form 816, Article 1.20-1.06.08, and the NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information.

B. Furnish five (5) year manufacturer's warranty for defects in workmanship and materials.

C. Furnish ten (10) year manufacturer's extended warranty against structural fatigue, corrosion and failure of manual operation parts and components.

D. Repair or replace any portion of retractable platform edge that fails during the manufacturer's extended warranty period at no additional cost to CTDOT, including labor to remove failed section(s) and install replacement section(s).

E. The Manufacturer shall furnish and install replacement parts and assemblies for a period of at least ten (10) years.

F. The Manufacturer shall retain jigs, gauges and other equipment utilized in the fabrication of the approved units for a period of at least ten (10) years.

PART 2 - PRODUCTS

2.1 RETRACTABLE PLATFORM EDGE

The retractable platform edge shall be ArmorDeck, as manufactured by Engineered Plastics, Inc., 300 International Dr., Williamsville, NY 14221, 800-682-2525. **This is a sole source item and no substitutions will be allowed.**

Blocking material, bolted to pre-engineered reinforced composite transit platform panels to hold retractable platform edge modules level, shall be a non-absorbent, slightly resilient neoprene material that will not deteriorate with time or as a result of contact with chlorides. The material,

and degree of resilience, shall be subject to assessment during review of the Pre-Production Modules and approved by the Architect.

2.2 TACTILE WARNING SYSTEM

The Vitrified Polymer Composite (VPC) Surface Applied Tactile Tiles specified and shown on plans is based on "Armor-Tile" manufactured by Engineered Plastics, Inc., 300 International Dr., Williamsville, NY 14221, 800-682-2525. **This is a sole source item and no substitutions will be allowed.**

PART 3 - EXECUTION

3.1 INSPECTION

1. Inspect the installed work of other trades and verify that such work is complete to the point where this work may properly commence.

3.2 PREPARATION

1. Field Measurements: Verify measurements in field before fabrication.

3.3 ERECTION

1. Provide suitable temporary braces and stays to hold guardrails and metal fabrications in position until permanently secured.

2. Draw threaded bolt connections up tight with lock washers or other means to prevent loosening. Screw fasteners in exposed or finished surfaces must be vandal-proof type.

3. Lubricate all moving parts with an approved high retention grease.

END OF SECTION 051300

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 decorative formed metal.
3. Steel framing and supports for applications where framing and supports are not specified in other Sections.
4. Miscellaneous steel trim.
5. Loose bearing and leveling plates.

B. Related Sections:

1. Section 055213 "Pipe and Tube Railings".
2. Section 057500 "Decorative Formed Metal".
3. Section 099600 "High-Performance Coatings".

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 aluminum.
   2. 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.

2.4 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.Shop Primers: Provide primers that comply with Section 099600 "High-Performance Coatings."

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.

E. Concrete: Comply with requirements in Section 033000 "Cast-in-Place Concrete" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 4000 psi.

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.

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 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.

2.10 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.

2.11 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 INSTALLING BEARING AND LEVELING PLATES

A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.

B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with nonshrink grout. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.4 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. Steel stairs with abrasive cast-aluminum structural stair treads and landings

B. Related Sections:
1. Section 051200 “Structural Steel Framing” for high-level platform framing.
2. Section 051213 “Architecturally Exposed Structural Steel Framing” for south stair.
3. Section 055213 "Pipe and Tube Railings" for pipe and tube railings.
4. Section 099600 “High Performance Coatings” for steel prep and paint coatings on metal stairs.
5. Section 102213 “Wire Mesh Partitions” for wire mesh guardrail infill panels.

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. 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 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.

2.4 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

C. 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 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 Cast-Aluminum Structural Stair Treads and Landings:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Alumogrit Type 105 (Safety Treads) manufactured by Wooster Products, Inc., 1000 Spruce St., Wooster, OH 44691; (800)321-4936, www.wooster-prodcuts.com, or approved equal.

   a. Abrasive shall be #20 virgin grain Aluminum Oxide abrasive, integrally cast into the walking surface to a minimum depth of 1/32 inch.
   b. Concealed type anchors shall be slotted rivet type, integrally cast into the body of the nosing a minimum of 3/8”.
   c. Cast meals used shall conform to the following:
      1) Alumogrit (Abrasive Cast Aluminum): No. 43 prime and secondary ingot; low copper content; corrosion resistant.
   d. Any holes or countersinks shall be machine-made, cored holes or countersinks are no acceptable. Screw heads shall not protrude above tread surface.
   e. All metal types shall have shot-blasted finish.
   f. Cross hatching and fluting shall be 1/16 inch deep minimum and shall be clean and well defined; treads and nosings shall be manufactured, packed and shipped so as to arrive at the jobsite in good condition.

2.6 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.

2.7 FINISHES

A. Prep, prime and finish metal stair framing 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, gate hinges, gate latches, sign frames, brackets and fasteners

B. Related Sections:

1. Section 066000 "Pre-Engineered Reinforced Composite Transit Platforms".
2. Section 087100 "Door Hardware" (gate alarmed exit device and hinges).
3. Section 099600 "High-Performance Coatings".
4. Section 102213 "Wire Mesh Partitions".

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 isolating 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.

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 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.

F. Gate-Spring Pivot Sets: Grade 1; double acting; non-handed; consisting of bottom pivot with door and jamb bracket and top pivot assembly with jamb bracket.

   1. Mounting: Surface.
   2. Tension: Adjustable.
   3. Base Metal: Type 316 Stainless Steel.

2.4 FASTENERS

A. General: Provide the following:
   1. Steel Railings: Plated steel fasteners complying with ASTM B 633, 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. 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.

E. 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 057500 - DECORATIVE FORMED METAL

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. Closure panels (below high-level platform and south end of south stair).

B. Related Sections:

1. Section 051200 "Structural Steel Framing".
2. Section 066000 "Pre-Engineered Reinforced Composite Transit Platforms".
3. Section 099600 "High-Performance Coatings".
4. Section 102213 "Wire Mesh Partitions".

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 finishing materials.

C. Shop Drawings: Show fabrication and installation details for decorative formed metal.

1. Include plans, elevations, component details, and attachments to other work.
2. Indicate materials and profiles of each decorative formed metal member, fittings, joinery, finishes, fasteners, anchorages, and accessory items.

D. Samples: For each type of exposed finish required, prepared on 6-inch- square Samples of metal of same thickness and material indicated for the Work.

PART 2 - PRODUCTS

2.1 SHEET METAL

A. General: Provide sheet metal without pitting, seam marks, roller marks, stains, discolorations, or other imperfections where exposed to view on finished units.

B. Perforations: ¼” square holes on ¾” centers (galvanized edges).

C. Galvanized-Steel Sheet: ASTM A 653/A 653M, G90 coating.

2.2 MISCELLANEOUS MATERIALS

A. Gaskets: As required to seal joints in decorative formed metal and remain weathertight; as recommended in writing by decorative formed metal manufacturer.

B. Filler Metal and Electrodes: Provide type and alloy as necessary for strength, corrosion resistance, and compatibility in fabricated items.

1. Use filler metals that will match the color of metal being joined.

C. Fasteners: Fabricated from same basic metal and alloy as fastened metal unless otherwise indicated.

1. Provide tamper-resistant flat-head machine screws for exposed fasteners unless otherwise indicated.

D. Anchors: Provide metal expansion sleeve anchors or metal-impact expansion anchors of type, size, and material necessary for type of load and installation indicated, as recommended by manufacturer, unless otherwise indicated.

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.

E. Isolation Coating: Manufacturer's standard bituminous paint.

2.3 PAINTS AND COATINGS

A. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

B. Shop Primer for Galvanized Steel: Cementitious galvanized metal primer complying with MPI#26.

C. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.4 FABRICATION, GENERAL

A. Shop Assembly: Preassemble decorative formed metal items in 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.

B. Fold back exposed edges of unsupported sheet metal to form a 1/2-inch- wide hem on the concealed side, or ease edges to a radius of approximately 1/32 inch and support with concealed stiffeners.

C. Increase metal thickness or reinforce with concealed stiffeners, backing materials, or both, as needed to provide surface flatness and sufficient strength for indicated use.

   1. Support joints with concealed stiffeners as needed to hold exposed faces of adjoining sheets in flush alignment.

D. Where welding or brazing is indicated, weld or braze joints and seams continuously. Grind, fill, and dress to produce smooth, flush, exposed surfaces in which joints are not visible after finishing is completed.

2.5 CLOSURES AND TRIM

A. Form closures and trim from metal of type and thickness indicated below. Fabricate to fit tightly to adjoining construction, with weathertight joints at exterior installations.

   1. Galvanized-Steel Sheet: 0.052 inch .
      a. Finish: High-performance coating

B. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

2.6 GALVANIZED-STEEL SHEET FINISHES

A. After cleaning, apply a conversion coating suited to the organic coating to be applied over it.

B. Repairing Galvanized Surfaces: Clean welds and abraded areas and repair galvanizing to comply with ASTM A 780.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Locate and place decorative formed metal items level and plumb and in alignment with adjacent construction. Perform cutting, drilling, and fitting required to install decorative formed metal.

B. Use concealed anchorages where possible.

C. Form tight joints with exposed connections accurately fitted together. Provide reveals and openings for sealants and joint fillers as indicated.

D. Corrosion Protection: Apply bituminous paint or other permanent separation materials on concealed surfaces where metals would otherwise be in direct contact with substrate materials that are incompatible or could result in corrosion or deterioration of either material or finish.

E. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit or provide new units.

END OF SECTION 057500

SECTION 061000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Framing with dimension lumber.
2. Framing with timber.
3. Wood blocking and nailers.
4. Wood furring].
5. Plywood backing panels.

B. Related Requirements:

1. Section 061063 "Exterior Rough Carpentry" for elevated decks and other exterior construction made of wood.
2. Section 061323 "Heavy Timber Framing."

1.3 DEFINITIONS

A. Exposed Framing: Framing not concealed by other construction.

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. Include 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. Include data for fire-retardant treatment from chemical 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.
6. Environmental Chambers."

B. Fastener Patterns: Full-size templates for fasteners in exposed framing.

1.5 INFORMATIONAL SUBMITTALS

A. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.

B. Evaluation Reports: For the following, from ICC-ES:

1. Wood-preservative-treated wood.
2. Power-driven fasteners.
3. Powder-actuated fasteners.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Certified Wood: Materials shall be produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship**.**

1. Dimension lumber framing.
2. Timber.
3. Rim boards.
4. Miscellaneous lumber.

B. Lumber: DOC PS 20 and 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 the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
3. Provide dressed lumber, S4S, unless otherwise indicated.

C. Maximum Moisture Content of Lumber: 19 percent for 2-inch nominal thickness or less, no limit for more than 2-inch nominal thickness unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2[for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground].

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
2. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.

C. Application: Treat all rough carpentry unless otherwise indicated:

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills, sleepers, blocking, and similar concealed members in contact with masonry or concrete.

3. Wood framing members that are less than 18 inches above the ground in crawlspaces or unexcavated areas.

2.3 DIMENSION LUMBER FRAMING

A. Joists, Rafters, and Other Framing Not Listed Above: [No. 2] grade.

1. Species:

a. Hem-fir (north); NLGA.
b. Southern pine; SPIB.
c. Douglas fir-larch; WCLIB or WWPA.
d. Mixed southern pine; SPIB.
e. Spruce-pine-fir; NLGA.
f. Douglas fir-south; WWPA.
g. Hem-fir; WCLIB or WWPA.
h. Douglas fir-larch (north); NLGA.
i. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.

B. Joists, Rafters, and Other Framing Not Listed Above: Any species and grade with a modulus of elasticity of at least 1,100,000 psi and an extreme fiber stress in bending of at least 850 psi for 2-inch nominal thickness and 12-inch nominal width for single-member use.

2.4 TIMBER FRAMING

A. Provide timber framing complying with the following requirements, according to grading rules of grading agency indicated:

1. Species and Grade: Douglas fir-larch, Douglas fir-larch (north), or Douglas fir-south; No. 1 grade; NLGA, WCLIB, or WWPA.
2. Species and Grade: Eastern hemlock, eastern hemlock-tamarack, or eastern hemlock-tamarack (north); No. 1 grade; NeLMA or NLGA.
3. Species and Grade: Hem-fir or hem-fir (north);No. 1 grade; NLGA, WCLIB, or WWPA.
4. Species and Grade: Mixed maple; No. 1 grade; NeLMA.
5. Species and Grade: Mixed oak; No. 1 grade; NeLMA.
6. Species and Grade: Southern pine; No. 1 grade; SPIB.
7. Maximum Moisture Content: [20] percent.
8. Additional Restriction: Free of heart centers.

2.5 MISCELLANEOUS LUMBER

A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:

1. Blocking.
2. Nailers.
3. Furring.

B. For items of dimension lumber size, provide Standard, Stud, or No. 3 grade lumber and any of the following species::

1. Hem-fir (north); NLGA.
2. Mixed southern pine; SPIB.
3. Spruce-pine-fir; NLGA.
4. Hem-fir; WCLIB or WWPA.
5. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.
6. Western woods; WCLIB or WWPA.
7. Northern species; NLGA.
8. Eastern softwoods; NeLMA.

C. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.

D. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

E. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.6 PLYWOOD BACKING PANELS

A. Equipment Backing Panels: DOC PS 1, Exterior, AC in thickness indicated or, if not indicated, not less than 3/4-inch nominal thickness.

1. Plywood shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.7 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners of Type 304 stainless steel.

B. Nails, Brads, and Staples: ASTM F 1667.

C. Power-Driven Fasteners: NES NER-272.

D. Wood Screws: ASME B18.6.1.

E. Lag Bolts: ASME B18.2.1 (ASME B18.2.3.8M).

F. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.

G. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry assemblies and equal to four times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.

1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
2. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 (ASTM F 738M and ASTM F 836M, Grade A1 or A4).

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, and similar supports to comply with requirements for attaching other construction.

B. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

C. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.

D. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Do not splice structural members between supports unless otherwise indicated.

E. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.

1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.

F. 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.

G. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

1. Use inorganic boron for items that are continuously protected from liquid water.
2. Use copper naphthenate for items not continuously protected from liquid water.

H. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. NES NER-272 for power-driven fasteners.
2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
3. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.

I. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

J. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.
1. Use common nails unless otherwise indicated. Drive nails snug but do not countersink nail heads.

3.2 WOOD BLOCKING, AND NAILER INSTALLATION

A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

3.3 WOOD FURRING INSTALLATION

A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.

B. Furring to Receive Plywood or Hardboard Paneling: Install 1-by-3-inch nominal- size furring horizontally and vertically at **24 inches** o.c.

3.4 FLOOR JOIST FRAMING INSTALLATION

A. General: Install floor joists with crown edge up and support ends of each member with not less than 1-1/2 inches of bearing on wood or metal, or 3 inches on masonry. Attach floor joists as follows:

1. Where supported on wood members, by toe nailing or by using metal framing anchors.
2. Where framed into wood supporting members, by using wood ledgers as indicated or, if not indicated, by using metal joist hangers.

B. Fire Cuts: At joists built into masonry, bevel cut ends 3 inches and do not embed more than 4 inches.

C. Frame openings with headers and trimmers supported by metal joist hangers; double headers and trimmers where span of header exceeds 48 inches.

D. Do not notch in middle third of joists; limit notches to one-sixth depth of joist, one-third at ends. Do not bore holes larger than 1/3 depth of joist; do not locate closer than 2 inches from top or bottom.

E. Provide solid blocking of 2-inch nominal thickness by depth of joist at ends of joists unless nailed to header or band.

F. Lap members framing from opposite sides of beams, girders, or partitions not less than 4 inches or securely tie opposing members together. Provide solid blocking of 2-inch nominal thickness by depth of joist over supports.

G. Provide solid blocking between joists under jamb studs for openings.

3.5 .TIMBER FRAMING INSTALLATION

A. Install timber with crown edge up and provide not less than 4 inches of bearing on supports. Provide continuous members unless otherwise indicated; tie together over supports as indicated if not continuous.

B. Where beams or girders are framed into pockets of exterior concrete or masonry walls, provide 1/2-inch air space at sides and ends of wood members.

C. Install wood posts using metal anchors indicated.

D. Treat ends of timber beams and posts exposed to weather by dipping in water-repellent preservative for 15 minutes.

END OF SECTION 061000

SECTION 061533 - WOOD 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. Wood decking.

1.3 RELATED WORK SPECIFIED ELSWHERE

A. Section 061000, "Rough Carpentry" (timber lumber).

1.4 DEFINITIONS

A. Boards: Lumber of less than 2 inches nominal in thickness and 2 inches nominal or greater in width.

B. 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.

1.5 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 preservative-treated wood products.

1. For preservative-treated wood products. Include chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.
2. For metal framing anchors Include installation instructions.

C. Samples: For wood decking, not less than 24 inches long, showing the range of variation to be expected in appearance of decking, including surface texture.

1.6 INFORMATIONAL SUBMITTALS

A. Material Certificates:

1. For lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by ALSC's Board of Review.
2. For preservative-treated wood products. Indicate type of preservative used and net amount of preservative retained. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

B. Certificates of Inspection: Issued by lumber grading agency for exposed wood products not marked with grade stamp.

C. Evaluation Reports: For the following, from ICC-ES:

1. Preservative-treated wood products.
2. Decking fasteners.

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. Lumber Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.

C. Lumber Vendor Qualifications: A vendor that is certified for chain of custody by an FSC-accredited certification body.

1.8 DELIVERY, STORAGE, AND HANDLING

A. 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.

B. Handle and store plastic lumber to comply with manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 LUMBER, GENERAL

A. Comply with DOC PS 20 and with grading rules of lumber grading agencies certified by ALSC's Board of Review as applicable. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by ALSC's Board of Review.

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
3. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry wood products.
4. Provide dressed lumber, S4S, unless otherwise indicated.

B. Maximum Moisture Content:
1. Dimension Lumber: 19 percent.
2. Timber. 19 percent.

2.2 WOOD DECKING

A. Hand select wood 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.

B. Dimension Lumber Decking: No. 2 grade and the following species:
1. Douglas fir-larch, Douglas fir-larch (North), or Douglas fir-south; NLGA, WCLIB, or WWPA.

2.3 PRESERVATIVE TREATMENT

A. Pressure treat boards and dimension lumber with waterborne preservative according to AWPA U1; Use Category UC3b for exterior construction not in contact with the ground.

B. Preservative Chemicals: Acceptable to authorities having jurisdiction.

1. Do not use chemicals containing arsenic or chromium.

C. After treatment, redry dimensional lumber and timber to 19 percent maximum moisture content.

D. Mark treated wood with treatment quality mark of an inspection agency approved by ALSC's Board of Review.

E. Application: Treat all wood unless otherwise indicated.

2.4 FASTENERS

A. General: Provide fasteners of size and type indicated, acceptable to authorities having jurisdiction, and that comply with requirements specified in this article for material and manufacture. Provide nails or screws, in sufficient length, to penetrate not less than 2 inches into wood substrate.

1. Use stainless steel unless otherwise indicated.
2. For pressure-preservative-treated wood, use stainless-steel fasteners.

B. Nails: ASTM F 1667.

C. Power-Driven Fasteners: ICC-ES AC70.

D. Wood Screws and Lag Screws: ASME B18.2.1, ASME B18.6.1, or ICC-ES AC233.

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 INSTALLATION, GENERAL

A. Set work to required levels and lines, with members plumb, true to line, cut, and fitted. Fit work to other construction; scribe and cope as needed for accurate fit.

B. Framing Standard: Comply with AF&PA WCD1 unless otherwise indicated.

C. Install wood decking with crown up (bark side down).

D. Secure decking to framing with screws.

E. Install metal framing anchors to comply with manufacturer's written instructions.

F. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.

G. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of members or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

H. Apply copper naphthenate field treatment to comply with AWPA M4, to cut surfaces of preservative-treated lumber.

I. Securely attach exterior rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. ICC-ES AC70 for power-driven fasteners.
2. "Fastening Schedule" in ICC's International Building Code.
3. "Fastener Schedule for Structural Members" and "Alternate Attachments" in ICC's International Residential Code for One- and Two-Family Dwellings.

J. 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 061533

SECTION 066000 - PRE-ENGINEERED REINFORCED COMPOSITE TRANSIT PLATFORMS

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.

C. This work includes the use of a sole-source product. No "or equals" will be permitted. Refer to the NOTICE TO CONTRACTOR – SOLE SOURCE PRODUCTS for additional information.

1.1 SUMMARY

A. Section includes pre-engineered reinforced polymer composite transit platform panels and stairs.

B. Related Sections:
1. Section 051200 "Structural Steel Framing" (platform substructure).
2. Section 051300 "Retractable Platform Edge".
3. Section 055000 "Metal Fabrications".
4. Section 055213 "Pipe and Tube Railings".
5. Section 104250 "Benches and Trash Receptacles".

1.2 REFERENCES

A. American Association of State Highway and Transportation Officials:
1. AASHTO M251 - Plain and Laminated Elastomeric Bridge Bearings.

B. American Concrete Institute:
1. ACI 503R - Use of Epoxy Compounds with Concrete.

C. American National Standards Institute:
1. ANSI A 117.1 - Accessible and Usable Buildings and Facilities.

D. American Railway Engineering and Maintenance-of-Way Association:
1. AREMA Manual for Railway Engineering.

E. ASTM International:
1. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60,000

PSI Tensile Strength.

2. ASTM C580 - Standard Test Method for Flexural Strength and Modulus of Elasticity of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes.
3. ASTM C1353 - Standard Test Method Using the Taber Abraser for Abrasion Resistance of Dimension Stone Subjected to Foot Traffic.
4. ASTM 0395 - Standard Test Methods for Rubber Property - Compression Set.
5. ASTM 0412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers -Tension.
6. ASTM 0543 - Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents.
7. ASTM 0570 - Standard Test Method for Water Absorption of Plastics.
8. ASTM 0638 - Standard Test Method for Tensile Properties of Plastics.
9. ASTM 0695 - Standard Test Method for Compressive Properties of Rigid Plastics.
10. ASTM 0790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
11. ASTM D816 - Standard Test Methods for Rubber Cements.
12. ASTM D2240 - Standard Test Method for Rubber Property – Durometer Hardness.
13. ASTM 03574 - Standard Test Methods for Flexible Cellular Materials Slab, Bonded, and Molded Urethane Foams.
14. ASTM 05420 - Standard Test Method for Impact Resistance of Flat. Rigid Plastic Specimen by Means of a Striker Impacted by a Falling Weight (Gardner Impact).
15. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

F. Federal Architectural and Transportation Barriers Compliance Board:
1. 36CFR1191 - Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities.

1.3 DESIGN REQUIREMENTS

A. Design Loads:
1. Live Loads: 150 Ibs/sq ft with deflection limited to 1/360 of span.
2. Dead loads: 25 Ibs/sq ft, with deflection limited to 1/240 of span.

B. Design items with sufficient strength for handling stresses.

1.4 PERFORMANCE REQUIREMENTS

A. Tensile Modulus of Elasticity: ASTM 0638, 570,000 psi.

B. Compressive Strength: ASTM C109, 5,000 psi.

C. Bond Strength: ACI 503R, 100% substrate failure.

D. Freeze Thaw Resistance: ASTM C666, Pass (no change).

E. Wet Skid Resistance: ASTM E274, minimum 40.

F. Tensile Strength: ASTM C307, minimum 1,200 psi.

G. Flexural Strength: ASTM C580, minimum 1,000 psi.

H. Tensile Adhesion: ACI 503R, 250 psi pull off.

1.5 SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Submit in accordance with General Provisions for Construction.

C. Shop Drawings: Indicate design load parameters, dimensions, adjacent construction, materials, thicknesses, fabrication details, required clearances, field jointing, tolerances, colors, finishes, methods of support, integration of structural, mechanical, and electrical components, and anchorages.

1. Indicate panel dimensions and cross-sections; location, size and type of reinforced composite internal flanges; and tactile surface and slope for drainage of rainwater.
2. Provide details of loose, cast-in, and field installed hardware, inserts, connections and joints, including accessories and construction at openings in panels.
3. Indicate locations and details of anchorage devices that are to be embedded in other construction. Furnish templates, if required, for accurate placement.
4. The Contractor shall verify all dimensions, grades and elevations in the field prior to the submission of drilled piers and shafts, and platforms' shop drawings and starting construction. The Contractor shall also verify grades and elevations of the tracks prior to the submission of platform shop drawings and starting construction. The Contractor shall submit shop drawings indicating the horizontal alignment and vertical profile of the proposed platforms and foundations and survey showing all existing and proposed grades and elevations of stair, ramps, sidewalks, curbs, asphalt pavement and top of rail for review.

D. Product Data: Submit data on specified component products.

E. Test Reports: Submit test reports from independent testing and inspection agency indicating that materials used in the manufacture of the pre-engineered reinforced composite platform panels, including the monolithic fusion bonded surface aggregate

finish, are in full compliance with requirements and meet the properties indicated herein.

E. Samples: Submit two samples, 24 x 24 inch in size, illustrating color, texture, and finish.

1.6 CLOSEOUT SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02, NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS

B. Submit in accordance with General Provisions for Construction.

C. Operation and Maintenance Data: Submit instructions for cleaning and stain removal, surface restoration, and patching and routine repairs.

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. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum five years documented experience in the manufacture of structural cast composite polymer products, including panels similar to those indicated for this project and a demonstrated record of successful in-service performance and sufficient production capacity to produce required units without delaying the project.

C. Installer: Company pre-trained and certified by manufacturer prior to beginning installation, including one-day factory training, and one week on-site supervised training during construction of mock-up.

1.8 QUALITY CONTROL

A. Employ independent testing and inspection agency to conduct full-scale load and material testing of Products in the factory.

B. Conduct uniform design load tests based on 125 pounds per square foot.

C. Conduct uniform ultimate load tests to determine the margin of safety above the design load the panel can withstand, based on 650 pounds per square foot or failure, whichever comes first.

D. Conduct coefficient of friction/slip resistance testing using standard test method ASTM C1028 to verify the combined wet/dry static coefficient of friction is not less than 0.80.

E. Conduct abrasion resistance testing using test method ASTM C1353.

F. Document test results in writing on the same day that tests are made. Provide copies to the Construction Manager, Contractor, and fabricator. Include the project name and contract number, date, name of fabricator, name of testing agency; provide unique identification name or code for plank or panels represented by tests; and indicate test strengths, type of break, and direction of applied load with respect to the top surface of panel.

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, store, protect, and handle Products to site under requirements of General Provisions for Construction.

C. Deliver panels to project site in such quantities and at such times to ensure continuity of installation. Accept units on site in factory packing. Inspect for damage.

D. Store panels at project site in a location approved by Construction Manager, and prevent cracking, distorting, warping, staining, or other physical damage.

E. Deliver anchorage items that are to be embedded in other construction before starting such work. Provide setting diagrams, templates, instructions, and directions, as required, for installation.

1.10 PRE-INSTALLATION MEETING

A. Convene minimum one week prior to commencing work of this section.

1.11 MOCKUP

A. Construct mockup of a single panel section that can be used in the final installation.

B. Locate where directed by Construction Manager.

C. Incorporate accepted mockup as part of Work.

1.12 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

B. Verify location and dimensions of steel substructure.

1.13 WARRANTY

A. Refer to Form 816, Article 1.20-1.06.08, and the NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information.

B. Furnish twenty-five (25) year manufacturer's warranty against excessive wear of the panel finish, structural fatigue, corrosion, spalling, or cracking.

C. Repair or replace any panel that fails during the manufacturer's extended warranty period at no additional cost to CTDOT, including labor to remove failed section and install replacement section.

D. Structurally reinforced polymer composite panels not conforming to requirements are unacceptable. Remove rejected panels and replace with panels conforming to requirements. Panels shall be considered potentially deficient if they fail to comply with specified requirements for strength, durability, manufacturing tolerances, curing and finishes; or are damaged during handling and erecting.

PART 2 PRODUCTS

2.1 PRE-ENGINEERED REINFORCED COMPOSITE TRANSIT PLATFORMS

A. Manufacturers: Subject to compliance with requirements, provide:

B. The composite transit platforms shall be “Armor-Deck”, as manufactured by Engineered Plastics, Inc., 300 International Dr., Williamsville, NY 14221, 800-682-2525. **This is a sole source item and no substitutions will be allowed.**

C. Description: Structurally reinforced polymer composite panels, sized as indicated on Drawings, with composite urethane, aggregate and epoxy deck topping, interlocking joint and leveling/alignment system, and integral component mounting inserts. Panels shall be monolithic, entirely formed in a closed mold. Panels assembled using individually extruded or molded components are not acceptable.

D. Platform panels shall be formed to create a recess to accommodate the retractable edge system. This section shall be molded monolithically with the entire platform panel, but have a specific internal construction designed to meet the load factors of the retractable edge connections. Bolt holes for attachment of retractable edge hinges and blocks are to be molded into the panel. Drilled bolt holes in the panel are not acceptable as they do not provide the strength nor maintain the integrity of the composite panel as molded holes provide. Retractable edge rear angle to be factory installed on platform panels. Retractable edge panels are to be supplied by composite platform panel manufacturer and test fit to composite platform panels prior to shipment to job site.

E. Tooling: Accurately construct forms of sufficient strength to withstand pressures due to molding operations, and temperature changes. Maintain formwork to provide completed panels, lines and dimensions indicated, within fabrication tolerances specified.

F. Anchorages: Accurately position built-in anchorage devices in accordance with approved shop drawings. Locate anchorages where they do not affect the position of the main reinforced composite internal "I" beams.

G. Openings: Cast in all openings larger than 5 inches in diameter or 5 inches square in accordance with approved shop drawings. Field cut or drill smaller holes without cutting "I" beams where approved by the Construction Manager.

H. Top Surface Finish: Composite urethane, aggregate and epoxy surface finish as described in 2.2 below.

I. Other Surfaces Finish: Normal plant-run finish that produces an exposed surface smooth surface.

J. Fabrication Tolerances:
   1. Panel Length: ± 1/8-inch.
   2. Panel Width: ± 1/8-inch.
   3. Panel Squareness: 0.002 radians (2:1,000).
   4. Panel Camber: ± 1/8-inch in length or width.
   5. Panel Thickness: ± 1/16-inch.
   6. Draft (Sides and Ends of Panel): ± 1/16-inch.

2.2 AGGREGATE DECK TOPPING

A. Manufacturers: Subject to compliance with requirements, provide:
   1. Engineered Plastics lnc. "Diamond-Tek". **This is a sole source item and no substitutions will be allowed.**

B. Description: factory applied non-skid composite urethane, aggregate and epoxy surface finish meeting 2006 DOTAS coefficient of friction requirements. Samples to be submitted to Owner for approval.

2.3 PRE-ENGINEERED REINFORCED COMPOSITE TRANSIT STAIRS

A. Manufacturers: Subject to compliance with requirements, provide:
   1. The composite transit stairs shall be “Armor-Deck”, as manufactured by Engineered Plastics, Inc., 300 International Dr., Williamsville, NY 14221, 800-682-2525. **This is a sole source item and no substitutions will be allowed.**

2.4 ABRASIVE NOSINGS

A. Cast-Metal Units: 4” cast aluminum (Type 116), with concealed integral anchors. Fabricate units in lengths necessary to accurately fit as an integral part of the composite transit stairs.
   1. Basis-of-Design Product: Subject to compliance with requirements, provide 4” Cast Aluminum Abrasive Stair Nosing by The Mat King, 3000 Hemptead Turnpike; Suite 301, Levitown, Long Island, NY 11756; (516) 501-0744 or (800) 442-6544, or approved equal.

2.5 BEARING PADS

A. Description: AASHTO M251, 100% virgin chloroprene plain vulcanized elastomeric bearing pad, molded to size or cut from a molded sheet.
   1. Hardness: ASTM D2240, Shore "A" Durometer 60.
   2. Tensile Strength: ASTM D412, 2,250 psig.
   3. Elongation: ASTM D412, minimum 300%.
   4. Compressive Set: ASTM D395, 35% maximum.

2.6 CONNECTION MATERIALS

A. Bolts and Studs: ASTM A307, Grade A (ASTM F 568, Property Class 4.6); nickel-plated nuts; connecting rods; and flat, unhardened steel washers.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements, including installation tolerances, true and level bearing surfaces, and other conditions affecting performance of the panels.

B. Verify substructure is ready to receive work and dimensions are as indicated on shop drawings. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install in accordance with manufacturer's installation instructions.

B. Install bearing pads as panels are being erected. Set pads on true, level, and uniform bearing surfaces and maintain in correct position by bonding it to the top flange of the steel beams until panels are placed.

C. Do not use drilled or powder-actuated fasteners for attaching accessory items to panels, unless otherwise approved by manufacturer.

D. Make field openings in strict accordance with manufacturer's instructions.

3.3 ERECTION TOLERANCES

A. Maximum Variation from Indicated Position: ¼-inch.

B. Maximum Offset from Alignment Adjacent Components: 1/8-inch.

C. Maximum Variation from Level or Elevation: 1/8-inch in any 20' run.

D. Maximum Offset in Alignment of Adjacent Panels at Joint: 1/16-inch in any 10' run.

3.4 CLEANING

A. Clean exposed surfaces of planks after erection to remove markings, dirt and stains without damaging finished surface.

B. Wash and rinse according to manufacturer's recommendations. Protect other work from staining or damage due to cleaning operations.

C. Do not use cleaning materials or processes that could change the appearances of exposed composite finishes.

END OF SECTION 066000

SECTION 066400 – POLYETHYLENE PLATFORM EDGE UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. 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. Polyethylene Platform Edge Units and fasteners

B. Related Sections:

1. Section 051300 "Retractable Platform Edge".

1.3 ACTION SUBMITTALS

A. Submit product data for review and approval.

B. Submit layout plan indicating unit dimensions, hole and groove spacing and dimensions, lengths of units, and fastening schedule.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Rub Rail Units: 4 full-length pieces.

2. Hardware: Adequate hardware for the replacement of four pieces.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain products from a single manufacturer.

B. The coefficient of thermal expansion in degrees Fahrenheit, tested in accordance with ASTM D696, shall not be greater than:

1. 0 to 75 degrees: 1.1×10^{-4} inches per inch

2. 75 to 120 degrees: 1.87 x 10^{-4} inches per inch

C. Fabrication Tolerances:

1. The straightness tolerance on the concrete edge side of the rubbing board shall be 1/8 inch in a ten foot section.
2. The variation in width of the board shall not be more than 1/16 of an inch in any length section.
3. The Contractor shall coordinate the location of fasteners with the factory-drilled holes in the units prior to fabrication.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Handle and store in compliance with manufacturer's written instructions.

1.7 FIELD CONDITIONS

A. Field Measurements: Verify all dimensions of related construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

PART 2 - PRODUCTS

2.1 POLYETHYLENE PLATFORM EDGE UNITS

A. Size and shape shall be as indicated on the Contract Drawings. The platform edge strip shall be fire-retardant ultra-high molecular weight polyethylene bar stock. The top surface shall be scarified to create a non-slip surface.

1. Manufacturers: Subject to compliance with requirements, provide one of the following:

   a. Units fabricated by Polymer Industries, 2926 South Steel, Tacoma, WA 98409, distributed by TriStar Engineered Plastic Solutions, (508) 925-7409.
   b. Approved Equal.

2. Cross Section Dimensions: As indicated on drawings.
3. Holes for Fastening: Provide factory-cut recessed holes and spline grooves as described in the contract drawings or as recommended by the manufacturer.
4. Lengths: Fabricate product to the maximum length possible to suit job conditions, but at least 10’-0” long.
5. Fasteners shall be Type 316 stainless steel.
6. Exterior Surface: Non-yellowing, UV Stable surfaces all sides.
7. Color: Safety Yellow.
8. Dry Coefficient of Friction (traffic surface): 0.80
9. Flammability: Flame Spread per ASTM E162-02: 35 Maximum Radiant Panel Index I_S.
10. Smoke Generation per ASTM E662

a. Flaming Mode: Specific Optical Density D_S: 12 max., Maximum Specific Optical Density D_M: 430.
b. Non-Flaming Mode: Specific Optical Density D_S: 8 max., Maximum Specific Optical Density D_M: 246.
c. Smoke Toxicity per ASTM E800:
   1) Carbon Monoxide (CO): 123 ppm max.
   2) Hydrogen Flouride (HF): 1.5 ppm max.
   3) Hydrogen Chloride (HCI): 12 ppm max.
   4) Hydrogen Cyanide (HCN): 2 ppm max.
   5) Nitrogen Oxides (NO_X): 53 ppm max.
   6) Sulfur Dioxide (SO^2): 1 ppm max.
   7) Carbon Dioxide (CO_2): 10,000 ppm max.

B. Sealant: Mildew-resistant, single-component, neutral-curing or acid-curing silicone sealant recommended by plastic manufacturer and complying with requirements in Section 079200 "Joint Sealants."

C. Centering Splines: Use manufacturers recommended fiberglass centering splines and type 316 stainless steel screws as indicated in the drawings and as recommended by the manufacturer, whichever is more stringent.

D. Anchor Rods: The anchor rods to be installed on the concrete platform edge for supporting the polyethylene platform edge unit shall be 5/8" diameter ASTM 240 Type 316 stainless steel with washer, nut and nylon lock nut.

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.

3.3 INSTALLATION, GENERAL

A. The Contractor shall gauge the concrete edge of the platform with the center line of track and dress the platform edge to provide the proper train clearance as follows:

If the centerline of the track is on a curve, this clearance shall be increased by the amount of "end" or "center" excesses, according to the Amtrak car clearance standard, unless other instructions are given on the Contract Drawings.

B. Attach polyethylene platform edge strips after retractable platform edge units have been installed and properly leveled and back-sloped. Do not shim units.

C. Install units true, straight, and plumb with no distortions.

D. Attach polyethylene platform edge units to retractable platform edge units with approved stainless steel, corrosion proof fasteners.

E. Maintain uniform space between adjacent units and adjacent surfaces. Fill space with sealant.

3.4 ADJUSTING, CLEANING AND REPLACEMENT

A. Adjust units such that the top (traffic) edge is flush with the finished platform topping surface, within 1/16". Align individual pieces both horizontally and vertically within 1/16", with no more than 1/8" gap between pieces at butt joints.

B. Adjust units to account for thermal expansion in the long direction of the unit. Cut units and install 1/8" gapped butt joints as required to prevent buckling of the units during expansions.

C. Repair damaged and defective units to eliminate functional and visual defects; replace units where not possible to repair. Adjust joinery for uniform appearance.

D. If units are struck by railroad traffic prior to substantial completion, the Contractor shall repair or replace the units to the Engineer's satisfaction at the Contractor's expense.

E. Remove excess sealant and smears as units are installed. Clean with solvent recommended by sealant manufacturer and then wipe with clean dry cloths until no residue remains.

F. Clean units on exposed and semi exposed surfaces.

END OF SECTION 066400

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.

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 RAILROAD TRAFFIC AND PROPERTY "and other Amtrak Specifications in the Contract.

1.2 SUMMARY

A. Section includes:

1. Furnishing and installation of all mechanical and finish hardware necessary for all doors, and hardware as specified herein and as enumerated in hardware sets and as indicated and required by actual conditions at the building. The hardware shall include the furnishing of all necessary screws, bolts, expansion shields, drop plates, and all other devices necessary for the proper application of the hardware.

B. Related Sections:

1. Section 055213 "Pipe and Tube Railings".

1.3 REFERENCES

A. Applicable state and local building codes and standards.

B. Accessibility

1. ADA - Americans with Disabilities Act
2. ICC / ANSI A117.1 - Accessible and Usable Buildings and Facilities

C. DHI - Door and Hardware Institute

1. Sequence and Format for the Hardware Schedule
2. Recommended Locations for Builders Hardware

D. ANSI - American National Standards Institute

1. ANSI/BHMA A156.1 - A156.29, and ANSI A156.31 - Standards for Hardware and Specialties

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 and installation details, material descriptions, dimensions of individual components and profiles, and finishes.

1. Samples: If requested by the Architect, submit production sample or sample installations as requested of each type of exposed hardware unit in the finish indicated, and tagged with a full description for coordination with the schedule.

a. Samples will be returned to the supplier in like-new condition. Units that are acceptable to the Architect may, after final check of operations, be incorporated into the Work, within limitations of key coordination requirements.

2. Templates: After final approval of the hardware schedule, provide templates for doors, frames, and other work specified to be factory prepared for the installation of door hardware.

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 and Architectural Hardware Consultant.

C. 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.

D. Warranty: Special warranty specified in this Section.

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: 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:

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. Accessibility Requirements: For door hardware on doors in an accessible route, comply with ICC/ANSI A117.1, the Connecticut State Building Code, and 2006 DOTAS.

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. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch high.

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. 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.

1.8 COORDINATION

A. Prior to ordering hardware, coordinate keying with Ms. Marlene Cordero of DOT Rail Operations 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.

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: 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. Exit Devices: Three years from date of Substantial Completion.
b. Locksets: 7 years, except electrified locksets.

1.10 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 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. Precision Hardware, Inc.; Division of Stanley Security Solutions, Inc. (Basis of Design).
b. Or equal.

2.3 LOCK CYLINDERS

A. Lock Cylinders: Tumbler type, constructed from stainless steel.

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.

2.4 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 Ms. Marlene Cordero of DOT Rail Operations 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.

2.5 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.

2.6 FINISHES

A. Protect mechanical 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 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 pipe and tube railing gates, with Installer present, for compliance with requirements for installation tolerances 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 Contract Drawings.

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: By pipe and tube railing gate manufacturer.

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.

1. Spring Hinges: Adjust to achieve positive latching when door is allowed to close freely from an open position of 30 degrees.

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

A. Provide hardware for each door to comply with requirements of hardware set numbers indicated in door schedule, and in the following schedule of hardware sets.

B. Locksets, exit devices, and other hardware items are referenced in the Hardware Sets for series, type, and function. Refer to the preamble for special features, options, cylinders/keying, and other requirements.

C. Hardware Sets:

Hardware Set # 1 – gates

1 ea	Alarmed Exit Device	2114 ALK exit only 626 battery operated	Precision
1 ea	Cylinder	Mortise type as required for ALK kit	Best

Remainder of hardware (including spring hinges) by pipe and tube railing gate manufacturer. Drill two weep holes in bottom of exit device center case for precipitation escape.

END OF SECTION 087100

SECTION 096519 - RESILIENT TILE FLOORING

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. Vinyl composition floor tile (located at Electrical Room).

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: Full-size units of each color and pattern of floor tile required.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For resilient tile flooring, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

B. FloorScore Compliance: Resilient tile flooring shall comply with requirements of FloorScore certification.

2.2 VINYL COMPOSITION FLOOR TILE

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. Armstrong World Industries, Inc.
   2. Congoleum Corporation.
   3. Mannington Mills, Inc.

B. Tile Standard: ASTM F 1066, Class 2, through-pattern tile.

C. Wearing Surface: Smooth.

D. Thickness: 0.125 inch.

E. Size: 12 by 12 inches.

F. Colors and Patterns: As selected by Architect from full range of industry colors.

2.3 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by floor tile manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.

   1. Adhesives shall comply with the following limits for VOC content:

      a. Vinyl Composition Tile Adhesives: 50 g/L or less.
      b. Rubber Floor Adhesives: 60 g/L or less.

   2. Adhesives shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

C. Floor Polish: Provide protective, liquid floor-polish products recommended by floor tile manufacturer.

PART 3 - EXECUTION

3.1 PREPARATION

A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.

B. Concrete Substrates: Prepare according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor tile manufacturer. Do not use solvents.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install floor tiles until they are the same temperature as the space where they are to be installed.

E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

3.2 FLOOR TILE INSTALLATION

A. Comply with manufacturer's written instructions for installing floor tile.

B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.

1. Lay tiles square with room axis.

C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.

1. Lay tiles with grain direction alternating in adjacent tiles (basket-weave pattern).

D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.

E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.

G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in finished floor areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.

H. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.3 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting floor tile.

B. Floor Polish: Remove soil, adhesive, and blemishes from floor tile surfaces before applying liquid floor polish.

1. Apply two coats.

C. Cover floor tile until Substantial Completion.

END OF SECTION 096519

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. 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.

C. Related Sections:

1. Section 051200 "Structural Steel Framing".
2. Section 055000 "Metal Fabrications".
3. Section 055213 "Pipe and Tube Railings".
4. Section 057500 "Decorative Formed Metal".
5. Section 102213 "Wire Mesh Partitions".

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 colors to be selected by Architect from manufacturer's full range.

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: All steel members including columns, beams, posts and accessories including base plates. Refer to Specification Section 051200 – Structural Steel for additional details.

b. Exterior platform guardrails and incorporated systems, gates, brackets and fasteners. Refer to Specifications Section 055213 – Pipe and Tube Railings and 055000 - Metal Fabrications, for additional details.

c. Exterior galvanized-steel sheet. Refer to Section 057500 – Decorative Formed Metal for additional details.

d. Exterior wire mesh partitions (guardrail panels). Refer to Section 102213 "Wire Mesh Partitions".

e. Exposed tube steel framing and connected miscellaneous steel, including guardrails/railing systems etc.

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 prepratain.
   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. 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 102213 - WIRE MESH PARTITIONS

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. Heavy-duty wire mesh partitions.

B. Related Sections:
   1. Section 055100 "Metal Stairs".
   2. Section 055213 "Pipe and Tube Railings".
   3. Section 099600 "High-Performance 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. Samples: For each exposed product and for each color and texture specified.

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. Acorn Wire & Iron Works, Inc.
   2. American Woven Wire Corporation.
   3. McNichols.

2.2 MATERIALS

A. Steel Wire: ASTM A 510.

2.3 HEAVY-DUTY WIRE MESH PARTITIONS

A. Mesh: Galvanized .120-inch diameter, 1-inch square opening woven wire mesh with lock-crimp weave.

2.4 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with applicable standard listed below:

1. ASTM A 123/A 123M, for galvanizing steel and iron components.
2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.
3. Preparation for Shop Priming: After galvanizing, thoroughly clean wire mesh components of grease, dirt, oil, flux, and other foreign matter, and treat with metallic-phosphate process.

B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface-preparation specifications and environmental exposure conditions of installed metal fabrications:

1. Exteriors (SSPC Zone 1B) and Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
2. Interiors (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."

C. Shop Priming: Provide primers that comply with Section 099600 "High-Performance Coatings."

D. Intermediate Coats and Topcoats: Provide products that comply with Section 099600 "High-Performance Coatings."

PART 3 - EXECUTION

3.1 WIRE MESH PARTITIONS ERECTION

A. Anchor wire mesh partitions per drawings.

3.2 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 102213

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:

1. Benches and trash receptacles furnished and installed in locations indicated on the drawings.

B. Related Sections:

1. Section 066000 "Pre-Engineered Reinforced Composite Transit Platforms".

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.

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. Bench 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. Mounting bolt covers: Provide covers that adequately cover bench mounting plates. Finish to match Support pipes.

E. 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.

F. Blast Resistant Waste Receptacle: 30" outside diameter with brushed finish stainless steel exterior. Provide full formed fiberglass hinged lid with side cut outs (no top opening) and frangible polyethylene liner.

2.2 MANUFACTURERS

A. Basis-of-Design Product (Benches): Subject to compliance with requirements, provide "Plexus Collection" by Landscape Forms. (800) 521-2546, or approved equal.

B. Basis-of-Design Product (Trash Receptacles): Subject to compliance with requirements, provide BlastGard MTR Model 101, by BlastGard International, Inc. (727)592-9400, www.blastgardintl.com, or 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 and trash receptacles should be mechanically secured to platform surfaces with epoxy-set anchor bolts. Coordinate installation of grounding wire with contractor. Refer to bench and trash receptacle manufacturer's instructions for additional mounting/securing instructions.

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 104250 – SITE WAYFINDING AND IDENTIFICATION SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY:

A. This Section includes the following types of signs:

1. Fabricated Panel Signs with Canopy Mount
2. Fabricated Panel Signs with Rail Mount
3. Aluminum Sign Panels, mounted to Existing Posts
4. Aluminum sign Panels, with Post Mount and Applied Vinyl Graphics
5. Zinc Sign Panels with Braille, with Wall or Glass Mount

B. Related Sections include the following:

1. Division 5 Section “Pipe and Tube Railings” for railing mounted panel signs

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions of Division I, 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.

1.3 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. Provide certifications that all work has been designed and installed in accordance with ADA requirements, the requirements of the 2006 DOTAS and Amtrak standards for signage and graphics.

2. Shop drawings showing fabrication and mounting methods for each sign type. Include plans, elevations, and large scale sections of typical components. Show anchors, layout, reinforcement, accessories and installation details.

   a. Provide a measured layout for each sign required, and prepare full scale layouts of sample messages showing word and letter spacing.

   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. 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.

4. 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.

   a. Submit 4” x 4” color samples of each specified finish including paints, applied vinyl, and aluminum.

   b. Typical mounting brackets.

   c. Submit a complete sample alphabet of each typeface and pictogram specified (1” minimum height).

   d. Submit an 8-1/2” x 11” color print of each specified logotype, to include any modifications as required.

   e. Catalog Cuts: Catalog cuts shall be marked to indicate the item, model, capacities and other characteristics listed in the table or on printed sheets.

5. 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.

1.4 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. Source Limitations: For each separate sign type required, obtain signs from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

C. Comply with the Department of Transportation ADA Standards for Transportation Facilities — the 2006 DOTAS and all other applicable codes with regard to signage, as well as any and all subsequent appendices, addenda or revisions.

D. For actual fabrication of the signage package, 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, square-ness, camber, and flat-ness.

   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. 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. Structural Performance: Structural elements shall withstand the effects of gravity, wind, seismic, snow, and ice loads as per the Connecticut State Building Code. At a minimum, 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 schedules 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 there-of. All damaged surfaces and materials shall be restored to their original condition and appearance by the Contractor.

1.5 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.

1.6 REFERENCES:

A. American Society for Testing Materials (ASTM)

B. American Welding Society (AWS) – Structural Welding Code

C. ANSI A-1171-2003 – Specifications for Sign Requirements for the Physically Handicapped.

D. 2006 DOTAS.

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. Deliver signs in factory-fabricated containers or wrappings, which offer proper protection from construction debris and physical damage.

C. Store items in original wrappings in a clean dry place. Protect from weather, dirt, fumes, and water and other abuses of the environment

D. Handle carefully to prevent damage, breaking and soiling. Do not install damaged units or components, replace with new.

E. 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.

1.8 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.

1.9 DELIVERY OF UNITS:

A. Contractor shall be responsible for handling and storage. The State shall not be responsible until installed and accepted.

1.10 WARRANTY:

A. Refer to Form 816, Article 1.20-1.06.08 and the NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information.

B. 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.

1.11 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:

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. Sign Comp, Comstock Park, Michigan
    b. Howard Industries, Fairview, PA
    c. Admiral Plastics, Cape Girardeau, Missouri

2. Aluminum Panel Signs with Applied Vinyl Graphics

    a. Sign Lite, Inc., 6 Corporate Drive, North Haven, CT 06473 (203) 239-6799
    b. ID Resources, PO Box 127, Peterborough, NH (603) 924-3371
    c. Advanced Signing LLC, Medway, MA (508) 533-9000

3. Zinc Panel Signs with Braille

    a. Metallic Arts, 914 North Lake Road, Spokane Valley, WA 99212.

(800) 541-3200

b. Gemini Inc., 103 Mensing Way, Cannon Falls, MN 55009-1143.
c. (800) 538-8377
d. Matthews International Corp., 1315 West Liberty Avenue, Pittsburg, Pa, 15226. (412) 571-3430

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, warp-age and any defects impairing strength, durability and appearance.

B. Paint:

1. Paint system to be low VOC, ultraviolet inhibited aliphatic acrylic polyurethane applied over pretreatment coating and primers, as appropriate for each sign substrate material. All signs are clear coated with low VOC satin clear unless indicated otherwise on design intent drawings. Colors to match as follows:

a. Satin AMT Blue = Matthews Paint VOC# SVOC1142SP
b. Satin Silver = Matthews Paint VOC# MP18073
c. Satin Red = Matthews Paint to match PMS# 185
d. Satin White = Matthews Paint VOC# SV202SP
e. Satin Black = Matthews Paint VOC# SV923SP
f. Satin Green = To Match PMS 376 Green
g. Satin Clear Coat = Matthews Paint VOC# Satin Clear 281228

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.

C. 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. Majestic Blue = Avery Ultimate Cast Opaque Film UC 900-625-O
   b. Light Silver Metallic = 3M Scotchcal Controltac Film 180C-220
   c. Perfect Match Red = 3M Scotchcal Electrocut Film 220--263
   d. White = 3M Scotchcal Electrocut Film 7725-10
   e. Black = 3M Scotchcal Electrocut Film 7725-12

D. 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. White = 3M Scotchlite Reflective Vinyl 680-10
   b. Black = 3M 3M Scotchlite Reflective Vinyl 680-85
   c. Ruby Red =3M Scotchlite Reflective Vinyl 680-82
   d. Green = To Match PMS 376 Green

E. 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 de-laminate 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.

F. 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.

2. All metal to be free of stain, warp-age and any defects impairing strength, durability and appearance.

3. All welds to comply with the recommendations of the AWS.

G. Fasteners:

1. Use concealed fasteners fabricated from metals that are not corrosive to the sign material and mounting surface.

H. 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 typefaces 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. Futura Heavy

2. Futura Bold

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. Symbols are based on the *"System of Passenger/Pedestrian Orientation Symbols"* developed for the Department of Transportation by the American Institute of Graphic Arts and the Society of Environmental Graphic Design's symbols of accessibility.

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 CTDOT, authorized artwork of the Connecticut Commuter Rail logo and the CT Fastrak 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 locations of signs shown on the drawings are for general information only. It is the responsibility of the Contractor to coordinate with the Owner to determine final locations 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 is to be performed and correct any conditions detrimental to the 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 the 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.

NHHS / Hartford
Platform
Hartford, CT

Type	Description	Comments
A1a	Branded City Identifier	
A3	Track Identifier	
A9	Directional Stacked	
A12	ADA City Identifier	
B1	Overhead Directional (1) Message	
B2	Overhead Directional (2) Messages	
B15.1	Area of Refuge	
B19	Permanent Room Identifier	
C	Trailblazer Directional Sign	
D1	No Smoking	
D2.1	In Case of Fire	
D3	Safety Sign	
D4	Platform End Restrictive Sign	
D6	Unattended Baggage	

NHHS / Hartford
Platform-Bridge Signs
Hartford, CT

Type	Tag	Level	Rm #	Message side "A"	Message side "B"	Comments
A1a	A1a-01	PLAT		(orb) CT *rail* Hartford, CT HARTFORD LI NE (Amtrak Symbol) AMTRAK	(orb) CT *rail* Hartford, CT HARTFORD LI NE (Amtrak Symbol) AMTRAK	Rail Mounted
A1a	A1a-02	PLAT		(orb) CT *rail* Hartford, CT HARTFORD LI NE (Amtrak Symbol) AMTRAK	(orb) CT *rail* Hartford, CT HARTFORD LI NE (Amtrak Symbol) AMTRAK	Rail Mounted
A1a	A1a-03	PLAT		(orb) CT *rail* Hartford, CT HARTFORD LI NE (Amtrak Symbol) AMTRAK	(orb) CT *rail* Hartford, CT HARTFORD LI NE (Amtrak Symbol) AMTRAK	Rail Mounted
A1a Count	3					
A3	A3-01	PLAT		↑ All Trains	↑ Station	Canopy Mounted
A3	A3-02	PLAT		↑ All Trains	↑ Station	Canopy Mounted
A3	A3-03	PLAT		Track 1	Track 1	Canopy Mounted
A3	A3-04	PLAT		Track 1	Track 1	Canopy Mounted
A3	A3-05	PLAT		Track 1	Track 1	Canopy Mounted
A3 Count	5					
A9	A9-01	PLAT		↗ All Trains	(none)	Wall Mounted
A9	A9-02	PLAT		→ All Trains	(none)	Fence Mounted
A9	A9-03	PLAT		← ♿ Exit	(none)	Rail Mounted
A9	A9-04	PLAT		← ♿ Exit	(none)	Rail Mounted
A9 Count	4					

NHHS / Hartford
Platform-Bridge Signs
Hartford, CT

A12	A12-01	PLAT		HARTFORD, CT (Grade 2 Braille)	(none)	Glass Mounted Backer Panel
A12	A12-02	PLAT		HARTFORD, CT (Grade 2 Braille)	(none)	Glass Mounted Backer Panel
A12 Count	2					
B1	B1-01	PLAT		↓ Exit to Station	(none)	Wall Mounted Above Elevator Door
B1 Count	1					
B2	B2-01	PLAT		↑ Stairway to Station ↖ To All Trains	→ Turn Right Follow Signs to All Trains	Wall Mounted
B2 Count	1					
B15.1	B15.1-01	PLAT		Area of Refuge	(none)	Rail Mounted
B15.1 Count	1					
B19	B19-01	STATION	156A	COMMUNICATIONS ROOM (Grade 2 Braille)	(none)	Wall Mounted
B19	B19-02	STATION	122	ELECTRICAL ROOM (Grade 2 Braille)	(none)	Wall Mounted
B19 Count	2					
C	C01	PLAT		← (fastrak orb) STATION	(none)	(TBD)
C	C02	PLAT		↑ (fastrak orb) STATION	(none)	(TBD)

NHHS / Hartford
Platform-Bridge Signs
Hartford, CT

C Count	2					
D1	D1-01	PLAT			(none)	Rail Mounted
D1	D1-02	PLAT			(none)	Rail Mounted
D1 Count	2					
D2.1	D2.1-01	PLAT		In Fire Emergency Do Not Use Elevator Use Exit Stairs	(none)	Wall Mounted
D2.1 Count	1					
D3	D3-01	PLAT		(Exclamation Point Symbol) ---------- Notice ---------- Not a Boarding Area	(none)	Column Mounted
D3	D3-02	PLAT		(Exclamation Point Symbol) ---------- Notice ---------- Not a Boarding Area	(none)	Column Mounted
D3	D3-03	PLAT		(Exclamation Point Symbol) ---------- Notice ---------- Not a Boarding Area	(none)	Column Mounted

NHHS / Hartford
Platform-Bridge Signs
Hartford, CT

D3	D3-04	PLAT		(Exclamation Point Symbol) ---------- Notice ---------- Not a Boarding Area	(none)	Column Mounted
D3	D3-05	PLAT		(Exclamation Point Symbol) ---------- Notice ---------- Not a Boarding Area	(none)	Column Mounted
D3	D3-06	PLAT		(Exclamation Point Symbol) ---------- Notice ---------- Not a Boarding Area	(none)	Column Mounted
D3	D3-07	PLAT		(Exclamation Point Symbol) ---------- Notice ---------- Not a Boarding Area	(none)	Column Mounted
D3 Count	7					
D4	D4-01	PLAT		(Exclamation Point Symbol) AUTHORIZED PERSONNEL (Grade 2 Braille)	(none)	Rail Mounted
D4 Count	1					

NHHS / Hartford
Platform-Bridge Signs
Hartford, CT

D6	D6-01	PLAT		WARNING ALL UNATTENDED BAGGAGE WILL BE SEIZED AND SEARCHED	(none)	Rail Mounted
D6	D6-02	PLAT		WARNING ALL UNATTENDED BAGGAGE WILL BE SEIZED AND SEARCHED	(none)	Rail Mounted
D6 Count	2					

END OF SECTION 104250

SECTION 108100 – PEST CONTROL DEVICES

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. 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.

C. The Work specified in this Section consists of furnishing and installing a complete Ultrasonic Bird Control System as shown on drawings.

1.2 RELATED DOCUMENTS

A. Drawings and Contract Terms and Conditions

B. Requirements of the following Division 26 Sections apply to this Section:

1. Common Work Results for Electrical - Section 260500.
2. Low Voltage Electrical Power Conductors and Cables - Section 260519.
3. Hangers and Support for Electrical Systems - Section 260529.
4. Raceways and Boxes for Electrical Systems - Section 260533.

1.3 SUMMARY:

A. This Section includes requirements for furnishing and installing a complete Ultrasonic Bird Control System.

B. The Contractor shall furnish and install all speakers, cable and conduit associated with the Bird Control System including the system head-end equipment at the location shown on the drawings.

1.4 ACCEPTABLE MANUFACTURERS:

A. Subject to compliance with specification requirements, suitable products by one of the following manufacturers will be considered by Engineer:
1. Bird-X, Inc, Model Ultrason X or approved equal

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 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.

1.6 CLOSEOUT SUBMITTALS:

A. Submit closeout submittals in accordance with Form 816 Article 1.20-1.05.02, NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS.

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. Electrical Component Standard: Provide work complying with applicable requirements of NFPA 70 "National Electrical Code".

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.

1.9 WARRANTY:

A. Refer to Form 816, Article 1.20-1.06.08, and the NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information.

PART 2 – PRODUCTS

2.1 BUY AMERICA COMPLIANCE

A. Products must meet Buy America requirements. Refer to NOTICE TO CONTRACTOR – BUY AMERICA for additional information.

2.2 ULTRASONIC BIRD CONTROL SYSTEM:

A. Ultrasonic Bird Control System shall comprise a field-installed head-end unit with a sufficient number of satellite speakers to provide complete coverage of canopy directly above raised platform area.

B. System shall generate irritating and alarming ultrasonic noises in the 15-25 kHz frequency range with sufficient sound pressure to discourage bird roosting.

C. Head-end unit shall be installed in a weather-proof enclosure suitable for installation beneath platform canopy. All components comprising the Ultrasonic Bird Control System shall be suitable for outdoor installation and rated to operate within the expected extremes of temperature.

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. Install in accordance with manufacturer's recommendations

3.3 TESTING:

A. Perform all field tests and provide all labor, equipment, and incidentals required for testing the Ultrasonic Bird Control System.

B. After installation has been completed the Contractor shall demonstrated the Ultrasonic Bird Control System operates in accordance with the requirements of this specification and manufacturer's instructions.

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.

END OF SECTION 10.81.00

SECTION 230500 – BASIC MECHANICAL MATERIALS AND METHODS

PART 1 – GENERAL

1.01 PROVISIONS INCLUDED

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.

C. Examine all other Sections of the specifications for requirements which affect work under this Section whether or not such work is specifically mentioned in this Section.

D. Coordinate work with that of all other Trades affecting, or affected by work of this Section. Cooperate with such Trades to ensure the steady progress of all work under the Contract.

1.02 DEFINITIONS

A. Words in the singular shall also mean and include the plural, wherever the context so indicates and words in the plural shall mean the singular, wherever the context so indicates.

B. Wherever the terms "shown on drawings" are used in the specifications, they shall mean "noted", "indicated", "scheduled", "detailed", or any other diagrammatic or written reference made on the drawings.

C. Wherever the term "provide" is used in the specifications it will mean "furnish" and "install", "connect", "apply", "erect", "construct", or similar terms, unless otherwise indicated in the specifications.

D. Wherever the term "material" is used in the specifications it will mean any product", "equipment", "device", "assembly", or "item" required under the Contract, as indicated by trade or brand name, manufacturer's name, standard specification reference or other description.

E. The terms "approved", or "approval" shall mean the written approval of the Architect.

F. The term "specification" shall mean all information contained in the bound or unbound volume, including all "Contract Documents" defined therein, except for the drawings.

G. The terms "directed", "required", "permitted", "ordered", "designated", "prescribed" and similar words shall mean the direction, requirement, permission, order, designation or prescription of the Architect. The terms "approved", "acceptable", "satisfactory" and similar words shall mean approved by, acceptable or satisfactory to the Architect. The terms "necessary", "reasonable", "proper", "correct" and similar words shall mean necessary, reasonable, proper or correct in the judgment of the Architect.

H. "Piping" includes in addition to pipe or mains, all fittings, flanges, unions, valves, strainers, drains, hangers and other accessories relative to such piping.

I. "Concealed" means hidden from sight in chases, furred spaces, shafts, hung ceilings, embedded in construction or in crawl spaces.

J. "Exposed" means not installed underground or "concealed" as defined above.

K. "Invert Elevation" means the elevation of the inside bottom of the pipe.

L. "HVAC, Plumbing, and/or Fire Protection Contractor" shall refer to the Contractor or his Subcontractors responsible for furnishing and installation of all work indicated on the HVAC, Plumbing, and/or Fire Protection drawings and specifications, as applicable and or referenced to Trade in the Architectural and/or Structural documents.

M. "Mechanical Contractor" shall refer to the Fire Protection, Plumbing, HVAC and ATC Contractors, as applicable.

N. "Architect" shall refer to the Architect "Michael Baker Jr., Inc." and Engineer "Hatch Mott MacDonald" and Owner “State of Connecticut, Department of Transportation.

O. "Owner" shall refer to the designated representatives of the Project Owner.

P. "General Contractor" shall refer to the Contractor(s) performing work under other sections of the Contract Specifications.

1.03 CODES, STANDARDS AND REFERENCES

A. All materials and workmanship shall comply with all applicable Codes, Specifications, Local and State Ordinances, Industry Standards and Utility Company Regulations, latest editions.

B. In case of difference between Building Codes, State Laws, Local Ordinances, Industry Standards and Utility Company Regulations and the Contract Documents, the Mechanical Contractor, as applicable, shall promptly notify the Architect in writing of any such difference.

C. In case of conflict between the Contract Documents and the requirements of any Code or Authorities having jurisdiction, the most stringent requirements of the aforementioned shall govern for budgetary purposes. However, no work will proceed until the Architect determines the correct method of installation.

D. Should any Contractor, as applicable, perform any work that does not comply with the requirements of the applicable Building Codes, State Laws, Local Ordinances, Industry Standards and Utility Company Regulations, he shall bear all costs arising in correcting the deficiencies, as approved by the Architect.

E. Applicable Codes and Standards shall include all State Laws, Local Ordinances, Utility Company Regulations and the applicable requirements of the following accepted Codes and Standards, without limiting the number, as follows:

1. National Electrical Code-2005 (NEC)

2. FM Global

3. Environmental Protection Agency (EPA)

4. Connecticut -- Environmental Air Quality Protection Agency

5. Connecticut Building Code/IBC-2003, including all adopted Connecticut Supplements

6. International Mechanical Code-2003 including all adopted Connecticut Supplements

7. International Energy Conservation Code-2009 including all adopted Connecticut Supplements

8. Connecticut - Fire Prevention Regulations and Elevator Regulations

9. Local Ordinances, Regulations of the Local Building Department and Fire Department

10. Recommendations of the National Fire Protection Association (NFPA), latest applicable edition adopted, in general and in particular:

    a. Life Safety, NFPA 101

    b. HVAC, NFPA 90A, 90B

11. Recommendations of ASHRAE (American Society of Heating, Refrigeration and Air Conditioning Engineers), including:

    a. ANSI/ASHRAE 90.1 and 90.2 – Energy Standard for Buildings

    b. ANSI/ASHRAE 62.1 and 62.2 – Ventilation for Acceptable Indoor Air Quality

    c. ANSI/ASHRAE 15-Safety Code for Mechanical Refrigeration

    d. ANSI/ASHRAE 110-Method of Testing Performance of Laboratory Fume Hoods

    e. ANSI/ASHRAE 55-Thermal Environmental Conditions for Human Occupancy

F. In these specifications, references made to the following Industry Standards and Code Bodies are intended to indicate the accepted volume or publication of the Standard. All equipment, materials and details of installation shall comply with the requirements and latest revisions of the following Bodies, as applicable:

1.	AMCA	Air Moving and Conditioning Association
2.	ANSI	American National Standards Institute
3.	ARI	American Refrigeration Institute
4.	ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers
5.	ASME	American Society of Mechanical Engineers
6.	ASTM	American Society of Testing Materials
7.	AWS	American Welding Society

8.	CS	Commercial Standards, U.S. Department of Commerce
9.	FM Global	Factory Mutual Global
10.	FS	Federal Specification, U.S. Government
11.	MSS	Manufacturers Standardization Society of the Valve and Fittings Industry
12.	NEMA	National Electrical Manufacturers Association
13.	SMACNA	Sheet Metal and Air Conditioning Contractor's National Association
14.	UL	Underwriters' Laboratories, Inc.

G. Contractor for the work under his charge, shall give all necessary notices, obtain and pay for all permits, pay all governmental taxes, fees and other costs in connection with his work; file for necessary approvals with the jurisdiction under which the work is to be performed. Contractor shall obtain all required Certificates of Inspection for his work and deliver same to the Architect before request for acceptance of his portion of work and before final payment is made.

H. All equipment shall be installed per manufacturer’s recommendations and requirements. The Contractor shall notify the Engineer in writing when they intend to deviate from manufacturer's installation guidelines. The Engineer shall advise if the installation is acceptable prior to installation.

I. All equipment and material shall be approved by FM Global.

J. All the equipment and material shall be installed according to FM Global requirements.

1.04 SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Submit detailed shop drawings or brochures for approval of equipment and material proposed to be used on this project. Furnish the number of copies required by General Conditions.

C. Documents submitted shall show the following:

1. Principal dimensions and details of construction.

2. Operating and maintenance clearances.

3. Weights of principal parts and total weights with information required for the design of supports and foundations.

4. Sizes and location of piping and connections.

5. Performance data, including pump and fan curves; sound data including sound power dB levels in 1/3 octave bands.

6. Data on electric motors, including brake horsepower of driven equipment, nameplate ratings and classes, sound data, starting and running full load currents, required starter size and recommended overload heater ratings.

7. Approval stamp of Underwriters' and other authorities having jurisdiction of Contract Drawings requiring such approval.

8. Certified performance guarantees.

9. Calculations and details for refrigeration for field assembled systems including description of specialties and pressure drops, layout of piping with lengths fittings, and refrigerant specialties, and capacity curves for evaporator and compressor showing balance points.

10. Minimum scale for sheet metal plans and piping plans shall be ¼ inch equal 1 foot.

D. Submit brochures that contain only that information which is relative to the particular equipment or materials to be furnished. Do not submit catalogs that describe several different items other than those items to be used unless irrelevant information is marked out and relevant material is clearly marked.

E. Specifications Compliance Statement

1. The manufacturer shall submit a point by point statement of compliance with the specifications.

2. The statement of compliance shall consist of a list of all paragraphs (line by line).

3. Where the proposed system complies fully, such shall be indicated by placing the word "comply" opposite the paragraph number.

4. Where the proposed system does not comply, or accomplishes the stated function in a manner different from that described, a full description of the deviation shall be provided.

5. Where a full description of a deviation is not provided, it shall be assumed that the proposed system does not comply with the paragraph in question.

6. Submissions which do not include a point by point statement of compliance as specified shall be disqualified.

1.05 CLOSEOUT SUBMITTALS

A. Submit closeout submittals in accordance with Form 816 Article 1.20-1.05.02, NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS.

1.06 QUALITY ASSURANCE

A. Source limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

1.07 GUARANTEE

A. Refer to Form 816, Article 1.20-1.06.08, and the NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information.

B. Manufacturers shall provide their standard guarantees for work under this Contract, unless specified otherwise. However, such guarantees shall be in addition to and not in lieu of all other liabilities which the manufacturer and Contractor may have by Law or by other provisions of the Contract Documents. In any case, such guarantees and warranties shall commence when the Owner accepts the various systems, as applicable and as determined by the Architect. The guarantees and warranties will remain in effect for a minimum period of (1) year thereafter except where longer periods are specifically stated and specified.

C. All materials, items of equipment and workmanship furnished under HVAC, shall carry the warranty against all defects in material and workmanship. Any fault due to defective or improper material, equipment, workmanship or design which may develop shall be made good, forthwith, by and at the expense of the Contractor responsible, including all other damage done to areas, materials and other systems resulting from this failure.

D. Contractor shall guarantee that all elements of the systems provided under his Contract, are of sufficient capacity to meet the specified performance requirements as set forth herein or as indicated on the drawings.

E. Upon receipt of notice from the Owner of failure of any part of the systems or equipment during the guarantee period, the affected part or parts shall be replaced by the responsible Contractor.

F. Contractor shall furnish, before the final payment is made, a written guarantee covering the above requirements.

1.08 THE CONTRACTOR

A. Contractor shall base his bid on site examinations performed by him. This requirement is mandatory. Contractor shall visit the proposed site where work is scheduled to be performed and ascertain for himself the amount of work required to fulfill the intent of his Contract and the complexity of the installation. Contractor shall not hold the Architect, his Consultants, agents or employees responsible for or bound by, any schedule, estimate or for any plan thereof. Contractor shall study all Contract Documents (HVAC, Electrical, Communications, Architectural, Structural), etc., included under Contract, to determine exactly the extent of work to be provided under Section, and in installing new equipment and systems and coordinating the work with the other Trades and existing conditions.

B. The Contractor shall faithfully execute his work according to the terms and conditions of the Contract and specifications and shall take all responsibility for and bear all losses resulting to him in the execution of his work.

C. The Contractor shall be responsible for the location and performance of work provided under his Contract as indicated on the Contract Documents. All parties employed directly or indirectly by the Contractor shall perform their work according to all the conditions as set forth in these specifications.

D. The Contractor shall furnish all materials and perform all work in accordance with the project specifications and any supplementary documents provided by the Architect. The work shall include every item shown on the drawings and/or required by the specifications as interpreted by the Architect. All work and materials furnished and installed shall be new and of the best quality and workmanship. The Contractor shall cooperate with the Architect so that no error or discrepancy in the Contract Documents shall cause defective materials to be used or poor workmanship to be performed.

1.09 COORDINATION OF WORK

A. The Contractor shall compare his drawings and specifications with those of other Trades and report any discrepancies between them to the Architect and obtain from the Architect written instructions for changes necessary in the mechanical or

electrical work, to ensure that all work is installed in coordination and cooperation with other Trades installing interrelated work. Before installation, Contractor shall make proper provisions to avoid interferences in a manner approved by the Architect. All changes required in the work of Contractor caused by his negligence, shall be corrected by him at his own expense, to the Architect's satisfaction.

B. Locations of piping, conduits and equipment shall be adjusted to accommodate the new work with interferences anticipated and encountered during installation. Contractor shall determine the exact routing and location of his systems prior to fabrication or installation of any system component. Accurate measurements and coordination drawings will have to be completed to verify dimensions and characteristics of the various systems' installations.

C. Lines which pitch shall have the right-of-way over those which do not pitch. For example, waste piping shall normally have the right-of-way. Lines whose elevations cannot be changed shall have the right-of-way over lines whose elevations can be changed.

D. Offsets, transitions and changes of direction in all systems shall be made as required to maintain proper headroom and pitch of sloping lines whether or not indicated on the drawings. Contractor shall provide manual air vents and drains as required for his work to affect these offsets, transitions and changes in direction, as applicable.

E. All work shall be installed in a way to permit removal (without damage to other parts) of coils, filters, control appurtenances, fan shafts and wheels, filters, belt guards, sheaves and drives and all other system components provided under this Contract requiring periodic replacement or maintenance. All piping shall be arranged in a manner to clear the openings of swinging overhead access doors, ceiling tiles.

1. Access to any and all components requiring servicing, adjustment, calibration, maintenance or periodic replacement shall be provided so that the Owner's operations personnel can freely gain access without removal of any materials other than the access panel or ceiling tile. Access shall be understood to mean free, clear and unobstructed from the floor up to the device and/or component being serviced.

2. Fire rated access doors with closers shall be provided for all rated assemblies.

F. The Contract Drawings are diagrammatic only intending to show general runs and locations of piping, equipment, terminals and specialties and not necessarily

showing all required offsets, details and accessories and equipment to be connected. All work shall be accurately laid out with other Trades to avoid conflicts and to obtain a neat and workmanlike installation which will afford maximum accessibility for operation, maintenance and headroom.

G. Where discrepancies in scope of work as to what Trade provides items, such as starters, disconnects, flow switches, electric control components, etc., exist, such conflicts shall be reported to the Architect prior to signing of the Contract. If such action is not taken, Contractor, as applicable, shall furnish such items as part of his work, for complete and operable systems and equipment, as determined by the Architect.

H. Where drawing details, plans and/or specification requirements are in conflict and where pipe sizes of same pipe run are shown to be different between plans and/or between plans and sections or details, the most stringent requirement will be included in the Contract. HVAC systems and equipment called for in the specification and/or shown on the drawings shall be provided under this Contract as if it were required by both the drawings and specifications. However, prior to ordering or installation of any portion of work which appears to be in conflict, such work shall be brought to Architect's attention for direction as to what is to be provided.

I. Final location of all air distribution devices, thermostats, heaters, control devices, etc., shall be coordinated with the Architectural reflected ceiling plans and/or other Architectural details, as applicable

1.10 COORDINATION DRAWINGS

A. Before materials are purchased, fabricated or work is begun, Contractor shall prepare coordination drawings for all floors/areas, including buried systems/services (all-Trade-composite at ¼" scale), showing the size and location of his equipment and lines, in the manner described herein under General Requirements.

B. Coordination drawings are for the GC and Architect's use during construction and shall not be construed as shop drawings or as replacing any shop drawings. The coordination drawings, when corrected for actual "as-built" conditions, will be reviewed by the Architect, corrected and be used to prepare the Record Drawings to be submitted to the Owner for his use.

C. The cost of producing and reproducing the drawings will be included under the Contract of Trade, including the cost or preparation of the Architectural building outlines. This process may include multiple revisions to these drawings which will be included in the cost. The intent is to provide a fully coordinated set of

documents between trades no matter how many times they may have to be redone. The Contractor shall take the lead to produce the Architectural backgrounds, show all piping, etc., and circulate the drawings to any of his Subcontractors and the other Trades (Electrical), so that they can indicate all their work as directed by the GC and Architect as required, to result in a fully coordinated installation.

D. In addition to the regular coordination drawing review, the mechanical work will also be reviewed by the Architect/Engineer to ensure that the system and equipment arrangements are suitable to provide maintenance access and service as follows:

1. Valves and instrumentation should be grouped where possible and positioned in the best accessible locations.

2. Location of control/diagnostic panels shall be shown and identified on the mechanical room coordination drawings.

E. Prepare a complete set of computer based MicroStation (Latest Version) drawings at scale not less than ¼" scale equals 1'-0", showing basic layout for the structure and other information as needed for preparation of Coordination Drawings. The drawings shall indicate the layout of all specialty tradework as indicated herein and shall be designated as Coordination Drawings. A signed liability release form will be required from the Contractor prior to the release of the disk from the Engineer.

F. Highlight all fire rated partitions on the Coordination Drawings for appropriate coordination.

G. The main paths for the installation or removal of equipment from mechanical and electrical rooms shall be clearly indicated on the Coordination Drawings.

H. Specialty trades shall add its work to the base drawings with appropriate elevations and grid dimensions. Specialty trade information shall be required for mechanical rooms, horizontal exits from crossovers and for spaces it the above ceilings where congestion of work may occur such as corridors and, where required, entire floors. Drawings shall indicate horizontal and vertical dimensions to avoid interference with structural framing, ceilings, partitions and other services. Indicate elevations relative to finish floor for bottom of piping and conduit 6" greater in diameter.

1. Specialty Trade shall include:

a. HVAC piping and associated control systems.

b. Electrical.

c. Automatic Temperature Control

I. Upon completing their portion of the Coordination Drawings, specialty trade shall sign, date and return Coordination Drawings to the Contractor.

J. Where conflicts occur with placement of materials of various trades, the General Contractor shall be responsible to coordinate the available space to accommodate all trades. Any resulting adjustments shall be initialed and dated by the affected specialty trade Subcontractor. The General Contractor shall then final date and sign drawing.

K. Fabrication shall not start until Coordinate Drawings have been distributed to all parties as indicated herein.

L. Format: Coordination Drawings (plans only) shall be done using Micro Station (Latest Version), in either IBM or Mac Format. Disks shall be given to the Architect for future transfer to Owner. Coordination Drawings will be used as base for as-built drawings.

M. Distribution of Coordination Drawings:

1. The General Contractor shall provide one print of Coordination Drawing to:

a. Owner.

b. General Contractor.

c. Architect (for record purposes).

N. After distribution:

1. Resolve all interference's not previously identified.

O. Coordination Drawings include but are not necessarily limited to:

1. Structure.

2. Partition/room layout, including indication of smoke and fire resistance rated partitions.

3. Ceiling layout and heights.

4. Light fixtures.

5. Access panels.

6. Major water and gases.

7. Major electrical conduit runs, panelboards, feeder conduit and racks of branch conduit. Motor control centers, starters and disconnects.

8. All equipment, including items in the Contract as well as O.F.C.I. and O.F.I. items.

9. Equipment located above finished ceiling requiring access for maintenance and service. In locations where acoustical lay-in ceilings occur indicate areas in which the required access area may be greater than the suspected grid systems.

10. Rainwater Piping.

11. Existing conditions, including, but not limited to, Mechanical, Plumbing and Electrical items.

12. ATC panels.

P. The Architect's response to all requests for information (RFI's) generated by the trade contractors shall be distributed to all other affected trades as if this information was contained in the original contract documents. In other words, the party that issues an RFI is responsible for distributing the information to all affected parties.

1.11 RECORD DRAWINGS

A. Contractor shall maintain, current at the site, a set of Contract Drawings for his portion of the work on which he shall accurately show the actual installation of all work provided under his Contract indicating any variation from the Contract Drawings, in accordance with the General Conditions and Supplementary General Conditions. Changes whether resulting from formal change orders, requests for information, or other instructions issued by the Architect shall be recorded. Include changes in sizes, location and dimensions of piping, equipment, etc.

B. Contractor shall indicate progress by coloring-in various pipes and associated appurtenances exactly as they are erected. This process shall incorporate both the changes noted above and all other deviations from the original drawings whether resulting from job conditions encountered or from any other causes.

C. The marked-up and colored-up prints will be used as a guide for determining the progress of the work installed. They shall be inspected periodically by the Architect and Owner's representatives and they shall be corrected if found either

inaccurate or incomplete. This procedure is mandatory. Marked up drawings shall include all flow diagrams, schedules, details and control diagrams.

D. Contractor shall meet at a minimum on a monthly basis, with the Owner's representative to transfer the information from his HVAC etc., marked-up and colored-up prints to a set which will become the basis for preparation of as-built drawings.

E. Upon completion of the project, Contractor shall submit his marked-up drawings to the Architect for review and comment. After the Architect reviews and comments on this set of documents, Contractor shall prepare as-built drawings using MicroStation (Latest Version). When the work is completed, Contractor shall provide 2 hard copies to the Architect for submittal to the Owner and disks with all documentation and a set of reproducible drawing plots marked "As-Built" drawings. The Contractor shall bear all costs of producing the MicroStation"As-Built" drawings, providing all necessary drawing changes and printing the reproducible drawings for the work under his charge.

1.12 GIVING INFORMATION

A. Contractor shall keep himself fully informed as to the shape, size and position of all openings required for his apparatus and shall give information to the Architect and other Contractors [or Subcontractors] sufficiently in advance of the work so that all openings may be built in advance.

B. The manufacturers listed within this specification have been preselected for use on this project. No submittal will be accepted from a manufacturer other than those specified. Should any Contractor wish to propose a substitution during the bid period, such request shall be made in writing to the Architect, at least (15) working days, prior to bid date. If substitutions are deemed acceptable, such items shall be issued as an Addendum, prior to bid due date. The above requirement is mandatory.

1.13 EQUIPMENT AND MATERIALS

A. Refer to Form 816 Article 1.06.03 and Form 816 Article 1.20-1.06.03 for additional information

B. Equipment and materials shall be delivered to the site and stored in original sealed containers, suitably sheltered from the elements, but readily accessible for inspection by the Architect until installed. All items subject to moisture damage such as controls, filters, etc., shall be stored in dry, heated spaces.

C. Contractor shall have his equipment tightly covered and protected against dirt, water and chemical or mechanical injury and theft. At the completion of the work,

equipment and materials shall be cleaned, polished thoroughly and turned over the Owner in a condition satisfactory to the Architect. Damage or defects developing before acceptance of the work shall be made good at Contractor's expense as applicable.

D. Contractor shall make necessary field measurements to ascertain space requirements, for equipment and connections to be provided under his Trade and shall furnish and install such sizes and shapes of equipment to allow for the final installation to conform to the drawings and specifications.

E. Manufacturers' directions shall be followed completely in the delivery, storage, protection and installation of any equipment. Promptly notify the Architect in writing of any conflict between any requirements of the Contract Documents and the manufacturer's directions and obtain the Architect's written instructions before proceeding with the work. Should any Contractor perform any work that does not comply with the manufacturer's directions or written instructions from the Architect, he shall bear all costs arising in correcting any deficiencies that should arise.

F. Contractor shall furnish and install all equipment, accessories, connections and incidental items necessary to fully complete the work under his Contract for use, occupancy and operation by the Owner.

G. Where equipment of the acceptable manufacturers requires different arrangement or connections from those shown, it shall be the responsibility of Contractor to install the equipment to operate properly and in harmony with the original intent of the drawings and specifications. When directed by the Architect, Contractor shall submit drawings showing the proposed installation. If the proposed installation is approved, Contractor shall make all necessary changes in all effected related work provided under other Sections including location of roughing-in connections by other Trades, electrical requirements, piping, supports, insulation, etc. All changes shall be made at no increase in the Contract amount or additional cost to the other Trades and/or Owner.

H. Testing Agency Labeling Requirements

1. All equipment and materials required for installation under these specifications shall be new and without blemish or defect.

2. Equipment and materials shall be products which will meet with the acceptance of the Authorities Having Jurisdiction over the work and as specified hereinbefore.

3. Where such acceptance is contingent upon having the FM Global, it shall be provided with FM Global label. Factory manufactured and assembled packaged equipment, such as the examples of equipment listed below, shall have the entire assembled package inspected and Labeled by Factory Mutual.

4. All equipment shall meet OSHA standards.

5. All products shall be listed and labeled by UL or other national testing laboratories such as ETL and the products shall be so labeled.

   a. Label of Underwriter's Laboratories, ETL or other nationally recognized testing agency acceptable to the Authorities Having Jurisdiction.

   b. This Labeling shall include not just the control panel and/or motor but all wiring and devices included in the package as a complete package. Note: Providing a series of individually labeled electrical devices that are then assembled into a package does not meet this requirement, the whole assembly must be labeled as an assembly. The manufacturers have the option of having the equipment inspected and Labeled at the factory or at the site after installation. This requirement shall supersede any other specification language hereinbefore or hereinafter that requires only portions of the equipment to be labeled.

   c. Some examples of packaged equipment requiring Labeling:
      1) Boilers
      2) Feed water equipment
      3) Water pressure booster systems

I. All equipment of one type (such as valves, fans, plumbing fixtures, etc.), shall be the product of one manufacturer.

J. Equipment pre-purchased on behalf of the Owner or by the Owner himself, if assigned to any of the Contractors, shall be received, inspected, installed, etc., as if it was purchased by the Contractors as applicable. All guarantees, service contracts, etc., shall be the same as for all other equipment provided under this Contract.

1.14 CUTTING AND PATCHING

A. Contractor shall be responsible for all core drilling, as required for work under his Contract, but in no case shall he cut into any structural elements without the written approval of the Architect.

B. All cutting, rough patching and finish patching, shall be provided under this Contract.

C. All concrete and masonry equipment bases shall be provided under this Contract.

1.15 USE OF PREMISES

A. Contractor shall confine all of his apparatus, storage of materials and construction to the limits indicated on the drawings and directed by the Architect and he shall not encumber the premises with his materials.

B. In storing materials within areas (structure or ground), or when used as a shop, Contractor shall consult with the General Contractor and shall restrict his storage to space designated for such purposes. Contractor will be held responsible for repairs, patching or cleaning arising from any unauthorized use of premises.

C. Notwithstanding any approvals or instructions which must be obtained by Contractor from the Architect in connection with use of premises, the responsibility for the safe working conditions at the site shall remain Contractor's. The Architect or Owner shall not be deemed to have any responsibility or liability in connection therewith.

1.16 PROTECTION/CLEANLINESS

A. All materials such as valves, fittings, piping, grilles, registers, diffusers, etc., shall be properly protected from the accumulation of dirt, dust, debris or any other contaminants. All piping openings shall be temporarily closed by Contractor [or Subcontractor] installing same, so to prevent obstruction and damage, as a minimum at the end of working day or more often if required by job conditions. Contractor shall take precautions to protect his materials from damage and theft.

B. Contractor shall furnish, place and maintain proper safety guards for the prevention of accidents that might be caused by the workmanship, materials, equipment or electrical systems provided under his Contract.

1.17 DAMAGE CORRECTION AND EXTRA WORK

A. Contractor shall be held responsible and shall pay for all damages caused by his work to the new and existing building structures and new and existing equipment, piping, systems, etc., and all work and finishes installed under this Contract in the new or in existing building. Repair of such damage shall be done as herein before specified, at the expense of Contractor and to the Architect's satisfaction.

B. Contractor shall promptly correct all work provided under his Contract and rejected by the Architect as defective or as failing to conform to the Contract

Documents whether observed before or after completion of work and whether or not fabricated, installed or completed. Contractor shall bear all costs of correcting such rejected work.

C. No claim for extra work will be allowed unless it is authorized by the Architect in writing before commencement of the extra said work.

1.18 TOUCH-UP PAINTING

A. Contractor shall thoroughly clean all equipment and systems provided under this Contract from rust, splatters and other foreign matter or discoloration, leaving every part of system in an acceptable prime condition. Contractor, for the work under his Contract, shall refinish and restore to the original condition all equipment and piping which has sustained damage to the manufacturer's prime and finish coats of paint and/or enamel.

1.19 HOUSEKEEPING PADS

A. Coordinate housekeeping pads for:

1. All equipment indoors or outdoors

2. All floor supports or braces

B. Pads shall be 4" above the finished floor.

C. Pads shall be a minimum of 6" larger then the equipment, support or isolation base in all directions.

D. Pads shall be formed, poured with concrete, and tooled by the General Contractor.

1.20 PIPE SLEEVES, PLATES AND ESCUTCHEONS, FIRESTOPPING AND SMOKEPROOFING

A. Where piping pass through masonry or concrete walls or drywall partitions, Contractor shall provide and set individual sleeves for pipe or and all other work under his charge, as necessary for passage of all pipes and/or . Sleeves shall be of sufficient size to provide 1/2" air space around the pipe or passing through (including insulation where pipe *are* internally/externally insulated). All openings shall be sealed, smokeproofed and made tight. Contractor shall be responsible for the exact location of sleeves provided under his Contract and shall coordinate all requirements for piping and sleeves.

B. Contractor, for work under his charge, shall determine the required inside diameter of individual wall opening or sleeve before ordering, fabrication or installation.

C. Sleeves and inserts shall not be used in any portions of the building, where their use would impair the strength or construction features of the building. Elimination of sleeves must be approved by the Architect.

D. Provide chrome plated brass escutcheons with set screw for exposed piping, in all areas except in mechanical rooms. In this area use plain brass or cast iron escutcheons suitable for painting. All escutcheons shall be sized to fit the bare pipe or insulation in a snug and neat manner. They shall be of sufficient size to cover sleeved openings for the pipes and of sufficient depth to cover sleeves projecting above floors. Escutcheons shall be as manufactured by Beaton & Caldwell, Dearborn Brass, or Grinnell.

E. Pipe sleeves shall be made of Schedule 40 pipe, 20 gauge galvanized steel or 16 gauge steel as follows:

1. Sleeves on pipes passing through masonry or concrete construction shall be Schedule 40 pipe.

2. Sleeves on passing through concrete construction shall be 20 gauge steel unless required otherwise by item 4. below.

3. Sleeves on pipes passing through fire rated partitions shall be 16 gauge steel.

4. Sleeves on pipes or passing through non-rated drywall construction shall be 20 gauge galvanized steel.

F. Pipe sleeves shall be set as follows:

1. Set sleeves 1" above finish floor, (except set sleeves, 6" above finish floor at penthouses or mechanical rooms and 6” above finished roof) and flush on side of walls. Coordinate roof penetrations with roof Subcontractor.

2. Sleeves shall be set securely in place before concrete is poured when placed in concrete construction.

3. .

G. Contractor shall fire stop, smoke stop, and/or acoustically seal the space between the sleeves provided under his Contract and piping as applicable, as follows:

1. See Specification Section 230584 Through Penetration Firestopping System

H. Except as otherwise specified, underground piping passing through exterior walls or foundation slabs on grade, shall have penetration closures of the modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the pipe and wall opening. Links shall be loosely assembled with bolts to form a continuous belt around the pipe and with a pressure plate under bolt head and nut. After the seal assembly is positioned in the sleeve, tightening of the bolts shall cause the rubber sealing elements to expand and provide an absolutely watertight seal between the pipe and wall, reducing chances of cathodic reaction between these members. Contractor for work under his charge shall determine the required inside diameter of individual wall opening or sleeve before ordering, fabrication or installation. The inside diameter of the wall opening shall be sized to fit the pipe and ensure a watertight joint. Where applicable, when installing seals, take into account the pipe O.D. if non-standard due to coating or jacketing.

1.21 MISCELLANEOUS IRON AND STEEL

A. Trade shall provide all primary and secondary steel supports and hangers as shown on the drawings and/or as required to support equipment, work, piping, exhaust fans, or any other materials provided under the work of this Section.

B. The work of this Section of designing, furnishing and installing all miscellaneous metal work associated with the system, and related items as indicated on the drawings and/or as specified herein, and includes, but is not limited to the items listed herein below.

C. The scope of work shall include:

1. Condensing unit support platforms including ship ladders, steel grating for decking, cross-bracing and floor stands.

2. Intermediate beams to hang piping from the roof. All piping must be hung from beam or supported from the floor. Provide supplemental steel for support of equipment.

3. Support of piping in shafts in addition to support provided by structure.

4. Piping support in underground concrete trench and manholes.

5. Pipe anchors in the building.

6. Hangers, brackets, angel irons or rods required for the support and protection of HVAC, plumbing and equipment.

7. Field prime painting of galvanized steel and field finish painting.

D. Shop Drawings for General Miscellaneous Items

1. Submit Shop Drawings of all miscellaneous metal items to Architect for approval, showing sizes and thickness of all members, types of materials, methods of connection and assembly, complete dimensions, clearances, anchorage, relationship to surrounding work by other Trades, shop paint, and other pertinent details of fabrication and installation.

E. The Subcontractor shall engage the services of a Professional Engineer registered within the state wherein the project is located to prepare complete Design Drawings and structural design computations based on, and closely following, the design and details on the Drawings. The Design Drawings and structural design computations, with the Engineer's seal affixed thereto, shall be submitted to the Architect for review. The structural design computations shall provide a complete structural analysis, including anchors and fastening devices, and shall certify as to conformation to governing laws and codes. These submittals, upon review, must be sufficient, when taken in conjunction with this Specification to provide the complete basis of the fabrication and erection.

F. Samples

1. Submit duplicate samples of all materials to be furnished under this Section if, and in size and form, requested by Architect.

G. Do not order materials or begin fabrication until Architect's approval of submittals has been obtained.

H. In addition to the governing laws and codes, the following Specifications and Codes form a part of this Specification:

1. American Iron and Steel Institute applicable standards.

2. American Institute of Steel Construction "Code of Standard Practice for Steel Buildings and Bridges" and "Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings".

3. American Welding Society Code: Standard Code for Arc and Gas Welding in Building Construction.

I. All materials shall be new stock, free from defects impairing strength, durability or appearance and of best commercial quality for intended purpose.

1. Unless other wise specifically called for, work of this Section shall be fabricated of structural steel conforming to ASTM Specification A36.

2. Steel pipe shall be seamless steel pipe conforming to ASTM Specification A53, Schedule 40.

3. Steel tubing shall be seamless steel tubing conforming to ASTM Specifications A500 to A501.

4. Construction specialties such as slotted inserts, wedge inserts, etc., shall be as manufactured by Hohmann and Barnard, Gateway Erectors, Inc., Richmond Screw Anchor Co. or equal approved by Architect.

5. Non-ferrous metals shall be as specified under descriptions of specific items, herein below.

J. Provide all anchors, bolts, sockets, sleeves, and other parts required for securing item of work of this Section to the construction, including furnishing to concrete workers all required insets and sleeves for use at concrete.

1. All exposed fastenings shall be of the same material and finish as the metal to which applied, unless otherwise noted.

2. Welding rods shall conform to AWS Standards and the recommendation of the welding rod manufacturer.

3. Shop primer for other ferrous surfaces shall be a high-quality, lead-free, rust-inhibitive primer, Tnemec No. 10-99 Metal Primer or equivalent by Devoe and Raynolds Co., Carboline or equal.

K. Metal surfaces shall be clean and free from mill scale, flake, rust and rust pitting. Metal work shall be well formed and finished to required shape and size, true to details, with straight, sharp lines and angles and smooth surfaces. Curved work shall be true radii. Exposed sheared edges shall be eased.

L. Weld all permanent connections. Welds shall be continuous on all exposed surfaces and where required for strength on concealed surfaces. Exposed welds shall be ground flush and smooth, with voids filled with metallic filling compound (metallic filling compound not permitted on surfaces to receive hot-dip galvanizing). Tack-welding will not be permitted unless specifically called for. Do not use screws or bolts where they can be avoided. Where used, heads shall be countersunk, screwed up tight, and threads nicked to prevent loosening.

M. Fastenings shall be concealed where practicable. Thickness of metal and details of assembly and supports shall give ample strength and stiffness. Joints exposed to weather shall be formed to exclude water.

N. Do all cutting, punching, drilling and tapping required for attachment of anchor bolts and other hardware and for attachment of work by other Trades. All such cutting, punching, drilling, etc., shall be done prior to hot-dip galvanizing of the various components.

O. Live loads shall be not less than the minimum required by law. Where specific live load are not set forth in the laws and codes applicable to this work, and are not given on the Drawings or in this Specification, designs shall be such as to support the live loads which may normally be imposed without failure, without deflection of more than 1/360 of length of any member, and without permanent deformation, all with a factor of safety of not less than 2 1/2 to 1.

P. Shop Painting

1. All ungalvanized ferrous metals under this Section shall be given a shop coat of rust inhibitive primer of type specified above.

a. Immediately before shop painting, remove all rust, loose mill scale, dirt, weld flux, weld spatter, and other foreign material with wire brushes and/or steel scrapers. Power tool clean in accordance with SSPC SP-3 (Power Tool Cleaning). Remove all grease with oil by use of solvent recommended by paint manufacturer. Sandpaper exposed surfaces as required to produce smooth, even finishes.

b. Apply paint by spray process in strict accordance with manufacturer's printed instructions to uniform thickness(es) recommended by manufacturer. Apply thoroughly and evenly and work well into corners and joints taking care to avoid sags and runs.

c. Do not paint surfaces to be embedded in concrete, or to be welded in the field. After field welds are complete, grind smooth and flush, thoroughly clean and then apply specified primer over all unprimed in the field by brush roller.

d. After erection, sand smooth and retouch all portions of the shop coats chipped or damaged during erection, and coat all field welds and connections with primer equivalent to that used for the shop coat.

Q. Installation

1. All materials shall be carefully handled and stored under cover in manner to prevent deformation and damage to the materials and to shop finishes, and to prevent rusting and the accumulation of foreign matter on the metal work. All such work shall be repaired and cleaned prior to erection.

2. Work shall be erected square, plumb and true, accurately fitted, and with the tight joints and intersections. All anchors, inserts and other members to be set in concrete or masonry shall be furnished loose by this Trade to be built-into concrete and masonry and by those Trades as the work progresses. Later cutting or drilling shall be avoided wherever possible.

3. All metal work shall be rigidly braced and secured to surrounding construction, and shall be tight and free of rattle, vibration, or noticeable deflection after installed.

4. Where members, other than expansion bolts or inserts, are fastened into concrete, set such members in holes formed as specified below, and secure permanently in place by installation of proprietary-type expanding grout manufactured specifically for such purpose, used strictly in accordance with manufacturer's directions. Holes to receive members shall be formed with galvanized sheetmetal sleeves, expanded polystyrene foam, or other approved method to provide at least 1/2 inch clearance around entire perimeter. At exposed applications, hold expanding grout back 1/2 inch from finish surface and fill voids with Portland cement grout to match color and texture of surrounding concrete surface.

5. Electrolytic Isolation

   a. Where dissimilar metals are to come into contact with one another, isolate by application of a heavy coating of bituminous paint on contact surfaces in addition to shop coat specified above. Do not permit the bituminous paint in any way to remain on surfaces to be exposed or to receive sealant.

R. Description of Major Items

1. The items described below constitute the major part of the work of this Section, but are not intended or implied to cover and every item that may be required to properly complete the work. Carefully review the Drawings to determine the full extent of the miscellaneous metal work required.

S. Steel Ladders/Platforms

1. Fabricate and install interior steel ladder at fans, air handling units, filter racks and all equipment requiring service. Ladders shall have a safety cage as required by OSHA regulations.

2. Except as may be otherwise indicated on the Drawings, ladder shall be minimum 16 inches wide, fabricated of minimum 3/8 inch by 2 1/2 inches hot rolled steel rails and minimum 3/4 inches outside diameter steel pipe rungs. Rungs shall be spaced 12 inches on center and shall be continuously welded to the rails. Provide a pair of steel clip angles or wall brackets at bottom and steel anchor plates or wall brackets at top, welded to the rails, as indicated.

3. Exterior steel ladders shall be hot dip galvanized after fabrication as specified hereinbefore. Rungs are to have non-slip surfaces.

4. All shall be OSHA and ANSI compliant.

T. Gratings and Frames

1. Fabricated and install steel gratings and frames at fan platforms.

2. Steel grating frames shall consist of a steel angle perimeter frame constructed of steel angles, at least 4 inches by 4 inches by 3/8 inches carried around perimeter with coped or mitered, full-welded corners. Perimeter frames shall be anchored with 7/16 inch minimum diameter expansion bolts or other suitable devices of adequate capacity, at corners, two (2) per beam end, and spaced not more than 2 feet on center around full perimeter.

3. Steel Gratings shall be pressure-locked type, with bearing bars spaced 1 3/16 inch on center and cross-bars spaced 4 inches on center. Sizes of bars shall be as required by manufacturer's loading tables to limit deflection of any member across any span to 1/240th of the span at live load of 100 pounds per square foot. Gratings shall be as manufactured by Borden Metal Products, Co., Irving Subway Grating Co., Reliance Steel Products Co., approved by Architect.

4. All (gratings and) frames shall be hot-dip galvanized after fabrication as specified hereinbefore (aluminum, FRP).

U. Miscellaneous Items

1. Carefully review all Drawings for miscellaneous metal items required but not specifically listed above, such as miscellaneous steel clip angles, miscellaneous steel bracketing, and other miscellaneous metal items as

indicated on the Drawings, reasonably implied therefrom, or reasonably necessary for the thorough completion of the work.

2. Provide rigid and secure anchorage of all components whether or not specifically described in complete detail on the Drawings.

V. Piping supports shall be coordinated with the building structure and shall span between roof beams as required.

1.22 WATERPROOFING, FLASHING AND COUNTERFLASHING

A. (Edit as applicable) Unless specifically indicated otherwise on the drawings, Contractor shall provide all counterflashing and waterproofing of all piping and equipment provided by him, which pierce roofs, walls and other weatherbarrier surfaces.

B. All work shall be performed in a workmanlike manner to ensure weatherproof installation. Any leaks developed due to Contractor's work shall be repaired at his expense, to the Architect's satisfaction.

C. Pipes passing through slabs shall have the sleeve extended above floors as hereinbefore specified to retain any water and the space between the pipe and sleeve caulked waterproof fire stopping. The top and the bottom shall be sealed with monolastic caulking compound.

D. All flashing required for piping penetrations shall be provided by the GC .

1.23 ELECTRICAL WORK, MOTORS, MOTOR CONTROLLERS

A. See Section 230513.

B. See Divisions 26, 27 and 28 for Electrical.

1.24 IDENTIFICATION OF MATERIALS

A. See Section 230553.

1.25 VALVE TAGS, NAMEPLATES AND CHARTS

A. See Section 230553.

1.26 PARTS LIST AND INSTRUCTIONS FOR OPERATION AND MAINTENANCE

A. Contractor shall thoroughly instruct the representative(s) of the Owner, to the complete satisfaction of the Architect, in the proper operation of all systems and equipment provided by him. Contractor shall make arrangements, via the GC as

to whom the instructions are to be given in the operation of the basic and auxiliary systems and the periods of time in which they are to be given. The Architect shall be completely satisfied that the representative of the Owner has been thoroughly and completely instructed in the proper operation of all systems and equipment before final payment is made. If the Architect determines that complete and thorough instructions have not been given by Contractor to the Owner's representative, then Contractor shall be directed by the Architect to provide whatever instructions are necessary until the intent of this paragraph of the specification has been complied with. All time required for Owner's instruction to satisfy the above requirements shall be included in this Contract. No extra compensation for such instructions will be allowed.

B. Contractor, including but not limited to, the Contractor, shall submit to the Architect for approval, a total of (6) typed sets, bound neatly in loose-leaf binders, of all maintenance and operating instructions for the installation, operation, care and maintenance of all equipment and systems. All data and literature furnished shall be specific for the make and model of the equipment furnished. General non-specific catalog data will not be acceptable. Information shall indicate possible problems with equipment and suggested corrective action. The manuals shall be indexed for type of equipment. section such as fans, valves, plumbing fixtures, hot water heaters, boilers, air handling units, etc., shall be clearly divided from the other sections. A sub-index for section shall also be provided. The methodology of setting-up the manuals shall be submitted to the Architect and Owner through the General Contractor for approval prior to final submission of manuals.

C. The instructions shall contain information deemed necessary by the Architect and shall include, but not be limited to, the following:

1. Instructional classes on equipment and systems operation for Owner's representative and maintenance personnel, by engineering staff of Contractor. Minimum of 48 hours of instruction for minimum of (6) people. Instruction shall include:

   a. Explanation of manual and its use.

   b. Summary description of the HVAC systems.

   c. Purpose of systems.

2. System

   a. Detailed description of all systems.

   b. Illustrations, schematics, block diagrams, catalog cuts and other exhibits.

3. Operations

   a. Complete detailed, step-by-step, sequential description of all phases of operation for all portions of the systems, including start-up, shutdown, adjusting and balancing. Include all posted instruction charts.

4. Maintenance

   a. Parts list and part numbers.

   b. Maintenance, lubrication and replacement charts and manufacturer's recommendations for preventive maintenance, as applicable to his work.

   c. Troubleshooting charts for systems and components.

   d. Instructions for testing type of part.

   e. Recommended list of on-hand spare parts.

   f. Complete calibration instructions for all parts and entire systems.

   g. Instruction for charging, filling, draining and purging, as applicable.

   h. General or miscellaneous maintenance notes.

5. Manufacturer's Literature

   a. Furnish complete listing for all parts required for models actually furnished.

   b. Names, addresses and telephone numbers of manufacturers and suppliers.

   c. Describe and operation of all models actually furnished.

   d. Furnish all and only pertinent brochures, illustrations, drawings, cuts, bulletins, technical data, certified performance charts and other literature with the model actually furnished to be clearly and conspicuously identified.

   e. Internal wiring diagrams and engineering data sheets for all items and/or equipment furnished under Contract.

f. Guarantee and warranty data.

6. Contractor shall furnish instructions for lubricating piece of equipment installed by him. Instructions shall state type of lubricant, where and how frequently lubrication is required. Frame instructions under glass and hang in a location as directed by Architect.

1.27 CONNECTIONS TO EQUIPMENT

A. Contractor shall provide all pipe connections, condensate traps, drains, overflows, relief valves and vents, power connections, etc., to make equipment operable, as provided under other Sections of the specifications, as shown on the Architectural and/or Trade's drawings and herein specified, including final connections to equipment to result in a complete system, fully operational. Coordinate location of all equipment with Architect. Obtain installation diagrams and methods of installation of all equipment from manufacturers. Follow instructions strictly. If additional information is required, obtain same from Architect. If equipment is indicated on the Architectural drawings, it shall also be construed and understood by the Mechanical Contractor to be constructed as shown on the HVAC drawings and shall be fully serviced and connected at no extra cost to the Owner.

1.28 ELECTRICAL ROOM REQUIREMENTS

A. The Contractor shall not install any piping and equipment in or through electrical rooms, transformer rooms, electrical closets, telephone rooms or elevator machine rooms, unless piping and equipment is intended to serve these rooms. If any Contractor violates this requirement, he shall remove and/or relocate all items as required at his expense and to the satisfaction of the Architect.

1.29 HOISTING EQUIPMENT AND MACHINERY

A. All hoisting equipment and machinery required for the proper and expeditious prosecution and progress of the work under this Contract shall be furnished, installed, operated and maintained in safe condition by Contractor for his material and/or equipment delivered to the designated hoisting area. All costs for hoisting operating services shall be borne by the Mechanical Contractor for all equipment and work under his charge.

1.30 STAGING

A. All staging, exterior and interior, required to be over 8'-0" in height, shall be furnished and erected by Contractor for work under his charge and maintained in safe condition by him for proper execution of his work.

1.31 CONTROL WIRING

A. The ATC Contractor shall provide all control and interlock wiring for all systems provided under the HVAC, plumbing and ATC Contracts.

B. All control wiring shall be installed in conduit and in accordance with the respective equipment manufacturer's requirements, and all connections shall be provided by the Mechanical and/or the ATC Contractor. All conduit and wiring provided by these Contractors shall be installed in accordance with the requirements of Section 26 of the specifications.

PART 2 – PRODUCTS

2.01 BUY AMERICA COMPLIANCE

A. Products must meet Buy America requirements. Refer to NOTICE TO CONTRACTOR – BUY AMERICA for additional information.

PART 3 – EXECUTION

3.01 NOT USED

END OF SECTION 230500

SECTION 230523 – HVAC VALVES

PART 1 – GENERAL

1.01 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.

C. Section 230500 also applies to this Section.

1.02 WORK INCLUDED

A. Furnish and install all shut-off, check, balancing and other type valves as shown and as required to make a complete and operational system.

B. Provide isolation valves at all drains, piping mains and branches at all piping systems, equipment, risers and before and after all control valves.

C. Secure all permits and local/state approval for the installation of all components included under this Section.

1.03 RELATED SECTIONS

A. Examine all drawings and criteria sheets and all other Sections of the Specifications for requirements which affect work under this Section whether or not such work is specifically mentioned in this Section.

1.04 REFERENCES

A. Applicable provisions of the following Codes and Trade Standard Publications shall apply to the work of this Section, and are hereby incorporated into, and made a part of the Contract Documents.

B. Material standards shall be as specified or detailed hereinafter and as follows:

1. MSS SP-69 – Pipe Hangers and Supports – Selection and Application; Manufacturers Standardization Society of the Valve and Fittings Industry.

2. MSS SP-85 – Cast Iron Globe & Angles Valves, Flanged and Threaded Ends; Manufacturers Standardization Society of the Valve and Fittings Industry.

3. MSS SP-89 – Pipe Hangers and Supports – Fabrication and Installation Practices; Manufacturers Standardization Society of the Valve and Fittings Industry.

4. MSS SP-11- Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; Manufacturers Standardization Society of the Valve and Fittings Industry.

5. UL 1479 – Standard for Fire Tests of Through-Penetration Firestops; Underwriters Laboratories Inc.

1.05 SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. See Section 230500 for additional requirements.

C. Product Data: Include data on valve materials, pressure class, construction, dimensions and ratings. Provide manufacturers catalogue information. All valves of one type shall be by one specific manufacturer.

D. Grooved joint couplings and fittings shall be shown on drawings and product submittals and shall be specifically identified with the applicable designation.

E. Manufacturer's Installation Instructions: Indicate hanging and support methods, joining procedures.

F. Project Record Documents: Record actual locations of all valves and valve tag numbers.

G. Maintenance Data: Include spare parts list and exploded valve assembly views.

1.06 CLOSEOUT SUBMITTALS

A. Submit closeout submittals in accordance with Form 816 Article 1.20-1.05.02, NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS.

1.07 QUALITY ASSURANCE

A. Source limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

B. Manufacturer: Company specializing in manufacturing valve products specified in this section, with documented experience.

C. Installer: Company specializing in performing work of the type specified in this section, with documented experience.

D. All grooved joint couplings, fittings, valves, and specialties shall be the products of a single manufacturer. Grooving tools shall be of the same manufacturer as the grooved components.

E. All valves shall contain manufacturer's name and pressure class marked on the valve body.

1.08 REGULATORY REQUIREMENTS

A. Perform Work in accordance with all State and Local codes.

B. Conform to all State and Local code for installation of boiler safety valves and backflow prevention devices.

1.09 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 valves on site in shipping containers with labeling in place. Inspect for damage.

C. Provide temporary protective coating on cast iron and steel valves.

1.10 WARRANTY

A. Refer to Form 816, Article 1.20-1.06.08, and the NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information.

PART 2 – PRODUCTS

2.01 BUY AMERICA COMPLIANCE

A. Products must meet Buy America requirements. Refer to NOTICE TO CONTRACTOR – BUY AMERICA for additional information.

2.02 GENERAL

A. One valve manufacturer's figure numbers are listed; valves from other manufacturers listed in the list of acceptable manufacturers will be accepted.

B. Provide all shutoff, check, balancing and other types of valves as shown on the drawings and required for proper operation, maintenance, isolation and safety of all piping systems.

C. Provide isolation valves at all drains and piping mains and branches for all water piping, at all equipment connections and before and after automatic control valves.

D. Face-to-face and end-to-end dimensions of flanged iron body valve shall conform to ANSI B16.10. Design workmanship, materials and testing shall conform to MSS-SP-70 (gates), MSS-SP-71 (swing checks) and MSS-SP-85 (globe).

E. End-to-end dimensions of grooved ductile iron body valves shall conform to the latest published dimensions.

F. Each valve body and seat shall be tested by the manufacturer and shall carry a permanently affixed indication that test have been successfully completed, with copy of the test data furnished.

G. All valves of the same type shall be of the same manufacturer. Before purchasing any valve, the Contractor shall submit for approval the name of the manufacturer, the figure number which he proposes to furnish and engineering data on each figure number. For acceptable manufacturers, see schedules herein.

H. Valves/Strainers in grooved piping systems may be grooved.

I. All valves used for balancing purposes, shall have memory stops.

J. Provide handwheels for all manually operated valves equipped with gear operators. Handwheels shall accept bolt-on chain operators.

K. Provide chain operators for all gear operated valves located 7'-0" above floor or higher.

L. Size valve handwheels for not more than 80 lbs. pull on one side of the handwheel to effect tight closure. Where the manufacturer's standard handwheel size is not large enough to accomplish this, provide a gear operator.

M. Valve bonnets and gear operators shall be designed to withstand all forces which may be applied to the handwheels, including those from chain operators.

N. Valves shall be rated in accordance with the "Spec. Class No." Specified for that system.

2.03 ACCEPTABLE MANUFACTURERS CONTINGENT ON COMPLIANCE WITH THE SPECIFICATIONS

A. Flow Control Balancing Valves

1. Tour & Andersson / TA Hydronics or approved equal.

B. Ball Valves

1. Apollo or approved equal.

2.04 VALVE CHART

Service	**Minimum Class and Material**			**Joints**	
	2" and Less			**2" and Less**	**2½" & Up**
Refrigerant system	MSS Class 150 Bronze			Silver Brazed	Flanged

* Grooved piping systems of standard wall or lighter shall be **roll** grooved according to Victaulic roll groove specification standards. On piping heavier than standard wall, cut grooving required per Victaulic **cut** groove specification standards.

2.05 BALL VALVE

A. Up to 2" (for water 200°F and below)

1. Full port

2. All stainless steel ball and stem

3. Extended stem for insulation

4. Two piece bronze body

5. 600 PSIG WOG

6. 250 PSIG steam trim

7. Threaded

a. Similar to Apollo Fig. 77-140-64

8. Soldered

a. Similar to Apollo Fig. 77-240-64

2.06 FLOW CONTROL BALANCING VALVES

A. Balancing valves shall be installed, as shown on the drawings and as required, to ensure the accurate balancing of all flows in the hydronic heating and cooling systems. The balancing shall meet the specified water flows with a maximum tolerance of ±5%.

B. Valves shall be of the "Y" pattern globe style design and must offer a minimum of (4) full rotations of the handwheel for accurate adjustment and for precise flow control.

C. Valves shall exhibit an accuracy of ±5% within the normal operating range.

D. Valves shall have integral self-sealing metering ports for measuring differential pressure, flow rates and temperature. Ports shall be protected with individual threaded caps.

E. Valves must offer 100% positive, leakproof shutoff against the same fluid pressure as the valve body rating to a nominal value of 300°F (230°F if grooved) at 250 psi.

F. Valves sizes 1/2" to 2" similar to TA (STAD/S) shall have a digital handwheel for positioning accuracy. Provide a transparent dust/paint cover to prevent destruction of the digits during construction. Sizes 2 1/2" to 12" similar to TA (STAF/G) shall have a numerical vernier sleeve for position readout.

G. All balancing valves must offer a hidden memory feature to prevent unauthorized adjustment and to ensure a return to the original setting after shutoff.

H. All balancing valves shall comply with international quality standard ISO 9001.

I. Valves larger than 12": use lubricated plug valve.

J. All balancing valves size 1/2" to 2" shall be manufactured from pressure diecast dezincification resistant AMETAL copper alloy which does not require dielectric

fittings. Valve bodies size 2 1/2" to 12" shall be manufactured from a cast iron equivalent to ASTM 35B with all wetted, moving parts of dezincification resistant AMETAL copper alloy.

K. This valve may be 1/2” with a reducer and increaser to 3/4” pipe as required for balancing. This is the only type of valve that can be 1/2”.

PART 3 – INSTALLATION OF VALVES

3.01 VALVES

A. Provide valves as noted and as indicated on drawings.

B. Shutoff Valves

1. Inlets and outlets of equipment.

2. All branch connections to mains.

3. As noted.

C. Valves

1. Accessible, but no valve handles pointing down below horizontal position. Removable without separating or lifting piping in which valves are installed. Provide cap screws on threaded bodies. Where abutting flanged similar devices, position valve with respect to device so as to permit removal of bolts.

D. Drain valves at low points in water piping and where noted.

1. In Equipment Rooms

a. Up to 3" Pipe: 3/4" ball valve
b. 4" to 8" Pipe: 1 1/2" ball valve

2. 1/2" drain valve with capped hose connection except in equipment rooms.

E. Where possible install butterfly valves with stems in horizontal position and with the low point of disc opening with the direction of flow.

F. Provide stem extensions on all valves such that hand wheel or lever extends beyond insulation and is operable.

G. Note soft seated butterfly valves can only be used in water services below 150°F. All butterfly valves in water services above 150°F shall be of the high performance type.

H. Use flow control balancing valves for throttling service.

I. Provide spring loaded silent type check valves on discharge of pumps.

J. Install swing check valves in horizontal position only.

K. Provide drain valves at low points between valves, low points of piping system and at equipment.

L. Threaded valves shall be provided with a union adjacent to and downstream of valve.

M. Grooved end valves shall be provided with grooved joint couplings.

N. Butterfly valves shall not be used for balancing.

O. Remove internal cartridges from constant flow valves during flushing and cleaning.

P. Butterfly valves shall be installed between weld neck flanges or with grooved joint couplings of the same manufacturer only.

Q. Provide chain operated sheaves for valves in exposed areas located more than 7'-0" from floor.

R. Pressure Relief Valves

1. Provide at:

a. Cooling coil side of isolation valve.

b. Other locations as noted.

2. Pipe to spill over floor drain or slop sink unless otherwise indicated.

END OF SECTION 230523

SECTION 230529 – HANGERS AND SUPPORTS

PART 1 – GENERAL

1.01 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.

C. Section 230500 also applies to this Section.

1.02 WORK INCLUDED

A. Furnish and install all hangers, supports and assemblies for all parts of the mechanical systems. This shall include all piping equipment specified in this Division and as shown on the drawings

B. All materials shall be new and manufactured for the specific purpose of supporting systems, equipment, pipes, conduits and accessories.

C. All system components shall be installed in accordance with local codes including seismic isolation as required and specified under Section 230598.

D. Secure all permits and local/state approval for the components as specified and included under this Section.

1.03 RELATED SECTIONS

A. Examine all drawings and criteria sheets and all other Sections of the Specifications for requirements which affect work under this Section whether or not such work is specifically mentioned in this Section.

B. Refer to Section 230598 – Mechanical Vibration Controls and Seismic Restraints for specified information related to and affecting this section.

1.04 REFERENCES

A. Applicable provisions of the following Codes and Trade Standard Publications shall apply to the work of this Section, and are hereby incorporated into, and made a part of the Contract Documents.

1. Material standards shall be as specified or detailed hereinafter and as following:

2. ASME B31.9 – Building Services Piping, The American Society of Mechanical Engineers.

3. ASME B31.1 – power piping.

4. ASHRAE Systems and Equipment Handbook.

5. ASTM F 708 – Standard Practice for Design and Installation of Rigid Pipe Hangers.

6. MSS SP-58 – Pipe Hangers and Supports – Materials, Design and Manufacture; Manufacturers Standardization Society of the Valve and Fittings Industry.

7. MSS SP-69 – Pipe Hangers and Supports – Selection and Application; Manufacturers Standardization Society of the Valve Fittings Industry.

8. MSS SP-89 – Pipe Hangers and Supports – Fabrication and Installation Practices; Manufacturers Standardization Society of the Valve and Fittings Industry.

9. NFPA-13 – Installation of Sprinkler Systems

10. MSS-SP-127-2001 – Bracing for Piping Systems.

1.05 SYSTEM DESCRIPTION

A. In addition to special hangers and supports specified elsewhere in this Section and shown on the drawings for piping and equipment furnish and install safe and substantial means of support for all parts of the mechanical systems. Shop drawings shall be submitted for review and approval for all supports. All piping hangers and supports in all mechanical rooms, penthouses and energy plant shall be installed with vibration isolators and Seismic restraints. This requirement is mandatory and shall be strictly enforced.

B. All piping shall be hung to true alignment, using appropriate and substantial hanger arrangements. Wire and strap hangers will not be permitted. Hangers shall

be located so that piping and hangers will be clear of other piping, hangers, conduits, lighting and other obstructions.

C. The hanging and supporting of piping and equipment shall conform to recommendations of the manufacturers of same and American National Standard, ANSI/MSS SP-58 and SP-69 latest edition, except where requirements of this specification exceed the above referenced Standards.

1.06 SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. See Section 230500 for Additional Requirements.

C. All brackets and hangers shall be submitted for review. Include the method of hanging and supporting all piping, ductwork and equipment.

D. The Architect is to be notified when the first bracket is assembled so that the installation can be reviewed in the field.

E. Provide location of all inserts to be used for hanging ductwork, piping and equipment and the weight of all components (including water weight).

1.07 CLOSEOUT SUBMITTALS

A. Submit closeout submittals in accordance with Form 816 Article 1.20-1.05.02, NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS.

1.08 QUALITY ASSURANCE

A. Source limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01

B. Manufacturer: Company specializing in manufacturing products of the type specified in Part 2 – Products.

C. Installer: Company specializing in performing work of the type specified in this section, with documented experience.

D. Welders: Certify in accordance with ASME.

1.09 REGULATORY REQUIREMENTS

A. Conform to ASME B31.9 code for installation of piping system and supports.

B. Conform to ASME B31.1 code for power piping.

C. All applicable seismic codes.

D. ASTM F708 for design and installation of pipe hangers..

E. Welding Materials and Procedures: Conform to ASME (BPV IX) and applicable state labor regulations

1. Provide certificate of compliance from authority having jurisdiction, indicating approval of welders.

1.10 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. All hangers and supports shall be delivered in containers and shall be kept in a dry and protected area.

C. All exposed hangers, supports, etc. shall be given 2 coats of rust resistant paint of a color selected by the Architect prior to installation.

1.11 WARRANTY

A. Refer to Form 816, Article 1.20-1.06.08, and the NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information.

1.12 ENVIRONMENTAL

A. Do not paint or install inserts, hangers and/or supports when environmental conditions are outside the specific limitations of the referenced codes and manufacturer's recommendations.

PART 2 – PRODUCTS

2.01 BUY AMERICA POLICY

A. Products must meet Buy America requirements. Refer to NOTICE TO CONTRACTOR – BUY AMERICA for additional information.

2.02 GENERAL

A. Pipe supports shall be of type and figure number as specified.

B. Acceptable manufacturers subject to compliance with the specifications shall be as follows:

1. Pipe Hangers

a. Carpenter & Patterson or approved equal.

2. Constant Force Hangers.

a. Anvill International, Inc. or approved equal.

3. Channel Support Systems

a. B-Line Systems, Inc. or approved equal.

4. Thermal-Hanger Shield Inserts

a. Carpenter & Patterson, Inc. or approved equal.

2.03 PIPE HANGERS

A. Bracket assemblies for supporting piping are to be fabricated by welding and all irregular surfaces are to be smoothed up by grinding. Shop drawings shall be submitted for review for each type bracket. The Architect is to be notified when the first bracket is assembled so that installation can be reviewed in the field. Exposed hangers, supports and brackets are to be given (2) coats of rust resistant paint of the color as selected by the Architect. Additionally, provide for Architect's review, the following:

1. Location of all inserts to be used for hanging ductwork and piping where applicable and the weight of such pipe or equipment to be hung, including the weight of water, valves and insulation.

2. Method of hanging and support of all piping and other equipment.

B. All pipe supports shall be of type and arrangement as hereinafter specified. They shall be so arranged as to prevent excessive bending stresses between supports.

C. All bracket clamp and rod sizes indicated in this specification are minimum sizes only. This Section shall be responsible for structural integrity of all supports. All structural hanging materials shall have a safety factor of (5) built in. Beam clamps shall be 2-sided steel clamps designed to firmly attach to the flange of the beam with the load directed downward on the centerline of the beam web. Beam clamps shall be similar to B-Line #B3055, or approved equal.

D. Other forms of hangers and supports shall be used to accommodate special or unusual job conditions or conditions not covered herein, subject to the approval of the Architect. When special conditions require the use of concrete inserts which are not "built in", such inserts may be used in locations approved by the Architect and shall be Phillips "Red Head" or approved equal. Explosive powder studs or detonator assisted studs or anchors will not be permitted.

E. All pipes shall be hung free of dependence on pipe sleeves for support.

F. All auxiliary steel required for pipe, duct and equipment supports shall be furnished and installed by the Mechanical Contractor.

G. Threaded pipe, chains, wire and perforated straps will not be accepted. No piping shall be supported from ductwork, conduit or other piping. All system components and equipment shall be independently supported. Distribute hangers on parallel piping to avoid overloading of structure.

H. Roller type supports shall be used for pipes subject to axial movement . They shall be braced so that movement occurs in roller rather than support rods. This requirement shall apply to piping 2 1/2" and up.

I. Constant force support hangers shall be provided for the emergency generator exhaust piping as determined by the stress and seismic analysis. Constant force hangers shall be similar to Anvil International, Inc. and they shall be pre-engineered to meet the loads and expansion for the vertical risers and off sets if any.

J. Hangers and supports used for systems exposed to weather shall be hot dipped galvanized in accordance with ASTM A153-73 or A123. Rods and nuts shall be electro-galvanized.

K. All horizontal water, drain, waste, vent and rainwater piping shall be hung with clevis steel hangers similar to B-Line #B3100. Groups of pipes in the same horizontal plane and with the same pitch may be supported on B-Line #3160 gang hangers. Wall brackets similar to shall be B-Line #B3066 and #B3077.

L. All pipes which are hung so that the centerline of the pipe is less than 10" below the point of suspension of the hanger rod and all hydronic hot water piping shall be supported on roller hangers similar to B-Line #B3110.

M. Unless otherwise noted, maximum hydronic pipe hanger spacing shall not exceed the recommendations of the pipe manufacturer and the following:

1. For 1/2" copper and steel pipe: 5'-0" o.c.

2. For pipe 3/4" to 1 1/2": 8'-0" o.c.

3. In addition, hangers shall be installed within 2'-0" of each change in direction and on each side of valves 3" in size and up.

N. Hanger rods shall be of steel and not less in diameter than:

1. For pipe 2" and under: 3/8"

O. Insulated piping 2" and under shall be fitted with 16 gauge steel covering protectors at each hanger location similar to B-Line #B3151.

P. All vertical piping shall be supported with steel riser clamps similar to B-Line #B3773. Such clamps on copper tubing shall be applied over couplings only.

Q. All pipes suspended at an elbow shall be hung using plate lugs similar to Grinnell #HS.53 with forged steel clevis similar to B-Line #B3201.

R. Spring hanger locations shall be provided as specified herein, under vibration isolation, and shall be Grinnell, pre-engineered to meet loads and movements in accordance with ANSI B.31.1.10, where applicable.

S. Drop rods for hangers may be used wherever possible and shall be installed prior to slabs being poured. Drop rod details shall be submitted to the Architect and Engineer for review.

PART 3 – EXECUTION

3.01 PREPARATION

A. All hangers, rod and supports shall receive two (2) coats of rust inhibitive paint.

B. Provide inserts for placement in concrete formwork.

C. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.

D. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.

E. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.

3.02 INSTALLATION

A. Pipe Hangers and Supports.

1. Install in accordance with ASME B31.9, ASTM F 708, or MSS SP-89 or NFPA-13.

2. Support piping, ductwork and equipment as specified under Part 2.

3. Install hangers to provide minimum ½ inch space between finished covering and adjacent work.

4. Place hangers with 24 inches of each horizontal elbow and on each side of valves 3” in size and up.

5. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.

6. Support vertical piping at every floor. Support riser piping independently of connected horizontal piping.

7. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.

8. Provide copper plated hangers and supports for copper piping or between hanger support and piping.

9. Prime coat (2 coats rust inhibitive paint) exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

10. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.

B. Where pipe support members are welded to structural building framing, scrape, brush clean and apply two coats of zinc rich primer to welds.

3.03 INSERTS

A. Use inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.

B. Finish inserts, flush with slab surface.

C. Inserts: Steel, slotted type, factory-painted.

1. Single rod: Similar to Grinnell Figure 281.

2. Multi-rod: Similar to Carpenter and Paterson 1480 Type 1.

3. Clip form nails flush with inserts.

4. Maximum load 75 percent of rating.

3.04 SUPPORTS FROM BUILDING CONSTRUCTION

A. Inserts, Beam Clamps, Steel Fishplates (in concrete fill only), Cantilever Brackets or Other Means.

B. Submit for Review.

C. Grouped Lines and Services

1. Trapeze Hangers fabricated of Bolted Angles or Channels.

D. Where Building Construction is Inadequate

1. Provide Additional Framing.

2. Submit for Review.

3.05 EXPANSION DEVICES

A. Expansion anchors: Similar to Hilti "Drop-In Anchor HDI" flush type.

B. Drill concrete to receive required expansion cases on concrete fasteners.

C. Install in shear only, not in tension.

3.06 EQUIPMENT BASES AND SUPPORTS

A. Provide rigid anchors for pipes immediately after vibration connections to equipment.

B. Refer to Specification Section 15001 for additional information.

C. Fabricate structural-steel stands to suspend equipment from structure above or to support equipment above floor.

D. Grouting: Place grout under supports for equipment and make smooth bearing surface.

3.07 ADJUSTING

A. Hanger Adjustment: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

3.08 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 230529

SECTION 230553 – MECHANICAL IDENTIFICATION

PART 1 – GENERAL

1.01 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.

C. Section 230500 also applies to this Section.

1.02 WORK INCLUDED

A. Furnish and install nameplates, valve tags, valve charts, stencils and pipe markers on all Mechanical equipment and piping.

B. Provide nameplates with the unit number and service designation on all mechanical equipment.

C. Indicate all valve tag numbers on Record Drawings and submit framed under glass valve tag charts including valve service and location.

D. Install color coded ceiling tacks in acoustical tile ceilings or color coded tape on ceiling grid to identify location of equipment, valves and dampers that require regular maintenance or are part of a life safety system (fire dampers, smoke dampers, sprinkler valves or main isolation valves).

E. Provide manufactured pipe identification stencils with flow arrows and service indicated. All backgrounds of the stencils shall be color coded with specific service designation

F. Prepare valve charts and frame under glass. All valves and the tag numbers shall be shown on the Record As-Built Drawings.

G. Provide valve computer data base to match chart.

H. Prepare and install exterior protected brass plaques indicating underground service entrances.

1.03 RELATED SECTIONS

A. Examine all drawings and criteria sheets and all other Sections of the Specifications for requirements which affect work under this Section whether or not such work is specifically mentioned in this Section.

1.04 REFERENCES

A. Applicable provisions of the following Codes and Trade Standard Publications shall apply to the work of this Section, and are hereby incorporated into, and made a part of the Contract Documents.

B. Material standards shall be as specified or detailed hereinafter and as follows:

1. ASME A 13.1 – Scheme for Identification of Piping Systems; The American Society of Mechanical Engineers.

1.05 SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. See Section 230500 for Additional Requirements.

C. Product Data: Submit product description including materials, attachment methods, color coding and lettering sizes.

1.06 CLOSEOUT SUBMITTALS

A. Submit closeout submittals in accordance with Form 816 Article 1.20-1.05.02, NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS.

1.07 QUALITY ASSURANCE

A. Source limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

B. All materials, lettering and individual system color coding schemes shall be uniform and of one single manufacturer.

C. No identification shall be installed until all systems are complete and insulated.

D. All surfaces shall be cleaned.

E. No nametag or identification shall break or penetrate a surface used as a vapor barrier.

1.08 REGULATORY REQUIREMENTS

A. Conform to all local/state and NFPA requirements for color-coding or painting of systems, piping or equipment related to Life Safety or Fire Protection.

1.09 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. All identification systems shall be stored in sealed containers in suitable locations to keep the containers and contents dry and clean.

1.10 WARRANTY

A. Refer to Form 816, Article 1.20-1.06.08, and the NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information.

1.11 ENVIRONMENTAL REQUIREMENTS

A. All surfaces shall be cleaned and dry before applying any form of identification or tagging.

B. Consult with the manufacturer prior to installation for the proper tagging and identification procedure and materials to be used on exterior outdoor equipment.

PART 2 – PRODUCTS

2.01 BUY AMERICA COMPLIANCE

A. Products must meet Buy America requirements. Refer to NOTICE TO CONTRACTOR – BUY AMERICA for additional information.

2.02 GENERAL

A. Acceptable manufactures contingent on compliance with the specification.
   1. W. H. Bradey Company or approved equal.

2.03 PIPE IDENTIFICATION AND VALVE TAGS

A. All piping, except that piping which is within inaccessible chases, shall be identified with semi-rigid plastic identification markers equal to Seton Setmark pipe markers.

1. Direction of flow arrows is to be included on each marker.

2. Each marker background shall be appropriately color coded with a clearly printed legend to identify the contents of the pipe in conformance with the "Scheme for the Identification of Piping Systems" (ASME A13.1-1981).

3. Setmark snap-around markers shall be used for overall diameters up to 6" and strap-around markers shall be used above 6" overall diameters.

4. Markers shall be located:

   a. Adjacent to each valve
   b. At each branch
   c. At each cap for future
   d. At each riser takeoff,
   e. At each pipe passage through wall (each side)
   f. At each pipe passage at 20' – 0" intervals maximum.

5. Under ground pipe markers:

   a. Provide detectable tape on all underground piping:
   b. Labels shall be color coded and labeled the same as indoors.

B. Valve tags

1. All valves shall be designated by distinguishing numbers and letters carefully coordinated with a valve chart.

2. Valve tags shall be color coded 0.032" anodized aluminum tags, with engraved letters similar to Seton S Type 250-BL or approved equal.

   a. HVAC tags shall be round 2" diameter, similar to Seton 15426.

   b. Lettering shall be ¼" high for type service and ½" for valve number. Tag shall indicate service and valve number.

   c. Each service shall be a different color.

3. Tag shall be attached to valves with chain similar to Seton No 16 stainless steel jack chain.

4. Whenever a valve is above a hung ceiling, the valve tag shall be located immediately above the hung ceiling.

C. Furnish a minimum of two (2) typed valve lists

1. Each framed under glass or Plexiglas. Each chart shall be enclosed in an approved 0.015" thick plastic closure for permanent protection.

2. Valve numbers shall correspond to those indicated on the Record Drawings and on the printed valve lists.

3. The printed list shall include the valve number, location and purpose of each valve.

4. It shall state other necessary information such as the required opening or closing of another valve when one valve is to be opened or closed.

5. Printed framed valve lists shall be displayed in each Mechanical Room or in a location designated by the Owner.

D. Valve data base.

1. Provide a valve data base for all valves to operate on the building computer.

2. Every valve shall include:

a. Tag Number

b. Service

c. Size

d. Operation

e. Location

f. Manufacture

g. Model number

h. Submittal reference

2.04 EQUIPMENT NAMEPLATES

A. Equipment nameplates shall be 3” x 6” long, 0.02” aluminum with a black enamel background with engraved natural aluminum letters similar to Seton Style 2065-20. Nameplate shall have pressure sensitive taped backing.

B. The nameplate shall contain the unit or equipment designation (“AHU” for air handling unit, “HP” for heat pump, “P” for circulating pump, etc.), unit number and area or system served.

C. Nameplates for exterior equipment shall be applied with waterproof adhesive.

2.05 UTILITY ENTRANCE DESIGNATIONS

A. Provide a brass wall plaque, minimum 0.020” thickness, secured to the exterior wall just above the grade line for all buried service entrances or exits. Samples are: Water Service Below; Gas Service Below; Sanitary Sewer Below; Storm Sewer Below; Irrigation Water Below; etc.

2.06 CEILING TACKS OR TAPE

A. Provide steel color coded ¾ inch diameter ceiling tacks in acoustical tile ceilings or color coded tape applied to ceiling grid to locate equipment, valves or dampers that require regular maintenance or are part of a Life Safety System.

B. The tacks or tapes shall be color codes as follows (coordinate with Owner):

1. Yellow – HVAC

2. Red – Life Safety (fire dampers, etc.)

3. Blue – Heating/Cooling Valves.

PART 3 – EXECUTION

3.01 PREPARATION

A. All surfaces shall be cleaned and insulated (if applicable) prior to installing any identification.

B. Exterior surfaces of outdoor equipment shall be dry and prepared to accept the specified identification.

3.02 INSTALLATION

A. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion. Seal with clear lacquer.

B. Install valve tags with chain.

C. Install plastic pipe markers in accordance with manufacturer's Instructions.

D. Install plastic tape markers complete around pipe in accordance with manufacturer's instructions.

E. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.

F. Identify air handling units, pumps, boilers, domestic hot water heaters, fire pumps, heat transfer equipment tanks, water treatment devices, etc. with plastic nameplates. Small devices, such as in-line pumps, may be identified with tags.

G. Identify control panels and major control components outside panels with plastic nameplates.

H. Install detector tape on all under ground services in accordance with the manufactures recommendations.

I. Identify thermostats relating to air handling equipment serving multiple spaces.

J. Identify valves in main and branch piping with valve tags.

K. Tag automatic controls, instruments and relays. Key to control schematic.

L. Identify piping, concealed or exposed, with pipe markers or where buried using plastic tape pipe markers. Use tags on piping ¾ inch diameter and smaller. Identify service, flow direction and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.

END OF SECTION 230553

SECTION 230584 – THROUGH-PENETRATION FIRESTOP SYSTEMS

PART 1 – GENERAL

1.01 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.

C. Section 230500 also applies to this Section.

1.02 WORK INCLUDED

A. Through-penetration firestop systems for penetrations through the following fire-resistance-rated assemblies, including both empty openings and openings containing penetrating items:

1. Floors

2. Walls and partitions

3. Smoke barriers

4. Construction enclosing compartmentalized areas.

5. Other rated assemblies.

1.03 RELATED SECTIONS

A. Examine all drawings and criteria sheets and all other Sections of the Specifications for requirements which affect work under this Section whether or not such work is specifically mentioned in this Section.

1.04 REFERENCES

A. American Society for Testing and Materials Standards (ASTM):

1. ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials

2. ASTM E814: Standard Test Methods for Fire Tests of Through-Penetration Firestops

3. ASTM E119: Standard Test Methods for Fire Tests of Building Construction Materials

4. ASTM E1399: Standard Test Methods for Cyclic Movement and Measuring of Joint Systems

5. ASTM E1725: Standard Test Methods for Fire Tests of Fire-Resistive Barrier Systems of Electrical Systems Components

6. ASTM E1966: Standard Test Methods for Fire Tests of Joints

B. Underwriters Laboratories, Inc. (UL):

1. UL 723 Surface Burning Characteristics of Building Materials

2. UL 1479 Fire Tests of Through-Penetration Firestops, including optional air leak test

3. UL 2079 Fire Test of Building Joint Firestop systems

4. UL Fire Resistance Directory (Component Listing Test Criterion)

C. National Fire Protection Agency (NFPA)

1. NFPA 80 Standard Fire Door and Window Assembly Tolerances

2. NFPA 252 Standard Fire Test for Fire Rated Doors (not specified for positive or negative furnace test pressure)

3. NFPA 257 Standard Fire Test for Fire Rated Windows (not specified for positive or negative furnace test pressure)

4. NFPA 101 Life Safety Code

5. NEC 70 National Electrical Code

1.05 PERFORMANCE REQUIREMENTS

A. General: For the following constructions, provide through-penetration firestop systems that are 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 assembly penetrated.

1. Fire-resistance-rated load-bearing walls, including partitions, with fire-protection-rated openings.

2. Fire-resistance-rated non-load-bearing walls, including partitions, with fire-protection-rated openings.

3. Fire-resistance-rated floor assemblies.

4. Fire-resistance-rated roof assemblies.

B. F-Rated Systems: Provide through-penetration firestop systems with F-ratings indicated, as determined per ASTM E 814, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.

C. T-Rated Systems: For the following conditions, provide through-penetration firestop systems with T-ratings indicated, as well as F-ratings, as determined per ASTM E 814, where systems protect penetrating items exposed to potential contact with adjacent materials in occupiable floor areas.

1. Penetrations located outside wall cavities.

2. Penetrations located outside fire-resistive shaft enclosures.

3. Penetrations located in construction containing fire-protection rated openings.

4. Penetrating items larger than 4-inch diameter normal pipe or 16 sq. in. in overall cross-sectional area.

D. For through-penetration firestop systems exposed to view, traffic, moisture, and physical damage, provide product that after curing do not deteriorate when exposed to these conditions both during and after construction.

1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.

2. For floor penetrations with annular spaces exceeding 4 inches in width and exposed to possible loading and traffic, provide firestop systems capable of supporting floor loads involved either by installing floor plates or by other means.

3. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.

E. For through-penetration firestop systems exposed to view, provide products with flame-spread ratings of less than 25 and smoke-development ratings of less than 450, as determined per ASTM E 84.

1.06 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. See Section 230500 for Additional Requirements.

D. Product Data: For each type through-penetration firestop system product indicated.

E. Shop Drawings: For each through-penetration firestop system show each kind of construction condition penetrated, relationships to adjoining construction, and kind of penetrating items. Include firestop design designation of testing and inspecting agency acceptable to authorities having, jurisdiction that evidences compliance with requirements for each condition indicated.

1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each through-penetration firestop system configuration for construction and penetrating items.

2. Where Project conditions require modification of qualified testing and inspecting agency's illustration to suit a particular through-penetration firestop condition, submit illustration, with modifications marked, approved by through-penetration firestop system manufacturer's fire-protection engineer.

F. Submit complete plans indicating clearly where all seals are located and the type of seal to be used at that location

G. Qualification Data: For firms and persons specified 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.

H. Product Certificates: Signed by manufacturers of through-penetration firestop system products certifying that products furnished comply with requirements.

I. Product Test Reports: From a qualified testing agency indicating through-penetration firestop system complies with requirements, based on comprehensive testing of current products.

1.07 CLOSEOUT SUBMITTALS

A. Submit closeout submittals in accordance with Form 816 Article 1.20-1.05.02, NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS.

1.08 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 experienced installer who has completed through-penetration firestop systems similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

C. Source Limitations: Obtain through-penetration firestop systems, for each kind of penetration and construction condition indicated, from a single manufacturer.

D. Fire-Test-Response Characteristics: Provide through-penetration firestop systems that comply with the following requirements and those specified in "Performance Requirements" Article:

1. Through-Penetration Firestop Systems tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL, ITS, or another agency performing testing and follow-up inspection services for firestop systems acceptable to authorities having jurisdiction.

2. Through-penetration firestop systems are identical to those tested per ASTM E 814. Provide rated systems complying with the following requirements:

a. Through-penetration firestop system products hear classification marking of qualified testing and inspecting agency.

b. Through-penetration firestop systems correspond to those indicated by reference to through-penetration firestop system designations listed by the following:

1) UL in "Fire Resistance Directory."

2) ITS in "Directory of Listed Products."

1.09 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 through-penetration firestop system products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer, date of manufacture; lot number; shelf life, if applicable, qualified testing and inspecting agency's classification marking applicable to Project; curing time; and mixing instructions for multicomponent materials.

C. Store and handle materials for through-penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.10 WARRANTY

A. Refer to Form 816, Article 1.20-1.06.08, and the NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information.

1.11 PROJECT CONDITIONS

A. Environmental Limitations: Do not install through-penetration fires top systems when ambient or substrate temperatures are outside limits permitted by through penetration firestop system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

B. Ventilate through-penetration firestop systems per manufacturer's written instructions by natural means or, where this is inadequate, forced-air circulation.

1.12 COORDINATION

A. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.

B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.

C. Notify Owner's inspecting agency at least seven days in advance of through-penetration firestop system installations; confirm dates and times on days preceding each series of installations.

D. Do not cover up through-penetration firestop system installations that will become concealed behind other construction until Owner's inspecting agency and building

inspector, if required by authorities having jurisdiction, have examined each installation.

PART 2 – PRODUCTS

2.01 BUY AMERICA COMPLIANCE

A. Products must meet Buy America requirements. Refer to NOTICE TO CONTRACTOR – BUY AMERICA for additional information.

2.02 MANUFACTURERS

A. Acceptable manufacturers subject to compliance with the specifications shall be one of following:

1. United States Gypsum Company or approved equal.

2.03 FIRESTOPPING GENERAL

A. Compatibility: Provide through-penetration firestop systems that are compatible with one another, with the substrates forming openings, and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and fired experience.

B. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer and approved by the qualified testing and inspecting agency for firestop systems indicated. Accessories include, but are not limited to, the following items:

1. Permanent forming/damming/backing materials, including the following:

a. Slag-/rock-wool-fire 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

2. Temporary forming materials

3. Substrate primers

4. Collars

5. Steel sleeves

2.04 MIXING

A. For those products requiring mixing before application, comply with through-penetration firestop system 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

3.01 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Surface Cleaning: Clean out openings immediately before installing through-penetration firestop systems to comply with written recommendations of firestop systems manufacturer and the following requirements:

1. Remove from surfaces of openings substrates and from penetrating items foreign materials that could interfere with adhesion of through-penetration firestop systems.

2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with through-penetration firestop systems. 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 through-penetration firestop system 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 through-penetration firestop systems from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contactor by cleaning methods used to remove smears from firestop systems materials. Remove tape as soon as possible without disturbing firestop system's seal with substrates.

3.03 THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION

A. General: Install through-penetration firestop systems to comply with "Performance Requirements" Article and firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Install forming/damming/backing 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, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.

C. Install fill materials for firestop systems 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 Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.04 FIELD-QUALITY CONTROL

A. Inspecting Agency: Owner will engage a qualified independent inspecting agency to inspect through-penetration firestop systems and to prepare test reports.

1. Inspecting agency will state in each report whether inspected through-penetration firestop systems comply with or deviate from requirements.

B. Proceed with enclosing through-penetration firestop systems with other construction only after inspection reports are issued.

C. Where deficiencies are found, repair or replace through-penetration firestop systems so they comply with requirements.

3.05 IDENTIFICATION

A. Identify through-penetration firestop systems with pressure-sensitive, self-adhesive, preprinted vinyl labels. Attach labels permanently to surfaces of penetrated construction on both sides of each firestop system installation where labels will be visible to anyone seeking to remove penetrating items or firestop systems. Include the following information on labels.

1. The words: "Warning-Through-Penetration Firestop System-Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's name, address, and phone number.
3. Through-penetration firestop systems designation of applicable testing and inspecting agency.
4. Date of installation.
5. Through-penetration firestop systems manufacturer's name.
6. Installer's name.

3.06 CLEANING AND PROTECTION

A. Clean off excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by through-penetration firestop system manufacturers and that do not damage materials in which openings occur.

B. Provide final protection and maintain conditions during and after installation that ensure through-penetration firestop systems are without damage or deterioration at time of Substantial Completion. If despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated through-penetration firestop systems immediately and install new materials to produce through-penetration firestop systems complying with specified requirements.

END OF SECTION 230584

SECTION 230598 – MECHANICAL SEISMIC RESTRAINTS

PART 1 – GENERAL

1.01 PROVISIONS INCLUDED

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.

C. Examine all other Sections of the specifications for requirements which affect work under this Section whether or not such work is specifically mentioned in this Section.

D. Coordinate work with that of all other Trades affecting, or affected by work of this Section. Cooperate with such Trades to ensure the steady progress of all work under the Contract.

1.02 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, Section 230500 and other Division 1 Specification Sections, apply to this Section.

1.03 WORK INCLUDED

A. Seismic restraints for all systems shall be installed in accordance with International Building Code 2003.

B. Piping types

1. High deformability piping:

a. Welded steel
b. Welded stainless steel
c. Socket welded steel
d. Grooved steel that is ASME B31.1
e. Braised copper
f. Grooved copper

2. Limited-deformability

a. Threaded Steel
b. Grooved steel that is not ASME B31.1
c. Soldered copper

3. Low-deformability

a. PVC
b. Cast iron
c. Glass
d. Non-ductile plastic

C. All trapeze supported Items weighing 10 Lbs per foot or greater shall be braced. This weight shall include all pipes and conduits filled with water.

D. Secure all permits and local/state approval for the installation of all components included under this Section.

E. The work in this Section shall include the following:
1. Seismic restraints for isolated equipment.
2. Seismic restraints for non-isolated equipment.
3. Seismic restraints for ductwork
4. Seismic restraints for piping
5. Certification of seismic restraint designs and installation supervision.
6. Certification of seismic attachment of housekeeping pads.

F. Coordinate closely with Hangers and Supports, Pipe Expansion and Structural documents.

1.04 RELATED SECTIONS

A. Examine all drawings and criteria sheets and all other Sections of the Specifications for requirements which affect work under this Section whether or not such work is specifically mentioned in this Section.

1.05 REFERENCES

A. Applicable provisions of the following Codes and Trade Standard Publications shall apply to the work of this Section, and are hereby incorporated into, and made a part of the Contract Documents.

B. Material standards shall be as specified or detailed hereinafter and as follows:

1. NEBB– Procedural Standards for Measuring Sound and Vibration; National Environmental Balancing Bureau.

2. NEBB– Sound and Vibration in Environmental Systems; National Environmental Balancing Bureau.
3. SMACNA – Guidelines for Seismic Restraint of Mechanical Systems.
4. ASHRAE Guidelines – HVAC Applications; Chapter– Sound and Vibration Control, Chapter – Seismic Restraint Design, Latest Edition.
5. ASCE Standard 7 Minimum Design Loads for Buildings and Other Structures

1.06 SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. See Section 230500 and General Conditions for additional requirements.

C. Seismic Analysis and Certification submittals shall include the following:

1. Seismic restraint calculations must be provided for all connections of equipment to the structure.

2. Calculations to support seismic restraint designs shall be stamped by a registered Professional Engineer.

3. Analysis must indicate calculated dead loads, derived loads, and materials utilized for connections to equipment and structure. Analysis must detail anchoring methods, bolt diameter, embedment and weld length.

4. A seismic design liability insurance certificate must accompany all submittals.

5. Coordinate all hangers and supports.

6. Provide Approved Agencies Certificate of Compliance meeting Seismic Category D for all components. Tests shall include anchorage, structural and on line capability from analytical or shaker test method.

a. Where the requirements of this specification cannot be met by any vendor, the contractor will submit a written summary indicating the lack of resources.

D. Submission of samples may be requested for each type of vibration isolation and seismic device. After approval, samples will be returned for installation at the job if requested. All costs associated with submission of samples shall be borne by the Contractor.

E. Provide seismic certifications for all equipment including, but not limited to:
1. Indoor air conditioning units and outdoor condensing unit
2. Seismic joints

1.07 CLOSEOUT SUBMITTALS

Submit closeout submittals in accordance with Form 816 Article 1.20-1.05.02, NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS.

1.08 QUALITY ASSURANCE

A. Manufacturer Responsibility

1. Manufacturer of seismic control equipment shall have the following responsibilities:

a. Determine vibration isolation and seismic restraint sizes and locations.

b. Provide equipment vibration isolation and seismic restraints as scheduled or specified.

c. Provide installation instructions, drawings and field supervision to ensure proper installation and performance of systems.

d. Provide certification by a licensed engineer that all mounts and restraints meet the project requirements for seismic loading.

2. Substitution of internally isolated mechanical equipment in lieu of the specified isolation of this Section must be approved for individual equipment units and is acceptable only if above acceleration loads are certified in writing by the equipment manufacturer and stamped and sealed by a licensed Civil or Structural Engineer.

3. Licensed Engineers shall be licensed in the project state.

B. Contractor Responsibilities

1. The Contractor performing the work on equipment in the section shall have the following responsibilities.

a. Identify the components that are part of the Quality Assurance Plan.

1) All flammable, combustible and highly toxic piping and their associated mechanical systems.
2) All ductwork containing hazardous materials.
3) All equipment using combustible or toxic energy sources.

b. Identify all Special inspection and Testing.

c. List control procedures within the contractor's organization including methods and frequency of reporting and their distribution.

d. List personnel and their qualifications exercising control over the seismic aspects of the project.

2. Purchased and/or fabricated equipment must be designed to safely accept external forces of 1.8 g load in any direction for all rigidly supported equipment, piping and ductwork without failure and permanent displacement of the equipment. Resiliently supported equipment, piping and ductwork and Life safety equipment such as fire pumps, smoke exhaust fans, emergency generators and other life safety designated equipment must be capable of accepting external forces of up to 3.6 g in any direction without permanent displacement or failure of the equipment.

1.09 REGULATORY REQUIREMENTS

A. Conform to ASME B31.9 code for installation of piping system and ASTM F708 for design and installation of pipe hangers.

B. Welding Materials and Procedures: Conform to ASME (BPV IX) and applicable state labor regulations.

C. Provide certificate of compliance from authority having jurisdiction, indicating approval of welders.

1.10 DELIVERY, STORAGE AND HANDLING

A. All seismic restraint equipment shall be delivered in containers and shall be kept in a dry and protected area.

B. All exposed hangers, supports, etc. shall be given 2 coats of rust resistant paint of a color selected by the Architect prior to installation.

PART 2 – PRODUCTS

2.01 BUY AMERICA COMPLIANCE

Products must meet Buy America requirements. Refer to NOTICE TO CONTRACTOR – BUY AMERICA for additional information.

2.02 SEISMIC RESTRAINT TYPES

A. Type I

1. Type I shall comply with general characteristics of spring isolator Type A with snubbing restraint in all directions capable of supporting equipment at fixed elevations during installation. Cast or aluminum housings, except ductile iron are not acceptable.

2. Type I seismic restraint shall be similar to Mason Industries Type SLRS.

B. Type II

1. Each corner or side of equipment base shall incorporate a seismic restraint snubber having a minimum of 5/8" thick resilient pad limit stop. Seismic snubbers shall be in accordance with manufacturer's recommendations.

2. Type II seismic restraints shall be similar to Mason Industries Type Z-1011 or Z-1225.

C. Type III

1. Type III shall be multiple metal cable or strut type with approved fastening devices to equipment and structure. System to be field bolted to deck or to overhead structural members using 2-sided beam clamps or appropriately designed inserts for concrete. All parts of the system including cables, excluding fasteners, are to be of a single supplier to ensure seismic compliance.

D. Type IV

1. Type IV shall have double deflection neoprene isolator (minimum 0.3") encased in ductile iron or steel casing.

2. Type IV seismic restraints shall be similar to Mason Industries Type BR, RBA or RCA.

E. Type V

1. Non-isolated equipment shall be field bolted or welded (powder shots not acceptable) to the structure as required to meet seismic forces. Bolt diameter, imbedment data and/or weld length must be shown in certified calculations.

2.03 FLEXIBLE PIPE CONNECTOR

A. All flexible connectors shall be:

1. Installed on the equipment side of the shutoff valves, horizontal and parallel to equipment shafts whenever possible. All piping between the flexible connector and the equipment shall be independently supported off the equipment base.

2. Provided wherever rigidity supported piping is connected to equipment.

B. Type FC-1 (Elastomer Connector)

1. Rubber expansion joints shall be peroxide cured EPDM throughout with Kevlar tire cord.

2. Straight connectors to have (2) spheres reinforced with a molded in external ductile iron ring between the spheres.

3. Rated at 250 psig/170°F, dropping in a straight line to 170 psig/250°F for sizes 1 1/2" to 12".

4. All sizes shall employ control rods with neoprene end fittings isolated from anchor plates by means of 1/2" bridge bearing neoprene bushings.

5. Connectors shall be installed pre-extended per manufacturer's recommendations to prevent elongation under pressure.

6. Minimum safety factory of 3.6:1 at maximum pressure ratings shall be certified by test reports. Submittals shall also include (2) test reports by independent consultants showing minimum reduction of 20 dB in vibration accelerations and 10 dB in sound pressure levels at typical blade passage frequencies.

7. Connectors bolted to Victaulic type coupling or gage, butterfly or check valves to have a minimum 5/8" flange spacer installed between the connector and the coupling flange.

8. Connectors for pipe size 2" and smaller shall have threaded female union couplings on each end. Larger pipe sizes shall be fitted with flange couplings.

9. Type FC-1 flexible connector shall be similar to Mason Industries Super-Flex Type SFDEJ or SFEJ.

10. equal by approved manufacturer.

C. Type FC-4 (Bronze Braided Flexible Hose)

1. Bronze hose and braid rated with a minimum 3:1 safety factor (minimum 150 psi).

2. Copper tube ends.

3. Minimum lengths (in inches) as follows:

Size		Length	Size		Length	Size		Length
1/8	x	7 1/2	3/4	x	11 1/2	3	x	27
1/4	x	8 1/4	1	x	13	3 1/2	x	32
3/8	x	9	1 1/4	x	14 3/4	4	x	33
1/2	x	9 3/4	1 1/2	x	17	5	x	41
5/8	x	10	2	x	20	6	x	48
			2 1/2	x	24			

4. Type FC-4 flexible connector shall be similar to Mason Industries Type BFF.

5. 250 PSIG working pressure.

D. Seismic Expansion Joints

1. Provide seismic expansion joints on all ducts, piping, conduits or other systems crossing building expansion seismic joints. Provide these joints to allow for the movement in the XY&Z direction as indicated on the structural documents.

2. Pressure rated for 250 PSIG at maximum service temperature.

PART 3 – EXECUTION

3.01 GENERAL

A. Isolation and seismic restraint systems must be installed in strict accordance with the manufacturer's written instructions and submittal data. Vibration isolators shall not cause any change of position of equipment resulting in stress on equipment connections.

B. Design Criteria

1. All mechanical equipment such as pumps, heat pumps, fans, air handling units, etc. shall be isolated from the building structure by means of noise and vibration isolators.

2. All piping ductwork in mechanical equipment rooms and penthouses shall be isolated from the building structure by means of noise and vibration isolation hangers and provided with seismic restraints.

3. Piping and/or ductwork penetrations through floors and walls shall not be rigidly connected to the building structure. Provide sleeves with clearances around the outside, as recommended by the vibration materials manufacturer. All such penetrations shall be smokeproofed and firestopped in an approved manner as hereinbefore specified.

4. Generally, isolation facilities shall be designed to limit equipment room floor or roof loading to a maximum of 50 lbs./sq.ft. and vibration isolators shall be carefully and specifically selected for each piece of equipment.

5. Flexible duct connections at fans and air handling units shall have a minimum clear gap of 3" between metal collars. Flexible connectors exposed to the weather shall be weatherproofed by the Mechanical Contractor. Refer to the Sheet Metal Section of this specification for requirements of flexible duct connections.

6. Piping found to have water hammer or other objectionable vibration or noise which cannot be eliminated by proper grading or other natural means shall be braced, trapped, hung with vibration isolation hangers, equipped with air

chambers or mechanical shock absorbers, flexible pipe connectors, or otherwise silenced using means as approved by the Architect.

7. Motor driven equipment which is to be isolated shall have motor mounted on the isolated equipment or shall have motor, equipment and drive mounted on a common base.

8. The Contractor shall not install any equipment, piping or conduit which makes rigid contact with the "building" unless permitted in this Specification. Building includes, but is not limited to, slabs, beams, columns, studs and walls.

9. Isolation mounting deflection shall be (minimum) as specified or scheduled on drawings.

10. Coordinate work with other trades to avoid rigid contact with the building. Inform other trades following work, such as plastering or electrical, to avoid any contact which would reduce the vibration isolation.

11. Bring to the Architect's attention, prior to installation, any conflicts with other trades that will result in unavoidable rigid contact with equipment or piping as described herein, due to inadequate space or other unforeseen conditions. Corrective work necessitated by conflicts after installation shall be at the responsible contractor's expense.

12. Bring to the Architect's attention any discrepancies between the specifications and field conditions or changes required due to specific equipment selection, prior to installation. Corrective work necessitated by discrepancies after installation shall be at the contractor's expense.

13. Obtain inspection and approval of any installation to be covered or enclosed, prior to such closure.

14. Correct, at no additional cost, all installations which are deemed defective in workmanship or materials.

3.02 SPRING RISER SUPPORT SYSTEM

A. All vertical riser subjected to thermal expansion and/or construction as noted herein or on the documents, shall be supported by spring isolators and central anchors designed to insure loading within design limits at structural support points. The riser design must include the initial load, initial deflection, change in deflection, final load and change in load at all spring support locations. In order to minimize load changes, the initial spring deflection must be at least 4 times the thermal movement. The submittal must also include anchor loads when installed, cold filled, and at operating temperature. Include calculated pipe stress at end conditions and branch off locations as well as installation instruction. The submittals must be stamped and signed by a licensed Professional Engineer in the employ of the vibration vendor for at least five years.

B. Neutral resilient anchors close to the center of the run shall direct movement up and down. The anchors shall be capable of holding an upward force equal to the water weight when the system is drained. If one level cannot accommodate this force, anchors can be located on 2 or 3 adjacent floors. Resilient guides shall be spaced and sized properly depending on the pipe diameter.

C. Proper provision shall be made for seismic protection in seismic zones, as required.

D. The support spring mounts shall be specification Type A, anchors Type ADA, telescoping guides Type VSG, all similar to as manufactured by Mason Industries, Inc.

E. The isolation vendor shall provide and design all brackets at riser spring and anchor locations where standard clamps lack capacity or do not fit. The contractor must install and adjust all isolators under the supervision of the designing isolation vendor or his representative.

3.03 SEISMIC RESTRAINTS INSTALLATION

A. All floor mounted equipment, whether isolated or not, shall be bolted or welded to the structure to allow for required acceleration. Bolt points, diameter of inserts, imbedment depth and weld length as shown on approved submittal drawings shall be followed in all respects.

B. All suspended equipment shall be 2-point or 4-point independently braced with Type III restraints, installed taut for non-isolated equipment, such as piping or ductwork and slack with 1/2" cable deflection for isolated equipment. Note: Stiffeners for support rods may be required, certifications shall clearly delineate when such stiffening is required or not.

1. Piping Bracing: Schedule 10 thru 40 welded, screwed, flanged or grooved; 40'-0" maximum transversely, 80'-0" maximum longitudinally, and within 4'-0" each change of direction. No- hub piping shall be at 10’-0” intervals or 40’-0” if 1.0 g couplings are used.

2. Ductwork Bracing: 30'-0" maximum, transversely, 60'-0" maximum longitudinally, and within 4'-0" of each change of direction.

C. Seismic restraints are not required:

1. Only when explicitly permitted by the code. These permitted exceptions shall be detailed clearly on the first page of the seismic submittal.

D. Seismic restraints are not required on the following (there are no exceptions for piping containing flammable or hazardous material or connected to life/safety equipment):

1. Piping in mechanical equipment rooms less than 1 1/4".

2. Other piping less than 2 1/2".

3. All rectangular ducts less than 6 sq.ft. in cross sectional areas.

4. All round ducts less than 28" diameter.

5. All pipe suspended by individual hangers 12" in length or less from the top of the pipe support to the bottom of the support for the hanger.

6. All top supported ducts suspended by hangers 12" or less in length from the top of the duct to the bottom of the support for the hanger.

E. Where base anchoring of equipment is insufficient to resist seismic forces, restraints such as Type III shall be located above the unit's center of gravity to resist "G" forces.

F. For overhead supported equipment, overstress of the building structure must not occur. Bracing may occur from:

1. Upper flanges of structural beams.

2. Upper truss chords in bar joists.

3. Cast-in-place inserts or drilled and shielded inserts in concrete structures.

G. Chimneys and stacks passing through floors are to be bolted at each floor level or secured above and below each floor with riser clamps or approved vibration isolation systems with seismic restraints.

H. Chimneys and stacks running horizontally to be braced every 30 ft (9 m) with Type III restraining system.

I. Inspection

1. On completion of installation of all vibration isolation and seismic restraint devices herein specified, the local representative of the isolation materials manufacturer shall inspect the completed system and report in writing any installation errors, improperly selected isolation or restraint devices, or other faults that could affect the performance of the system. Contractor shall submit a report to the Architect, including the manufacturer's representative's final report, indicating all isolation reported as properly installed or requiring correction, and include a report by the Contractor on steps taken to properly complete the isolation work.

2. Provide all special inspections in accordance with IBC and as specified herein.

a. Continuous inspection: The full-time observation of work by an approved special inspector pursuant to IBC. The following pieces of equipment require these inspections:

1) All equipment using combustible or toxic energy sources.
2) All electric motors and motor control centers.
3) Reciprocating and rotating type machinery.
4) Pipe.
5) Tanks, heat exchangers & pressure vessels.
6) Ductwork.

b. Periodic inspection: Provide intermittent observation of work by an approved special inspector of the following pieces of equipment in compliance with IBC.

1) All smoke control systems during construction & prior to concealment for leakage testing.

2) Isolator units for seismic isolation system.

3) All flammable, combustible and highly toxic piping and their associated mechanical systems.

4) All ductwork containing hazardous materials.

c. After all inspections a written report shall be provided.

3.04 INSTALLATION INSTRUCTIONS

A. Position equipment, structural base and concrete base on blocks or wedges at proper operating height.

B. Install equipment with flexibility in wiring connection.

C. Verify all installed isolators and mounting system permit equipment motion in all directions.

D. Adjust or provide additional resilient restraints to flexibly limit lateral motion to 1/4" during start-up of equipment.

E. Before start-up, clean out all foreign matter between bases and equipment to prevent short circuit.

F. Install flexible pipe connectors on pipe connected to equipment supported by vibration isolation. Hook up piping to equipment and mains with spool pieces. After completion of pressure testing but prior to start-up, remove spool pieces and install flexible pipe connectors. Identify spool pieces as to equipment served and either entering or leaving.

G. Provide seismic displacement joints for all piping, ductwork and conduits crossing building expansion joints or building seismic joints.

3.05 CERTIFICATION

A. Upon completion of installation of all vibration isolation devices and seismic restraints, the Mechanical Contractor shall hire an independent Seismic Professional Engineer to visit the site, inspect the completed project and certify in writing to the Architect that all systems are installed properly, or require correction.

END OF SECTION 230598

SECTION 230700 – HVAC PIPING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Insulation Materials:
   a. Flexible elastomeric.

2. Fire-rated insulation systems.
3. Insulating cements.
4. Adhesives.
5. Mastics.
6. Sealants.
7. Field-applied jackets.
8. Tapes.
9. Securements.
10. Corner angles.

1.2 RELATED DOCUMENTS

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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.

C. Section 230500 also applies to this Section.

1.3 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:

1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
2. Detail attachment and covering of heat tracing inside insulation.
3. Detail insulation application at pipe expansion joints for each type of insulation.
4. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
5. Detail removable insulation at piping specialties, equipment connections, and access panels.
6. Detail application of field-applied jackets.
7. Detail application at linkages of control devices.
8. Detail field application for each equipment type.

D. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

Submit closeout submittals in accordance with Form 816 Article 1.20-1.05.02, NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS.

1.5 WARRANTY

A. Refer to Form 816, Article 1.20-1.06.08, and the NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information.

1.6 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Insulation and related materials shall have fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing and inspecting agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

PART 2 - PRODUCTS

2.1 BUY AMERICA COMPLIANCE

A. Products must meet Buy America requirements. Refer to NOTICE TO CONTRACTOR – BUY AMERICA for additional information.

2.2 INSULATION MATERIALS

A. Comply with requirements in Part 3 schedule articles for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

F. Flexible Elastomeric: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet 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. Aeroflex USA Inc.; Aerocel.
b. Armacell LLC; AP Armaflex.
c. RBX Corporation; Insul-Sheet 1800 and Insul-Tube 180.

2.3 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.

B. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.

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. Aeroflex USA Inc.; Aeroseal.

b. Armacell LCC; 520 Adhesive.
c. Foster Products Corporation, H. B. Fuller Company; 85-75.
d. RBX Corporation; Rubatex Contact Adhesive.

2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.4 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-C-19565C, Type II.

B. Vapor-Barrier Mastic: Water based; suitable for indoor and outdoor use on below ambient services.

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. Childers Products, Division of ITW; CP-35.
b. Foster Products Corporation, H. B. Fuller Company; 30-90.
c. ITW TACC, Division of Illinois Tool Works; CB-50.
d. Marathon Industries, Inc.; 590.
e. Mon-Eco Industries, Inc.; 55-40.
f. Vimasco Corporation; 749.

2.5 SEALANTS

A. Joint Sealants:

1. Joint Sealants for Polystyrene Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Childers Products, Division of ITW; CP-70.
b. Foster Products Corporation, H. B. Fuller Company; 30-45/30-46.
c. Marathon Industries, Inc.; 405.
d. Mon-Eco Industries, Inc.; 44-05.
e. Vimasco Corporation; 750.

2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Permanently flexible, elastomeric sealant.
4. Service Temperature Range: Minus 100 to plus 300 deg F
5. Color: White or gray.

2.6 FIELD-APPLIED JACKETS

A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.

B. FSK Jacket: Aluminum-foil-face, fiberglass-reinforced scrim with kraft-paper backing.

C. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.

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. Johns Manville; Zeston.
   b. P.I.C. Plastics, Inc.; FG Series.
   c. Proto PVC Corporation; LoSmoke.
   d. Speedline Corporation; SmokeSafe.

2. Adhesive: As recommended by jacket material manufacturer.
3. Color: Color as selected by Architect.
4. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.

   a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.

5. Factory-fabricated tank heads and tank side panels.

2.7 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.

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. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0835.
   b. Compac Corp.; 104 and 105.
   c. Ideal Tape Co., Inc., an American Biltrite Company; 428 AWF ASJ.
   d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.

2. Width: 3 inches
3. Thickness: 11.5 mils
4. Adhesion: 90 ounces force/inch in width.

5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch in width.
7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

B. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive. Suitable for indoor and outdoor applications.

1. Products: Subject to compliance with requirements, [provide the following] [provide one of the following] [available products that may be incorporated into the Work include, but are not limited to, the following]:

a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0555.
b. Compac Corp.; 130.
c. Ideal Tape Co., Inc., an American Biltrite Company; 370 White PVC tape.
d. Venture Tape; 1506 CW NS.

2. Width: 2 inches
3. Thickness: 6 mils
4. Adhesion: 64 ounces force/inch in width.
5. Elongation: 500 percent.
6. Tensile Strength: 18 lbf/inch in width.

2.8 SECUREMENTS

A. Aluminum Bands: ASTM B 209 Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 1/2 inch 3/4 inch wide with wing or closed seal].

1. Products: Subject to compliance with requirements, [provide the following] [provide one of the following] [available products that may be incorporated into the Work include, but are not limited to, the following:

a. Childers Products; Bands.
b. PABCO Metals Corporation; Bands.
c. RPR Products, Inc.; Bands.

B. Insulation Pins and Hangers:

1. Metal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:

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) AGM Industries, Inc.; Tactoo Insul-Hangers, Series T.

2) GEMCO; Perforated Base.
3) Midwest Fasteners, Inc.; Spindle.

b. Baseplate: Perforated, galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
c. Spindle: Stainless steel, fully annealed, 0.106-inch- diameter shank, length to suit depth of insulation indicated.
d. Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.

2. Nonmetal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate fastened to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:

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) GEMCO; Nylon Hangers.
2) Midwest Fasteners, Inc.; Nylon Insulation Hangers.

2.9 CORNER ANGLES

A. PVC Corner Angles: 30 mils thick, minimum 1 by 1 inch PVC according to ASTM D 1784, Class 16354-C. White or color-coded to match adjacent surface.

PART 3 - EXECUTION

3.1 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.

C. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.2 GENERAL INSTALLATION REQUIREMENTS

A. Installation shall comply with heat pump and factory requirements.

B. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of fittings, and piping including fittings, valves, and specialties.

C. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.

D. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

E. Install insulation with longitudinal seams at top and bottom of horizontal runs.

F. Install multiple layers of insulation with longitudinal and end seams staggered.

G. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

H. Keep insulation materials dry during application and finishing.

I. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

J. Install insulation with least number of joints practical.

K. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

L. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

P. For above ambient services, do not install insulation to the following:

1. Vibration-control devices.
2. Testing agency labels and stamps.
3. Nameplates and data plates.
4. Manholes.
5. Handholes.
6. Cleanouts.

3.3 PENETRATIONS

A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches (50 mm) below top of roof flashing.
4. Seal jacket to roof flashing with flashing sealant.

B. Insulation Installation at Underground Exterior Wall Penetrations: Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.

C. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches .
4. Seal jacket to wall flashing with flashing sealant.

D. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

E. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions. Terminate insulation at fire damper sleeves for fire-rated wall and partition penetrations.

1. Comply with requirements in Division 07 Section "Penetration Firestopping"irestopping and fire-resistive joint sealers.

3.4 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity, unless otherwise indicated.
2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below ambient services, provide a design that maintains vapor barrier.
6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below ambient services and a breather

mastic for above ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.

8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
9. Stencil or label the outside insulation jacket of each union with the word "UNION." Match size and color of pipe labels.

C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes, vessels, and equipment. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

D. Install removable insulation covers at locations indicated. Installation shall conform to the following:

1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
3. Construct removable valve insulation covers in same manner as for flanges except divide the two-part section on the vertical center line of valve body.
4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.
5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.5 FLEXIBLE ELASTOMERIC INSULATION INSTALLATION

A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Flanges:

1. Install pipe insulation to outer diameter of pipe flange.

2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as pipe insulation.
4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install mitered sections of pipe insulation.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed valve covers manufactured of same material as pipe insulation when available.
2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.
4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.6 FIELD-APPLIED JACKET INSTALLATION

A. Where FSK jackets are indicated, install as follows:

1. Draw jacket material smooth and tight.
2. Install lap or joint strips with same material as jacket.
3. Secure jacket to insulation with manufacturer's recommended adhesive.
4. Install jacket with 1-1/2-inch laps at longitudinal seams and 3-inch- wide joint strips at end joints.
5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-barrier mastic.

B. Where PVC jackets are indicated, install with 1-inch overlap at longitudinal seams and end joints; for horizontal applications, install with longitudinal seams along top and bottom of tanks and vessels. Seal with manufacturer's recommended adhesive.

1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

C. Where metal jackets are indicated, install with 2-inch overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches o.c. and at end joints.

3.7 FINISHES

A. Pipe Insulation with ASJ or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Division 09 painting Sections.

1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.

a. Finish Coat Material: Interior, flat, latex-emulsion size.

B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

C. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.

D. Do not field paint aluminum or stainless-steel jackets.

3.8 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. Inspect pipe, fittings, strainers, and valves, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to three locations of straight pipe, three locations of threaded fittings, three locations of welded fittings, two locations of threaded strainers, two locations of welded strainers, three locations of threaded valves, and three locaations of flanged valves for each pipe service defined in the "Piping Insulation Schedule, General" Article.

C. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.9 PIPING INSULATION SCHEDULE, GENERAL

A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.

B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:

1. Drainage piping located in crawl spaces.
2. Underground piping.
3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.10 INDOOR PIPING INSULATION SCHEDULE

A. Refrigerant Suction and Hot-Gas Piping: Flexible elastomeric 1 ½ inch thick.

B. Refrigerant Suction and Hot-Gas Flexible Tubing: Flexible elastomeric, 1 1/2 inch thick.

3.11 OUTDOOR, ABOVEGROUND PIPING INSULATION SCHEDULE

A. Refrigerant Suction and Hot-Gas Piping: Insulation shall be the following:
1. Flexible Elastomeric: 2 inches thick.

B. Refrigerant Suction and Hot-Gas Flexible Tubing: Insulation shall be the following:

1. Flexible Elastomeric: 2 inches thick.

END OF SECTION 230700

SECTION 232300 - REFRIGERANT PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes refrigerant piping used for air-conditioning applications.

1.2 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

C. Section 230500 also applies to this Section.

1.3 PERFORMANCE REQUIREMENTS

A. Line Test Pressure for Refrigerant R-410A:

1. Suction Lines for Air-Conditioning Applications: 185 psig.
2. Suction Lines for Heat-Pump Applications: 325 psig.
3. Hot-Gas and Liquid Lines: 325 psig .

1.4 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. See Section 230500 for additional requirements.

D. Product Data: For each type of valve and refrigerant piping specialty indicated. Include pressure drop based on manufacturer's test data.

E. Shop Drawings: Show layout of refrigerant piping and specialties, including pipe, tube, and fitting sizes, flow capacities, valve arrangements and locations, slopes of horizontal runs, oil traps, double risers, wall and floor penetrations, and equipment connection details. Show interface and spatial relationships between piping and equipment.

1. Refrigerant piping indicated on Drawings is schematic only. Size piping and design actual piping layout, including oil traps, double risers, specialties, and pipe and tube sizes to accommodate, as a minimum, equipment provided, elevation difference between compressor and evaporator, and length of piping to ensure proper operation and compliance with warranties of connected equipment.

F. Field quality-control test reports.

G. Operation and maintenance data.

1.5 CLOSEOUT SUBMITTALS

D. Submit closeout submittals in accordance with Form 816 Article 1.20-1.05.02, NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS.

1.6 QUALITY ASSURANCE

A. Comply with ASHRAE 15, "Safety Code for Refrigeration Systems."

B. Comply with ASME B31.5, "Refrigeration Piping and Heat Transfer Components."

1.7 Refer to Form 816, Article 1.20-1.06.08, and the NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information.

1.8 PRODUCT STORAGE AND HANDLING

A. Store piping in a clean and protected area with end caps in place to ensure that piping interior and exterior are clean when installed.

PART 2 - PRODUCTS

2.1 BUY AMERICA COMPLIANCE

A. Products must meet Buy America requirements. Refer to NOTICE TO CONTRACTOR – BUY AMERICA for additional information.

2.2 COPPER TUBE AND FITTINGS

A. Copper Tube: Hard drawn Type-L, ASTM B 280, Type ACR.

B. Wrought-Copper Fittings: ASME B16.22.

C. Wrought-Copper Unions: ASME B16.22.

D. Brazing Filler Metals: AWS A5.8.

E. Flexible Connectors:

1. Body: Tin-bronze bellows with woven, flexible, tinned-bronze-wire-reinforced protective jacket.
2. End Connections: Socket ends.
3. Offset Performance: Capable of minimum 3/4-inch misalignment in minimum 7-inch-long assembly.
4. Pressure Rating: Factory test at minimum 500 psig.
5. Maximum Operating Temperature: 250 deg F.

2.3 VALVES AND SPECIALTIES

A. Diaphragm Packless Valves:

1. Body and Bonnet: Forged brass or cast bronze; globe design with straight-through or angle pattern.
2. Diaphragm: Phosphor bronze and stainless steel with stainless-steel spring.
3. Operator: Rising stem and hand wheel.
4. Seat: Nylon.
5. End Connections: Socket, union, or flanged.
6. Working Pressure Rating: 500 psig.
7. Maximum Operating Temperature: 275 deg F.

B. Packed-Angle Valves:

1. Body and Bonnet: Forged brass or cast bronze.
2. Packing: Molded stem, back seating, and replaceable under pressure.
3. Operator: Rising stem.
4. Seat: Nonrotating, self-aligning polytetrafluoroethylene.
5. Seal Cap: Forged-brass or valox hex cap.
6. End Connections: Socket, union, threaded, or flanged.
7. Working Pressure Rating: 500 psig.
8. Maximum Operating Temperature: 275 deg F .

C. Check Valves:

1. Body: Ductile iron, forged brass, or cast bronze; globe pattern.
2. Bonnet: Bolted ductile iron, forged brass, or cast bronze; or brass hex plug.
3. Piston: Removable polytetrafluoroethylene seat.
4. Closing Spring: Stainless steel.

5. Manual Opening Stem: Seal cap, plated-steel stem, and graphite seal.
6. End Connections: Socket, union, threaded, or flanged.
7. Maximum Opening Pressure: 0.50 psig.
8. Working Pressure Rating: 500 psig.
9. Maximum Operating Temperature: 275 deg F.

D. Service Valves:

1. Body: Forged brass with brass cap including key end to remove core.
2. Core: Removable ball-type check valve with stainless-steel spring.
3. Seat: Polytetrafluoroethylene.
4. End Connections: Copper spring.
5. Working Pressure Rating: 500 psig.

E. Solenoid Valves: Comply with ARI 760 and UL 429; listed and labeled by an NRTL.

1. Body and Bonnet: Plated steel.
2. Solenoid Tube, Plunger, Closing Spring, and Seat Orifice: Stainless steel.
3. Seat: Polytetrafluoroethylene.
4. End Connections: Threaded.
5. Electrical: Molded, watertight coil in NEMA 250 enclosure of type required by location with 1/2-inch conduit adapter, and [24] [115] [208]-V ac coil.
6. Working Pressure Rating: 400 psig.
7. Maximum Operating Temperature: 240 deg F.
8. Manual operator.

F. Safety Relief Valves: Comply with ASME Boiler and Pressure Vessel Code; listed and labeled by an NRTL.

1. Body and Bonnet: Ductile iron and steel, with neoprene O-ring seal.
2. Piston, Closing Spring, and Seat Insert: Stainless steel.
3. Seat Disc: Polytetrafluoroethylene.
4. End Connections: Threaded.
5. Working Pressure Rating: 400 psig.
6. Maximum Operating Temperature: 240 deg F.

G. Thermostatic Expansion Valves: Comply with ARI 750.

1. Body, Bonnet, and Seal Cap: Forged brass or steel.
2. Diaphragm, Piston, Closing Spring, and Seat Insert: Stainless steel.
3. Packing and Gaskets: Non-asbestos.
4. Capillary and Bulb: Copper tubing filled with refrigerant charge.
5. Suction Temperature: 40 deg F.
6. Superheat: Adjustable.
7. Reverse-flow option (for heat-pump applications).
8. End Connections: Socket, flare, or threaded union.
9. Working Pressure Rating: 700 psig .

H. Straight-Type Strainers:

1. Body: Welded steel with corrosion-resistant coating.

2. Screen: 100-mesh stainless steel.
3. End Connections: Socket or flare.
4. Working Pressure Rating: 500 psig.
5. Maximum Operating Temperature: 275 deg F.

I. Angle-Type Strainers:

1. Body: Forged brass or cast bronze.
2. Drain Plug: Brass hex plug.
3. Screen: 100-mesh monel.
4. End Connections: Socket or flare.
5. Working Pressure Rating: 500 psig.
6. Maximum Operating Temperature: 275 deg F.

J. Moisture/Liquid Indicators:

1. Body: Forged brass.
2. Window: Replaceable, clear, fused glass window with indicating element protected by filter screen.
3. Indicator: Color coded to show moisture content in ppm.
4. Minimum Moisture Indicator Sensitivity: Indicate moisture above 60 ppm.
5. End Connections: Socket or flare.
6. Working Pressure Rating: 500 psig.
7. Maximum Operating Temperature: 240 deg F.

K. Replaceable-Core Filter Dryers: Comply with ARI 730.

1. Body and Cover: Painted-steel shell with ductile-iron cover, stainless-steel screws, and neoprene gaskets.
2. Filter Media: 10 micron, pleated with integral end rings; stainless-steel support.
3. Desiccant Media: Activated [alumina] [charcoal].
4. Designed for reverse flow (for heat-pump applications).
5. End Connections: Socket.
6. Access Ports: NPS 1/4 connections at entering and leaving sides for pressure differential measurement.
7. Maximum Pressure Loss: 2 psig.
8. Working Pressure Rating: 500 psig.
9. Maximum Operating Temperature: 240 deg F.

L. Permanent Filter Dryers: Comply with ARI 730.

1. Body and Cover: Painted-steel shell.
2. Filter Media: 10 micron, pleated with integral end rings; stainless-steel support.
3. Desiccant Media: Activated charcoal.
4. Designed for reverse flow.
5. End Connections: Socket.
6. Access Ports: NPS 1/4 connections at entering and leaving sides for pressure differential measurement.
7. Maximum Pressure Loss: 2 psig
8. Working Pressure Rating: 500 psig.
9. Maximum Operating Temperature: 240 deg F.

M. Liquid Accumulators: Comply with ARI 495.

1. Body: Welded steel with corrosion-resistant coating.
2. End Connections: Socket or threaded.
3. Working Pressure Rating: 500 psig.
4. Maximum Operating Temperature: 275 deg F.

2.4 REFRIGERANTS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Atofina Chemicals, Inc.
2. DuPont Company; Fluorochemicals Div.
3. Honeywell, Inc.; Genetron Refrigerants.
4. INEOS Fluor Americas LLC.

C. ASHRAE 34, R-410A

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

A. Hot-Gas and Liquid Lines and Suction Lines for Heat-Pump Applications:
1. NPS 1-1/2 and Smaller: Copper, Type ACR L, drawn-temper tubing and wrought-copper fittings with silver brazed joints.

B. Safety-Relief-Valve Discharge Piping: Copper, Type ACR L, drawn-temper tubing and wrought-copper fittings with soldered joints.

C. Safety-Relief-Valve Discharge Piping:
1. NPS 1-1/2 and Smaller: Copper, Type ACR L, hard drawn-temper tubing and wrought-copper fittings with brazed joints.

3.2 VALVE AND SPECIALTY APPLICATIONS

A. Install packed-angle valves in suction and discharge lines of compressor.

B. Install service valves for gage taps at strainers if they are not an integral part of strainers.

C. Install a check valve at the compressor discharge and a liquid accumulator at the compressor suction connection.

D. Except as otherwise indicated, install packed-angle valves on inlet and outlet side of filter dryers.

E. Install a full-sized, three-valve bypass around filter dryers.

F. Install solenoid valves upstream from each expansion valve. Install solenoid valves in horizontal lines with coil at top.

G. Install thermostatic expansion valves as close as possible to distributors on evaporators.

1. Install valve so diaphragm case is warmer than bulb.
2. Secure bulb to clean, straight, horizontal section of suction line using two bulb straps. Do not mount bulb in a trap or at bottom of the line.
3. If external equalizer lines are required, make connection where it will reflect suction-line pressure at bulb location.

H. Install safety relief valves where required by ASME Boiler and Pressure Vessel Code. Pipe safety-relief-valve discharge line to outside according to ASHRAE 15.

I. Install moisture/liquid indicators in liquid line at the inlet of the thermostatic expansion valve or at the inlet of the evaporator coil capillary tube.

J. Install strainers upstream from and adjacent to the following unless they are furnished as an integral assembly for device being protected:

1. Solenoid valves.
2. Thermostatic expansion valves.
3. Compressor.

K. Install filter dryers in liquid line between compressor and thermostatic expansion valve and in the suction line at the compressor.

L. Install flexible connectors at compressors.

3.3 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems; indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Shop Drawings.

B. Install refrigerant piping according to ASHRAE 15.

C. Refrigerant Piping and Connections

D. Provide all refrigeration piping, including thermal expansion valves, driers, moisture indicator sight glasses, shutoff valves, controls, gauges, insulation and other appurtenances, as required to complete the heat pump system. Piping connections to the units shall be fitted with flexible pipe fittings and renewable unions.

E. The HVAC Contractor shall triple evacuate and field charge entire refrigeration system. All labor and materials required for evacuation, charging, as well as commissioning of the refrigerant systems, shall be provided by the HVAC Contractor. The refrigerant piping

arrangement shall be in strict accordance with manufacturer's recommendations. Provide shop drawings indicating sizes and all required components and accessories for Architect's review prior to ordering equipment or installation.

F. All refrigerant piping exposed to weather outside the building shall be properly supported in a manner to allow expansion and contraction. All sleepers provided shall be secured and their installation shall be as directed and approved by the Architect.

G. Refrigerant piping joints shall be made with cadmium free 45% silver brazing filler metal having a melting point of 1225°F. Joint flux, if used, shall be compatible with materials. The outside surface at end of pipe and inside surface of fittings shall be thoroughly cleaned with steel wool or emery cloth, and cut pipe ends shall be reamed and all burrs shall be removed. Care shall be taken to ensure the entry of foreign particles into the system does not occur. While brazing, purge piping with low pressure nitrogen to prevent interior oxidation and to dry the system. Caution must be taken to continuously ventilate the work area and to avoid allowing nitrogen to concentrate in an enclosed area thereby expelling all of the oxygen and causing asphyxiation.

H. Traps shall be factory fabricated one-piece fittings or field assembled 45°-90°-45° elbows. Do not use 90°-90°-90° elbows.

I. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

J. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

K. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

L. Install piping adjacent to machines to allow service and maintenance.

M. Install piping free of sags and bends.

N. Install fittings for changes in direction and branch connections.

O. Select system components with pressure rating equal to or greater than system operating pressure.

P. Refer to Division 23 Sections "Instrumentation and Control for HVAC" and "Sequence of Operations for HVAC Controls" for solenoid valve controllers, control wiring, and sequence of operation.

Q. Install piping as short and direct as possible, with a minimum number of joints, elbows, and fittings.

R. Arrange piping to allow inspection and service of refrigeration equipment. Install valves and specialties in accessible locations to allow for service and inspection. Install access doors or panels as specified in Division 08 Section "Access Doors and Frames" if valves or equipment requiring maintenance is concealed behind finished surfaces.

S. Install refrigerant piping in protective conduit where installed belowground.

T. Install refrigerant piping in rigid or flexible conduit in locations where exposed to mechanical injury.

U. Slope refrigerant piping as follows:

1. Install horizontal hot-gas discharge piping with a uniform slope downward away from compressor.
2. Install horizontal suction lines with a uniform slope downward to compressor.
3. Install traps and double risers to entrain oil in vertical runs.
4. Liquid lines may be installed level.

V. When brazing or soldering, remove solenoid-valve coils and sight glasses; also remove valve stems, seats, and packing, and accessible internal parts of refrigerant specialties. Do not apply heat near expansion-valve bulb.

W. Install piping with adequate clearance between pipe and adjacent walls and hangers or between pipes for insulation installation.

X. Identify refrigerant piping and valves according to Division 23 Section "Identification for HVAC Piping and Equipment."

Y. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Division 23 Section "Sleeves and Sleeve Seals for HVAC Piping."

Z. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Division 23 Section "Sleeves and Sleeve Seals for HVAC Piping."

AA. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Division 23 Section "Escutcheons for HVAC Piping."

3.4 PIPE JOINT CONSTRUCTION

A. Soldered Joints: Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook."

B. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," Chapter "Pipe and Tube."

1. Use Type BcuP, copper-phosphorus alloy for joining copper socket fittings with copper pipe.
2. Use Type BAg, cadmium-free silver alloy for joining copper with bronze or steel.

3.5 HANGERS AND SUPPORTS

A. Hanger, support, and anchor products are specified in Division 23 Section "Hangers and Supports for HVAC Piping and Equipment."

B. Install the following pipe attachments:

1. Adjustable steel clevis hangers for individual horizontal runs less than 20 feet long.
2. Roller hangers and spring hangers for individual horizontal runs 20 feet or longer.
3. Pipe Roller: MSS SP-58, Type 44 for multiple horizontal piping 20 feet or longer, supported on a trapeze.
4. Spring hangers to support vertical runs.
5. Copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.

C. Install hangers for copper tubing with the following maximum spacing and minimum rod sizes:

1. NPS 1/2 Maximum span, 60 inches; minimum rod size, 1/4 inch.
2. NPS 5/8: Maximum span, 60 inches ; (minimum rod size, 1/4 inch.
3. NPS 1: Maximum span, 72 inches ; minimum rod size, 1/4 inch.
4. NPS 1-1/4 : Maximum span, 96 inches ; minimum rod size, 3/8 inch.
5. NPS 1-1/2: Maximum span, 96 inches ; minimum rod size, 3/8 inch.
6. NPS 2: Maximum span, 96 inches; minimum rod size, 3/8 inch .
7. NPS 2-1/2: Maximum span, 108 inches ; minimum rod size, 3/8 inch.
8. NPS 3: Maximum span, 10 feet; minimum rod size, 3/8 inch.
9. NPS 4: Maximum span, 12 feet; minimum rod size, 1/2 inch.

D. Support multifloor vertical runs at least at each floor.

3.6 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

B. Tests and Inspections:

1. Comply with ASME B31.5, Chapter VI.
2. Test refrigerant piping and specialties. Isolate compressor, condenser, evaporator, and safety devices from test pressure if they are not rated above the test pressure.
3. Test high- and low-pressure side piping of each system separately at not less than the pressures indicated in Part 1 "Performance Requirements" Article.

    a. Fill system with nitrogen to the required test pressure.
    b. System shall maintain test pressure at the manifold gage throughout duration of test.
    c. Test joints and fittings with electronic leak detector or by brushing a small amount of soap and glycerin solution over joints.
    d. Remake leaking joints using new materials, and retest until satisfactory results are achieved.

3.7 SYSTEM CHARGING

A. Charge system using the following procedures:

1. Install core in filter dryers after leak test but before evacuation.

2. Evacuate entire refrigerant system with a vacuum pump to 500 micrometers . If vacuum holds for 12 hours, system is ready for charging.
3. Break vacuum with refrigerant gas, allowing pressure to build up to 2 psig.
4. Charge system with a new filter-dryer core in charging line.

3.8 ADJUSTING

A. Adjust thermostatic expansion valve to obtain proper evaporator superheat.

B. Adjust high- and low-pressure switch settings to avoid short cycling in response to fluctuating suction pressure.

C. Adjust set-point temperature of air-conditioning or chilled-water controllers to the system design temperature.

D. Perform the following adjustments before operating the refrigeration system, according to manufacturer's written instructions:

1. Open shutoff valves in condenser water circuit.
2. Verify that compressor oil level is correct.
3. Open compressor suction and discharge valves.
4. Open refrigerant valves except bypass valves that are used for other purposes.
5. Check open compressor-motor alignment and verify lubrication for motors and bearings.

E. Replace core of replaceable filter dryer after system has been adjusted and after design flow rates and pressures are established.

END OF SECTION 232300

SECTION 238240 – DX MINI-SPLITS SYSTEM

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.

C. Section 230500 also applies to this Section.

1.2 WORK INCLUDED

A. Furnish and install all terminal heat pump units of the type, size and capacity as scheduled.

B. Units shall be UL, FM Global and AGA listed in accordance with the specific unit's heat transfer design and construction.

1.3 RELATED SECTIONS

A. Examine all drawings and criteria sheets and all other Sections of the Specifications for requirements which affect work under this Section whether or not such work is specifically mentioned in this Section.

1.4 REFERENCES

A. Applicable provisions of the following Codes and Trade Standard Publications shall apply to the work of this Section, and are hereby incorporated into, and made a part of the Contract Documents.

B. Material standards shall be as specified or detailed hereinafter and as following:

1. UL 1025-89 – Electric Air Heaters.

2. FM Global

3. UL 1042-86 – Electric Baseboard Heating Equipment.

4. ASHRAE 90.1 – Energy Efficient Design of New Buildings Except Low-Rise Residential Buildings.

5. NFPA 54 – National Fuel Gas Code.

6. NFPA 90A – Installation of Air Conditioning and Ventilating Systems.

7. NFPA 90B – Installation of Warm Air Heating and Air Conditioning Systems.

8. NFPA 211 – Chimneys, Fireplaces, Vents and Solid Fuel Burning Appliances.

1.5 SYSTEM DESCRIPTION

A. Furnish and install all heat pump, controls, piping, wiring, enclosures, access doors, etc. to make a complete and operational system.

B. All enclosures shall be installed with aligning strips, plaster frames and end trims so as to provide a neat architectural finish.

C. All equipment shall be new and shall be of the type, style, size and capacities as scheduled. All radiation enclosures shall be continuous and of the same finish and style as adjacent enclosures.

1.6 SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. See Section 230500 for additional requirements.

C. Product Data: Provide typical catalog of information including arrangements.

D. Shop Drawings:

1. Submit schedules of equipment and enclosures typically indicating length and number of pieces of element and enclosure, corner pieces, end caps, cap strips, access doors, pilaster covers and comparison of specified heat required to actual heat output provided.

a. Indicate cross sections of cabinets, grilles, bracing and reinforcing, mounting details and insulation if required and typical elevations.

b. Indicate flows, pressure drops (including interconnecting piping for radiant panels), heat outputs and mean temperatures.

c. Indicate mechanical and electrical service locations and requirements.

E. Manufacturer's Instructions: Indicate installation instructions and recommendations.

F. Project specific installation instructions and details.

G. Project Record Documents: Record actual locations of components and locations of access doors in radiation cabinets and ceiling panels required for access or valving.

H. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data and parts listings.

I. Warranty: Submit manufacturer's warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.7 CLOSEOUT SUBMITTALS

A. Submit closeout submittals in accordance with Form 816 Article 1.20-1.05.02, NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS.

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. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum ten (10) years of documented experience.

C. Products Requiring Electrical Connection: Listed and classified by Underwriter's Laboratories Inc. testing firm acceptable to the authority having jurisdiction and suitable for the purpose specified and indicated.

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. Delivery of materials shall be made to the project by the materials supplier in accordance with the instructions to the Contractor.

C. The Contractor shall provide adequate locked storage space with shelving for the materials, shall be responsible for all items of materials after receipt from the supplier, and shall replace all materials lost or damaged after delivery and receipt.

D. The Contractor shall furnish the materials supplier with receipts for all materials and accessory items received and shall send copies of these receipts to the Architect.

1.10 WARRANTY

A. Refer to Form 816, Article 1.20-1.06.08, and the NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information.

PART 2 - PRODUCTS

2.1 BUY AMERICA COMPLIANCE

A. Products must meet Buy America requirements. Refer to NOTICE TO CONTRACTOR – BUY AMERICA for additional information.

2.2 ACCEPTABLE MANUFACTURERS

A. Mitsubishi-Multi City or approved equal.

2.3 System Description

The Heat Pump system shall be a Mitsubishi Electric split system with Variable Speed Inverter Compressor technology. The system shall consist of a horizontal discharge, single phase outdoor unit, a matched capacity indoor section that shall be equipped with a wired wall mounted and/or wireless handheld remote controller.

2.4 Outdoor Unit Capacity

Outdoor Units		
Model Numbers	Cooling	Heating
PUZ-A18NHA3	18,000	19,000

Quality Assurance

A. The units shall be tested by a Nationally Recognized Testing Laboratory (NRTL) and shall bear the ETL label.
B. All wiring shall be in accordance with the National Electrical Code (N.E.C.) and local codes as required.
C. The units shall be rated in accordance with Air-conditioning, Heating, and Refrigeration Institute's (AHRI) Standard 240 and bear the ARI Certification label.

D. The units shall be manufactured in a facility registered to ISO 9001 and ISO 14001, which is a set of standards applying to environmental protection set by the International Standard Organization (ISO).
E. A dry air holding charge shall be provided in the indoor section.
F. The outdoor unit shall be pre-charged with R-410a refrigerant for 70 feet of refrigerant tubing.- PUZ42NHA3 for 100 feet of refrigerant tubing
G. System efficiency shall meet or exceed SEER / HSPF values below:

When used with Indoor Unit	SEER	HSPF
PKA Wall Mounted Type	14.0	8.9

2.5 Delivery, Storage and Handling

A. Unit shall be stored and handled according to the manufacturer's recommendations.
B. The controller shall be shipped inside the carton with the indoor unit and shall be able to withstand 105°F storage temperatures and 95% relative humidity without adverse effect.

2.6 Warranty

2.7 The units shall have a manufacturer's parts and defects warranty for a period five (5) year from date of installation. The compressor shall have a warranty of seven (7) years from date of installation. If, during this period, any part should fail to function properly due to defects in workmanship or material, it shall be replaced or repaired at the discretion of the manufacturer. This warranty does not include labor.

2.8 Manufacturer shall have over twenty-nine (29) years of continuous experience in the U.S. market.

Part 3 Outdoor Unit Design:

3.01 The outdoor unit shall be compatible with PKA - wall mounted. The connected indoor unit shall be of the same capacity as the outdoor unit.
3.02 The outdoor unit shall be equipped with an electronic control board that interfaces with the indoor unit to perform all necessary operation functions.
3.03 The outdoor unit shall be capable of cooling operation down to 0°F ambient temperature without additional low ambient controls (optional wind baffle shall be required).
3.04 The outdoor unit shall be able to operate with a maximum height difference of 100 feet (30 meters) between indoor and outdoor units.
3.05 System shall operate at up to a maximum refrigerant tubing length of 100 feet for the 18,000 BTU/h units between indoor and outdoor units without the need for line size changes, traps or additional oil. Models PUZ-A18 shall be pre-charged for a maximum of 70 of refrigerant tubing.
3.07 The outdoor unit shall be completely factory assembled, piped, and wired. Each unit must be test run at the factory.

3.08 Outdoor unit sound level shall not exceed:

Outdoor Unit Sound Level		
Model Numbers	Cooling	Heating
PUZ-A18NHA3	46 dB(A)	47 dB(A)

3.09 Cabinet

3.2.1 The casing shall be constructed from galvanized steel plate, finished with an electrostatically applied, thermally fused acrylic or polyester powder coating for corrosion protection and have a Munsell 3Y 7.8/1.1 finish.

3.2.2 Mounting feet shall be provided and shall be welded to the base of the cabinet and be of sufficient size to afford reliable equipment mount and stability.

3.2.3 Easy access shall be afforded to all serviceable parts by means of removable panel sections.

3.2.4 The fan grill shall be of ABS plastic.

3.2.5 Cabinet mounting and construction shall be sufficient to withstand 155 MPH wind speed conditions for use in Hurricane condition areas. Mounting, base support, and other installation to meet Hurricane Code Conditions shall be by others.

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3.10 Fan

3.10.1 Models PUZ-A18shall be furnished with a single AC fan motor.

3.10.2 The fan blade(s) shall be of aerodynamic design for quiet operation, and the fan motor bearings shall be permanently lubricated.

3.10.3 The outdoor unit shall have horizontal discharge airflow. The fan shall be mounted in front of the coil, pulling air across it from the rear and dispelling it through the front. The fan shall be provided with a raised guard to prevent external contact with moving parts.

3.11 Coil

3.11.1 The L shaped condenser coil shall be of copper tubing with flat aluminum fins to reduce debris build up and allow maximum airflow. The coil shall be protected with an integral metal guard.

3.11.2 Refrigerant flow from the condenser shall be controlled by means of an electronic linear expansion valve (LEV) metering device. The LEV shall be control by a microprocessor controlled step motor.

3.11.3 All refrigerant lines between outdoor and indoor units shall be of annealed, refrigeration grade copper tubing, ARC Type, meeting ASTM B280 requirements, individually insulated in twin-tube, flexible, closed-cell, CFC-free (ozone depletion potential of zero), elastomeric material for the insulation of refrigerant pipes and tubes with thermal conductivity equal to or better than 0.27 BTU-inch/hour per Sq Ft / °F, a water vapor transmission equal to or better than 0.08 Perm-inch and superior fire ratings such that insulation will not contribute significantly to fire and up to 1” thick insulation shall have a - Flame-Spread Index of less than 25 and a Smoke-development Index of less than 50 as tested by ASTM E 84 and CAN / ULC S-102.

3.12 Compressor

3.12.1 The compressor for models PUZ-A18 shall be a DC twin-rotor rotary compressor with Variable Speed Inverter Drive Technology.

3.12.2 The compressor shall be driven by inverter circuit to control compressor speed. The compressor speed shall dynamically vary to match the room load for significantly increasing the efficiency of the system which shall result in significant energy savings.

3.12.3 To prevent liquid from accumulating in the compressor during the off cycle, a minimal amount of current shall be automatically, intermittently applied to the compressor motor windings to maintain sufficient heat to vaporize any refrigerant. No crankcase heater is to be used.

3.12.4 The outdoor unit shall have an accumulator and high pressure safety switch. The compressor shall be mounted to avoid the transmission of vibration.

3.13 Electrical

3.13.1 The electrical power of the unit shall be 208volts or 230 volts, single phase, 60 hertz. The unit shall be capable of satisfactory operation within voltage limits of 198 volts to 253 volts.

3.13.2 Power for the indoor unit shall be supplied from the outdoor unit via Mitsubishi Electric A-Control using three (3) fourteen (14) gauge AWG conductors plus ground wire connecting the units.

3.13.3 The outdoor unit shall be controlled by the microprocessor located in the indoor unit. The control signal between the indoor unit and the outdoor unit shall be pulse signal 24 volts DC.

3.14 The unit shall have Pulse Amplitude Modulation circuit to utilize 98% of input power supply.

3.15 Operating Range:

Cooling	Maximum	D.B. 95°F W.B. 71°F	D.B. 115°F
	Minimum	D.B. 67°F W.B. 57°F	D.B. 0°F
Heating	Maximum	D.B. 80°F W.B. 67°F	D.B. 70°F W.B. 59°F
	Minimum	D.B. 70°F W.B. 60°F	D.B. 12°F W.B. 10°F

* Requires wind baffle – without wind baffle: D.B. 23°F

Part 4 - Indoor Unit Selection and Specification

4.1 PKA Wall Mounted Type

The indoor unit shall be factory assembled, wired and tested. Contained within the unit shall be all factory wiring and internal piping, control circuit board and fan motor. The unit, in conjunction with the wired, wall mounted controller or wireless handheld controller, shall have a self-diagnostic function, 3-minute time delay mechanism, an auto restart function, and a test run switch. Indoor unit and refrigerant pipes shall be purged with dry nitrogen before shipment from the factory.

Wall Mounted Type Indoor Units			
Model Number with	Model Number with	Cooling	Heating

Wired Controller	Wireless Controller	Capacity	Capacity
PKA-A18HA	PKA-A18HAL	18,000	20,000

4.1.1 Unit Cabinet: The cabinet shall be formed from high strength molded plastic with smooth finish, flat front panel design with access for filter. Cabinet color shall be white – Munsell 1.0Y 9.2/0.2. The unit shall be wall mounted by means of a factory supplied, pre-drilled, mounting plate.

4.1.2 Fan: The indoor unit fan shall be high performance, double inlet, forward curve, direct drive sirocco fan with a single motor. The fans shall be statically and dynamically balanced and run on a motor with permanently lubricated bearings. The indoor fan shall consist of three (3) speeds: Low, Mid, and Hi and Auto. The fan shall have a selectable Auto fan setting that will adjust the fan speed based on the difference between controller set-point and space temperature.

Indoor unit sound level shall not exceed the levels below:

Model Number	Low Speed	Mid Speed	High Speed
PKA-A18HA(L)	36 dB(A)	40 dB(A)	43 dB(A)

4.1.3 Vane: There shall be a motorized horizontal vane to automatically direct air flow in a horizontal and downward direction for uniform air distribution. The horizontal vane shall significantly decrease downward air resistance for lower sound levels, and shall close the outlet port when operation is stopped. There shall also be a set of vertical vanes to provide horizontal swing airflow movement.

4.1.4 Filter: Return air shall be filtered by means of an easily removable washable filter.

4.1.5 Coil: The evaporator coil shall be of nonferrous construction with pre-coated aluminum strake fins on copper tubing. The multi-angled heat exchanger shall have a modified fin shape that reduces air resistance for a smoother, quieter airflow. All tube joints shall be brazed with PhosCopper or silver alloy. The coils shall be pressure tested at the factory. A condensate pan and drain shall be provided under the coil. A condensate mini-pump shall be provided .

4.1.6 Electrical: The electrical power of the unit shall be 208 volts or 230 volts, 1 phase, 60 hertz. The system shall be capable of satisfactory operation within voltage limits of 198 volts to 253 volts. The power to the indoor unit shall be supplied from the outdoor unit, using the Mitsubishi Electric A-Control system. For A-Control, a three (3) conductor AWG-14 wire with ground shall provide power feed and bi-directional control transmission between the outdoor and indoor units.

4.1.7 Performance: Each system shall perform in accordance to the ratings shown in the table below. Cooling performance shall be based on 80°F DB, 67°F WB for the indoor unit and 95°F DB, 75°F WB for the outdoor unit. Heating performance shall be based on 70°F DB, 60°F WB for the indoor unit and 47°F DB, 15°F WB for the outdoor unit.

System Model Number	Cooling Capacity Btu/h	Heating Capacity Btu/h	TPW Cooling	TPW Heating	SEER	HSPF IV (V)	CFM (Hi/Dry)
PKA-A18HA(L)	8,000 – 18,000	8,000 – 19,000	2.240	1,970	15.3	9.5 (7.6)	425

TPW = Total Power Watts

System Control: The control system shall consist of a minimum of two (2) microprocessors, one on each indoor and outdoor unit, interconnected by a single non-polar two-wire cable. Field wiring shall run directly from the indoor unit to the wall mounted controller with no splices. The microprocessor located in the indoor unit shall have the capability of monitoring return air temperature and indoor coil temperature, receiving and processing commands from the wired controller, providing emergency operation and controlling the outdoor unit. The control voltage from the wired controller to the indoor unit shall be 12/24 volts, DC. The control signal between the indoor and outdoor unit shall be pulse signal 24 volts DC. Up to two wired controllers shall be able to be used to control one unit.

4.1.8 For A-Control, a three (3) conductor 14 ga. AWG wire with ground shall provide power feed and bi-directional control transmission between the outdoor and indoor units. . If code requires a disconnect mounted near the indoor unit, a TAZ-MS303 3-Pole Disconnect shall be used – all three conductors must be interrupted.

4.1.9 The system shall be capable of automatic restart when power is restored after power interruption. The system shall have self-diagnostics ability, including total hours of compressor run time. Diagnostics codes for indoor and outdoor units shall be displayed on the wired controller panel.

4.1.10 The indoor unit control board shall have auxiliary control contact connectors to provide:

Function / Model	PCA	PEA / PEAD	PKA	PLA
CN-2L – Lossnay Control	X	X	X	X
CN-24(152) Back-up Heat	X	X	X	X
CN-32 – Remote Switch	X	X	X	X
CN-51 – Central Control	X	X	X	X
CN-105 – IP Terminal	X	X	X	X

X = Included

4.1.11 The indoor unit shall be connected to a wall mounted wired controller to perform input functions necessary to operate the system. The wired controller shall have a large multi-language DOT liquid crystal display (LCD) presenting contents in eight (8) different languages, including English, French, Chinese, German, Japanese, Spanish, Russian, and Italian. There shall be a built-in weekly timer with up to eight pattern settings per day. The controller shall consist of an On/Off button, Increase/Decrease Set Temperature buttons, a Heat/Cool/Auto/Dry mode selector, a Timer Menu button, a Timer On/Off button, Set Time buttons, a Fan Speed selector, a Ventilation button, a Test Run button, and a Check Mode button. The controller shall have a built-in temperature sensor. Temperature shall be displayed in either Fahrenheit (°F) . Temperature changes shall be by increments of 1°F with a range of 67°F to 87°F.

4.1.12 The wired controller shall display operating conditions such as set temperature, room temperature, pipe temperatures (i.e. liquid, discharge, indoor and outdoor), compressor operating conditions (including running current, frequency, input voltage, On/Off status and operating time), LEV opening pulses, sub cooling and discharge super heat. Normal operation of the wired controller shall provide individual system control in which one wired controller and one indoor unit are installed in the same room. The controller shall have the capability of controlling up to a maximum of sixteen systems, as a group with the same mode and set-point for all, at a maximum developed control cable distance of 1,500 feet (500 meters).

4.1.13 Control system shall provide On/Off and mode switching. The controller shall have the capability to provide sequential starting with up to fifty seconds delay.

4.1.14 PKA- L Version with wireless remote control

The unit shall have a wireless remote controller to perform input functions necessary to operate the system. With the controller, a wireless receiver assembly must be furnished which shall be plug and fit compatible with the indoor unit.

4.1.14.1 The controller shall have a Power On/Off switch, Mode Selector – Cool, Dry, Heat, Auto, and Powerful Modes - Temperature Setting, Timer Control, Fan Speed Select and Horizontal and Vertical Vane control selector. There shall be an i-See® Sensor Area Selector control. The indoor unit shall perform Self-diagnostic Function and Check Mode switching. Temperature changes shall be in 1ºF increments with a setting range of 61 to 88ºF.

4.1.14.2 The microprocessor located in the indoor unit shall have the capability of sensing return air temperature and indoor coil temperature, receiving and processing commands from the wireless or a wired controller, providing emergency operation and controlling the outdoor unit.

END OF SECTION 238240

SECTION 260500 – COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 APPLICATION

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.

C. This Section applies to all sections of Division 26 of this Contract, except if specified otherwise in the individual section.

D. Electrical work, equipment and material shall be only that suitable for a commuter railroad station and shall be of the highest class, and shall be applied in the best manner and according to the best rules and usages of electric work. Where no specific requirements are given, the work and materials shall conform to the latest applicable standards of material and construction of nationally recognized associations.

1.2 SUBMITTALS

A. Submit the following in accordance with Standard Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. In accordance with the General and Special Conditions, specific items requiring submittals are specified in each individual section of Division 26. Shop drawings shall be submitted for review before procurement, fabrication, or delivery of such items to the jobsite. Partial submittals are not acceptable; such submittals will be returned without review.

C. Manufacturer's Data: Submittals for each manufactured item shall be manufacturer's descriptive literature, equipment drawings, diagrams, performance and characteristic curves, and catalog cuts. Each submittal shall include the manufacturer's name, trade name, catalog model or number, nameplate data, size, layout dimensions, capacity, specification reference, applicable Federal and industry specification references, and all other information necessary to establish Contract compliance.

D. Shop Drawings shall show types, sizes, accessories, elevations, floor plans, sectional views, installation details, elementary diagrams, and interconnection wiring diagrams. Wiring diagrams shall identify circuit terminals and shall indicate the internal wiring for each item of equipment and the interconnection between the items both internal and external. Point to point wiring diagrams are required. Elementary wiring diagrams shall contain a sequence of equipment operation. Contractor shall submit conduit routing drawings and station composite drawings detailing electrical equipment installation layouts for approval by Connecticut DOT/Amtrak prior to performing construction work. Drawings shall also indicate adequate clearance for operation, maintenance, and replacement of operating equipment devices. If any equipment is nonconforming, the drawings shall be revised to show acceptable equipment and be resubmitted.

E. Standards Compliance: When materials or equipment are required to conform to the standards or organizations such as the American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), National Electrical Manufacturer's Association (NEMA), or Underwriters Laboratories (UL), proof of such conformance shall be submitted to the Engineer for approval. If an organization uses a label or listing to indicate compliance with a particular standard, the label or listing will be acceptable evidence, unless otherwise specified in the individual sections. In lieu of the label or listing, the Contractor shall submit a certificate from an independent testing organization competent to perform acceptable tests 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 conforms to the specified organization's standard. For materials and equipment whose compliance with organizational standards or specifications is not regulated by an organization using its own listing or label as proof of compliance, a certificate of compliance from the manufacturer shall be submitted for approval. The certificate shall identify the manufacturer, the product, and the referenced standard and shall state that the manufacturer certifies that the product conforms to all requirements of the project specification and of the referenced standards listed.

F. Certified Test Reports: Before delivery of materials and equipment, certified copies of all test reports specified in the individual sections shall be submitted for approval.

G. Operation and Maintenance Manual: Submit where necessary conform to the requirements of Standard Form 816.

1.3 POSTED OPERATING INSTRUCTIONS

A. Operating instructions approved by Connecticut DOT/Amtrak shall be provided for each system and each principal piece of equipment for the use of operation and maintenance personnel. The operating instructions shall include wiring and control diagrams showing the complete layout of the entire system, including equipment,

devices, and control sequence. Operating instructions shall be printed or engraved and shall be framed under glass or in approved laminated plastic and posted where directed by the Engineer. Operating instructions shall be attached to or posted adjacent to each principal piece of equipment and shall include such instructions as startup, proper adjustment, operating lubrication, shutdown, safety precautions, procedure in the event of equipment failure, and any other necessary items of instruction as recommended by the manufacturer of the unit. Operating instructions exposed to the weather shall be made of weather-resisting materials or shall be suitably enclosed to be weather protected. Operating instructions shall not fade when exposed to sunlight and shall be secured to prevent easy removal or peeling.

1.4 QUALITY ASSURANCE

A. Source limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

1.5 DELIVERY AND STORAGE

B. Refer to Form 816 Article 1.06.03 and Form 816 Article 1.20-1.06.03 for additional information.

C. Equipment and materials shall be properly stored, adequately protected and carefully handled to prevent damage before and during installation. Equipment and materials shall be handled, stored, and protected in accordance with the manufacturer's recommendations and as approved by the Engineer. Electrical conduit shall be stored to provide protection from the weather and accidental damage. Cables shall be sealed, stored, and handled carefully to avoid damage to the outer covering or insulation and damage from moisture and weather. Outdoor storage of cable will not be permitted. Damaged or defective items, in the opinion of the Engineer, shall be replaced with new items at no additional cost to Amtrak.

1.6 CATALOGED PRODUCTS

A. Source limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

B. Materials and equipment shall be the cataloged products of manufacturers regularly engaged in production of such materials or equipment and shall be manufacturer's latest standard design that complies with the specification requirements. When two or more units of the same type, class, and size of equipment are required, these units shall be products of a single manufacturer; however, the component parts of the system need not be the products of the same manufacturer. Each major component of equipment shall have the manufacturer's name, address and the model and serial number on a nameplate securely affixed in a conspicuous place, the nameplate of the distributing agent will not be

acceptable.

1.7 MANUFACTURER'S RECOMMENDATIONS

A. Where installation procedures are specified to comply with the recommendations of the manufacturer of the material or equipment being installed, printed copies of these recommendations shall be furnished to the Engineer prior to installation. Installation of the item will not be allowed to proceed until the recommendations are received. Failure to furnish these recommendations can be cause for rejection of the material.

1.8 MECHANICAL REQUIREMENTS

A. The interconnecting power wiring and conduit, control wiring and conduit as indicated on the drawings, and the electrical power circuits are included under this division. The electrical components of mechanical equipment, such as motors, motor starters, control or push-button stations, float or pressure switches, solenoid valves, and other devices functioning to control mechanical equipment, and control wiring and conduit not indicated on the drawings are specified in the appropriate sections covering such work rather than in Division 26.

1.9 COORDINATION

A. Electrical work shall be coordinated with other trades involved in the construction project. All work shall be carefully laid out in advance, coordinating electrical features with architectural, structural, and mechanical features of construction.

1.10 COORDINATION WITH UTILITIES AND CONNECTICUT DOT/AMTRAK

A. Contractor shall comply with all local power company requirements.

B. Contractor shall contact the local telephone company and arrange for installation of telephone equipment.

1.11 CODES, LISTINGS AND STANDARDS

A. Electrical Codes: All electrical work covered by the Contract Documents shall conform to the requirements of National Electrical Code, 2011 Edition, and all other state and local codes as required.

B. Listings: All equipment and materials for which Underwriters Laboratories, Inc. (UL) provides product listing service shall be Underwriters Laboratories approved and bear the U.L. Label.

C. Equipment and materials wherever applicable shall conform to the following standards:

1. Illuminating Engineering Society (IES).

2. National Electrical Manufacturers Association (NEMA).

3. Institute of Electrical and Electronic Engineers (IEEE).

4. American National Standards Institute (ANSI).

5. Insulated Cable Engineers Association (ICEA).

1.12 ENCLOSURES

A. Furnish NEMA enclosures to suit location classification, unless otherwise shown on the drawings. The platform area shall be considered NEMA 4X utilizing stainless steel covers and PVC coated boxes and fittings.

1.13 POWER SUPPLY

A. Power will be obtained from the three phase, four wire, 60 hertz, 480/277 V existing service.

1.14 TEMPORARY SERVICE

A. The Electrical Contractor shall furnish and install a temporary 208/120V, 3-phase, 4-wire electric service if necessary during construction. This service shall be obtained from the existing installation if approved by owner or directly from utility, in which case will be furnished complete with main disconnect, overcurrent protection, meter outlet, branch circuit breakers and wiring as required.

B. The Electrical Contractor shall make all necessary arrangements, and pay for permits and inspections and utility charges for the temporary service installation. Temporary systems shall comply with and meet the approval of Underwriters Inspection Agency authorized for the project.

C. Temporary service meter shall be registered in the name of the General Contractor and all energy charges for furnishing temporary electric power and construction power shall be borne by the Electrical Contractor.

D. Upon completion of the work, but prior to acceptance by Connecticut DOT/Amtrak, the Electrical Contractor shall remove all equipment associated with temporary service. The cost of such removals shall be included in the bid price.

1.15 PERMANENT ELECTRIC POWER SERVICE & EQUIPMENT

A. It shall be the responsibility of the Contractor to obtain all information required relative to connecting into the power supply. The Contractor shall abide by the requirements and if disagreement arises shall inform the Engineer of such disagreement. The Engineer will then consult with the owner/utility company and any decisions resulting therefrom shall be binding on the Contractor.

B. The Contractor shall submit shop drawings showing the proposed service equipment for compliance with the company's requirements as to service and metering arrangements including property line splice box/C.T. cabinet and termination devices, etc. if necessary. Connecticut DOT/Amtrak shall approve any changes.

1.16 GROUNDING

A. No ground connections to the track rails or to the neutral conductor of the utility feeder will be permitted.

1.17 LIGHTING FIXTURES

A. The Contractor shall not proceed with the manufacture or installation of any lighting fixtures before approval of the Engineer is obtained.

B. The Contractor shall submit engineering data for the lighting fixtures to be installed under this Contract as specified in Section 265600.

1.18 SAMPLES OF ELECTRICAL EQUIPMENT

A. The Contractor shall submit samples of conduits, boxes, fixtures, wiring and other equipment for approval before proceeding with the electrical work.

1.19 SPECIAL REQUIREMENT FOR APPROVAL OF "OR EQUAL" ELECTRICAL DEVICES

A. The electrical distribution system as specified and shown on the Contract Drawings has been designed to provide system protection and selectivity on inrush, starting, normal overcurrent and ground fault conditions. Any request to install devices other than those specified and shown on the Contract Drawings shall include sufficient information to determine their equality with the devices specified. This information shall include, but not be limited to, the following:

1. For fuses and circuit breakers, time-current curves for the proposed devices comparing them to the devices specified and shown on the Contract Drawings. Manufacturer's curves shall be considered acceptable for this purpose of system protection and selectivity.

2. For transformers, the percent impedance and X/R ratio as supplied by the proposed manufacturer shall be considered acceptable for this purpose of system protection.

3. In addition, the Contractor is required to provide a complete system coordination study to show equality of the proposed devices, prior to their approval.

1.20 EXISTING CONDITIONS AND RELOCATIONS

A. The Contractor, before submitting his proposal, shall visit the site and shall be responsible for having ascertained local conditions, such as location, accessibility and general character of the site, the character and extent of any existing work within or adjacent to the site, and any other work being performed on the site at the time of submitting his proposal. The Contractor shall fully examine all the drawings relating to the work and shall become completely informed as to the extent and character of the work required and prevailing existing conditions. No allowances will be made for the Contractor's failure to avail himself of such information.

1.21 LOCATIONS - APPROXIMATE

A. The locations of equipment, boxes, switches, outlets, and similar matters as shown on the Contract Drawings are approximate only and exact locations shall be determined in the field by the Contractor. In case of interference with other work or of erroneous locations with respect to equipment or structures the Contractor shall furnish all labor and materials to complete the work in an approved manner, at no additional cost to Connecticut DOT/Amtrak.

1.22 DRAWINGS - DIAGRAMMATIC

A. Conduits and wiring are shown diagrammatically only and in some cases only homeruns are shown. Contractor shall furnish, install, and place in satisfactory condition ready for operation, all conduits, cables, and all other material needed for lighting, power, and other electrical systems shown or indicated in the Contract Documents. Additional conduits and the required wiring shall be installed by the Contractor wherever needed to complete the installation of the specific equipment furnished and to meet NEC requirements at no additional cost to the Connecticut DOT/Amtrak.

1.23 PAINTING

A. All shop painting shall be accomplished at the manufacturer facilities meeting ANSI standards and shall be included in the bid price for equipment and materials furnished under this division. All scratched or base surfaces of factory painted equipment shall be touched up with the same color paints as used originally.

1.24 CLOSEOUT PROCEDURES

A. General coordination is required. Closeout procedures shall be sequenced properly so that work will not be endangered or damaged, and that every required performance will be fully tested and demonstrated.

B. System performance test runs are required. Test runs of electrical systems shall be coordinated with test runs of equipment served.

C. During test runs, the Contractor shall make final corrections or adjustments of systems to refine and improve performances where possible, including noise and vibration reductions, elimination of hazards, better response of controls, signals and alarms, and similar system performance improvements.

D. Cleaning and lubrication is required. After final performance test run of each electrical system, the Contractor shall clean system both externally and internally and shall comply with manufacturer's instructions for lubrication. Contractor shall remove excess lubrication, touch up minor damage to factory-painted finishes.

1.25 DOCUMENTATION PROCEDURES

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02, NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS.

B. Signed commitments are required. The transfer of the electrical system to Connecticut DOT/Amtrak for operation will not proceed until guarantees, warranties, performance certifications, maintenance agreements and similar commitments to be signed by Contractor and other entities have been executed and transmitted to Connecticut DOT/Amtrak for placement in records.

1.26 GUARANTEE

A. Refer to Form 816, Article 1.20-1.06.08, and the NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information.

B. The Contractor shall guarantee and service the entire installation for a period of one (1) year from the date of the final acceptance of the installation by

Connecticut DOT/Amtrak.

C. The Contractor shall, during the period of the guarantee, replace or repair at his own expense any piece of equipment and/or material which is found to be defective. The replacement or repair shall be done as soon as notified by Connecticut DOT/Amtrak or its authorized representative. The Contractor shall also repair all damage to surrounding work caused by the failure, repair or replacement of the defective equipment or material.

1.27 CONTRACTOR'S RESPONSIBILITIES

A. The Contractor shall furnish and install all electrical equipment, materials and also labor, machinery, tools, transportation, procurement of all necessary permits, certificates and other incidental services, whether described in these specifications and drawings or not, to provide a satisfactory operating electrical installation.

B. The Contractor shall familiarize himself with the installation requirements of the local electrical utilities, and shall furnish and install the equipment in complete accordance therewith.

C. Contractor shall perform all operations necessary to install, adjust and put into satisfactory operation all electrical equipment.

D. Contractor shall provide and install conduits, cable and electrical connections, adjustments, and testing of mechanical equipment that requires electrical power.

E. Contractor shall install UL Listed firestop material on all rated walls per Specification 230584 “Through-penetration firestop systems”.

F. Providing and installing all required systems and equipment grounding as required to properly ground all system equipment in conformance with the latest requirements of the NEC and best modern practice.

G. The specifications and Contract Drawings are complimentary; items shown in one, but not in the other shall be as binding as if included in both. Where there is a discrepancy, the Contractor shall assume the most expensive material and/or method of installation for bidding purposes and refer the discrepancy to the Engineer for a decision.

1.28 RECORD DRAWINGS

A. The Contractor shall furnish to the Engineer two (2) CD’s of record drawings in Microstation format and two (2) sets of black-on-white prints, satisfactory to Connecticut DOT/Amtrak, of all electrical equipment installed under this Contract, showing:

1. Electrical equipment as finally installed.

2. The Contractor's approved working drawings.

3. The Manufacturer's name and address.

B. These reproductions and black-on-white prints shall be 26 inches by 32 inches.

C. Drawings:

1. Individual detail wiring drawings shall be furnished showing all connections to all equipment in the final systems furnished or modified under this contract, and drawings showing cable and conduit runs as installed.

2. Final as-built layout drawings of field equipment, for the various types of installations, shall be furnished by the Contractor.

D. Before field installation work shall commence, the Contractor shall submit for approval the drawings that he is required to furnish as specified elsewhere herein.

E. There shall be no substantial completion until all final drawings and manuals have been received by Connecticut DOT/Amtrak.

F. There shall be no final acceptance of contract until all final drawings and manuals have been received by Connecticut DOT/Amtrak.

G. The guarantee shall not start until all final drawings and manuals have been delivered to Connecticut DOT/Amtrak.

H. The Contractor shall be responsible for and shall correct all wiring diagrams of telephone terminal boxes.

I. All manuals provided by the Contractor shall be originals. Copies of original manuals will not be acceptable.

1.29 CLEAN UP

A. The Contractor shall execute cleaning, during progress of the Work, including periods when Work is suspended and at completion of the Work.

B. Requirements of Regulatory Agencies:

1. In addition to the requirements herein, maintain the cleanliness of the Work and surrounding premises within the Work limits so as to comply with federal and local fire and safety laws, ordinances, codes and regulations.

2. Comply with all federal and local anti-pollution laws, ordinances, codes and regulations when disposing of waste materials, debris and rubbish.

C. The Contractor shall schedule cleaning and disposal operations:

1. So that dust, wash water or other contaminants generated during such operations do not damage or mar painted or finished surfaces.

2. To prevent accumulation of dust, dirt, debris, rubbish and waste materials on or within the Work or on the premises surrounding the Work.

D. Waste Material Disposal:

1. Dispose of all waste materials, surplus materials, debris and rubbish off the Project site.

2. Do not burn or bury rubbish and waste materials on the Project site.

3. Do not dispose of volatile or hazardous wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains.

4. Do not discharge wastes into streams or waterways.

E. Cleaning Materials:

1. Use only cleaning materials recommended by manufacturer of surface to be cleaned.

2. Use each type of cleaning material on only those surfaces recommended by the cleaning material manufacturer.

3. Use only materials which will not create hazards to health or property.

F. During Construction:

1. Keep the Work and surrounding premises within work limits free of accumulations of dirt, dust, waste materials, debris and rubbish.

2. Keep dust generating areas wetted down.

3. Provide suitable containers for storage of waste materials, debris and rubbish until time of disposal.

4. Dispose of waste, debris and rubbish off site at legal disposal areas.

G. When the Project is completed, the Contractor shall:

1. Remove and dispose of all excess or waste materials, debris, rubbish, and temporary facilities from the site, structures and all facilities.

2. Repair pavement, roads, sod, and all other areas affected by construction operations and restore them to original condition or to minimum condition specified.

3. Remove spatter, grease, stains, fingerprints, dirt, dust, labels, tags, packing materials and other foreign items or substances from interior and exterior surfaces, equipment, signs and lettering.

4. Repair, patch and touch-up chipped, scratched, dented or otherwise marred surfaces to match specified finish.

5. Remove paint, clean and restore all equipment and material nameplates, labels and other identification markings.

6. Clean all floors, slabs, pavements, and ground surfaces.

7. Maintain cleaning until acceptance and occupation by Connecticut DOT/Amtrak.

PART 2 - PRODUCTS

A. Products must meet Buy America requirements. Refer to NOTICE TO CONTRACTOR – BUY AMERICA for additional information.

PART 3 - EXECUTION

Not Used.

END OF SECTION 260500

SECTION 260519 LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.1 SUMMARY

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.

C. Section includes wires and cables and wiring connectors and connections.

D. Related Sections:
1. Section 260553 - Identification for Electrical Systems
2. Section 260533 – Raceway and Boxes for Electrical Systems.

E. The Contractor shall supply, install, test and commission into service, all conductors indicated on the drawings.

1.2 REFERENCES

A. National Fire Protection Association (NFPA), including the National Electrical Code (NFPA 70) and NFPA 130

B. American National Standards Institute (ANSI).

C. Institute of Electrical and Electronics Engineers (IEEE).

D. Underwriters Laboratories Inc. (UL).

E. National Electrical Manufacturers Association (NEMA).

F. Insulated Cable Engineers Association (ICEA).

1.3 SYSTEM DESCRIPTION

A. Product Requirements: Provide products as follows:
   1. All wire and cable shall have copper conductors except where indicated otherwise. Copper wires shall be soft drawn, annealed, 98 percent conductivity.
   2. Stranded conductor for feeders and branch circuits.
   3. Conductor not smaller than 10 AWG for power and lighting circuits. 120-volt branch circuits of more than 100 ft and 277-volt branch circuits of more than 150 ft from center of load to panel shall be No. 10 AWG minimum.

B. Wiring Methods: Provide the following wiring methods:
   1. Concealed Dry Interior Locations: Use only XHHW-2 insulation, in raceway.
   2. Exposed Dry Interior Locations: Use only XHHW-2 insulation, in raceway.
   3. Wet or Damp Interior/Exterior Locations: Use only XHHW-2 insulation, in raceway.

1.4 DESIGN REQUIREMENTS

A. Conductor sizes are based on copper.

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, Submittal Requirements:
   Before installation of wires and cables, submit the following information for each type and size of wire and cable:
   l. Manufacturer of wire and cable, and certificate of compliance;
   2. Number and size of strands composing each conductor;
   3. Conductor insulation composition type in accordance with National Electrical Code and thickness in mils;
   4. Average overall diameter of finished wire and cable;
   5. Minimum insulation resistance in megohms per 1000 feet at 30 degrees C ambient;
   6. Jacket composition and thickness in mils;
   7. Total number of conductors per cable;
   8. Shield material (if any) and thickness;

1.6 CLOSEOUT SUBMITTALS

A. Submit closeout submittals in accordance with Form 816 Article 1.20-1.05.02, NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS.

1.7 QUALITY ASSURANCE

A. Source limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

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.

1.9 WARRANTY

A. Refer to Form 816, Article 1.20-1.06.08, and the NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information.

1.10 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

1.11 COORDINATION

A. Where wire and cable destination is indicated and routing is not shown the contractor shall determine routing and lengths required.

B. Wire and cable routing indicated is approximate and shall be recalculated by contractor.

PART 2 PRODUCTS

2.1 BUY AMERICA COMPLIANCE

A. Products must meet Buy America requirements. Refer to NOTICE TO CONTRACTOR – BUY AMERICA for additional information.

2.2 WIRES

A. Manufacturers:
1. American Insulated Wire Corporation.
   Or
2. Approved equal

B. Product Description: Single conductor 600 volt insulated wire.

C. Conductor: Compressed concentric stranded copper. The connection lug shall be adequately sized for compressed cables.

D. Insulation: Type XHHW-2 insulation conforming to UL 44 for feeders and branch circuits.

2.3 WIRING CONNECTORS

A. Insulated Spring Wire Connectors: Buchanan Construction Products or approved equal.

B. Insulated Crimp Connectors: Buchanan Construction Products or approved equal.

C. Uninsulated Crimp Connectors: Burndy Corp. Hydent or approved equal.

D. Wireway Taps: O-Z/Gedney Co. PMX or PT, with covers PMXC or PTC, or approved equal.

E. Terminals: Burndy Corp. Nylon insulated terminals or approved equal.

F. Lugs: Burndy Corp. or approved equal.

G. Rubber Electrical Tape: 3M or approved equal.

H. Color Coding Tape: 3M or approved equal.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify interiors have been protected from weather.

B. Verify mechanical work likely to damage wire and cable has been completed.

C. Verify raceway installation is complete and supported.

3.2 PREPARATION

A. Completely and thoroughly swab raceway before installing wire.

B. Transmit submittals required by this Section.

C. Furnish products as indicated.

3.3 EXISTING WORK

A. Contractor will submit demolition plans of the existing work that shall be removed.

3.4 INSTALLATION

A. Route wire and cable to meet project conditions.

B. Neatly train and lace wiring inside boxes, equipment, and panel boards.

C. Identify wire and cable under provisions of Section 260553. Identify each conductor with its circuit number or other designation indicated.

D. Special Techniques--Building Wire in Raceway:
   1. Pull conductors into raceway at same time.
   2. Install wiring after the raceway system is completed and cleaned, and all work that may damage wiring has been completed.
   3. Pull conductors using only UL listed wire pulling lubricant and polypropylene dragline.

E. Special Techniques - Wiring Connections:
   1. Clean conductor surfaces before installing lugs and connectors.
   2. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
   3. Tape uninsulated conductors and connectors with electrical tape to 150 percent of insulation rating of conductor.
   4. Install split bolt connectors for copper conductor splices and taps, 6 AWG and larger.
   5. Install solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.
   6. Install insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.
   7. Arrange conductors in groups of three phases and neutral (if used) in wireways and large pullboxes
   8. Install splices only in junction boxes.
   9. In dry locations, splice conductors No. 8 AWG and smaller using insulated spring wire connectors or insulated crimp connectors. For conductors No. 6 AWG and larger, use uninsulated crimp connectors and apply electrical filler tape to fill the indentations, and rubber electrical tape to provide insulation equivalent to the conductor insulation.
   10. In damp locations, make splices similar to dry locations, with the addition of moisture-sealing tape over the insulation.
   11. In wet locations, make splices using uninsulated crimp connectors, and insulate with resin splice kits or heat-shrinkable splices.

12. For conductors No. 10 AWG and smaller, use terminals to connect to equipment designed for use with terminals.
13. For conductors No. 8 AWG and larger, use lugs to connect to flat bus bars or to equipment designed for use with lugs.
14. Arrange conductors in cabinets, panels, lighting contactor, panels, etc., neatly cut to proper length, and remove surplus conductor. Terminate, bridle and secure in an approved manner. List all circuits emanating from power, distribution, and lighting panelboards by function on the directory card. Identify all circuits entering panelboards or other control cabinets by directory card listing terminal block number and function or by means of tags securely fastened to the conductors.
15. Single-phase branch circuits of different phases may be installed as multi-wire branch circuits having a common neutral conductor, except that lighting branch circuits shall not share a common neutral with receptacle branch circuits.

3.5 WIRE COLOR

A. Refer to Section 260553

3.6 FIELD QUALITY CONTROL

A. Inspect and test in accordance with NETA ATS, except Section 4.

B. Perform inspections and tests listed in NETA ATS, Section 7.3.1.

END OF SECTION 260519

SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

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. 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.

C. This section specifies furnishing, installing, connecting, and testing of a complete grounding and bonding system.

D. All permanent or temporary metal structures shall be bonded to form a continuous conductive path. All structural steel, including, but not limited to, platform bents, overpass columns, stair stringers or canopy columns, shall be bonded to the main bonding conductor using a 4/0 AWG conductor. All terminations of the conductors shall be exothermic welded.

E. All other non-structural steel shall be bonded to the main bonding conductor using a # 1/0 AWG conductor. This includes, but is not limited to, buildings, bridges, bungalows, fences, metal roofs of buildings, shelters, light poles, communication poles, power poles, metal handrails, metal guardrails, signs, vending machines, metal seating, metal expansion joints, and any ramps.

1.2 REFERENCE STANDARDS

A. American National Standard Institute (ANSI)C33.8/UL6467 Grounding and Bonding Equipment, Safety Standard

B. National Fire Protection Association (NFPA)
70-2011 National Electrical Code (NEC)

C. American Society for Testing And Materials (ASTM)
B3 Soft or Annealed Copper Wire

D. National Electrical Safety Code (NESC)
9 Grounding

E. Association of American Railroads (AAR)

F. American National Standards Institute (ANSI)

G. American Railway Engineering Association (AREA)

H. Institute of Electrical and Electronic Engineers (IEEE)
142 Recommended Practice for Grounding of Industrial and Commercial Power Systems

I. Insulated Power Cable Engineers Association (IPCEA)

J. NEMA National Electrical Manufactures Association

K. Underwriters Laboratories (UL)
467 Grounding and Equipment

1.3 SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. In accordance with the General and Special Conditions, the Contractor shall submit: Certified test report stating that grounding system measures a maximum of 5 ohms to ground.

1.4 CLOSEOUT SUBMITTALS

A. Submit closeout submittals in accordance with Form 816 Article 1.20-1.05.02, NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS.

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.

1.7 WARRANTY

A. Refer to Form 816, Article 1.20-1.06.08, and the NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information.

PART 2 - PRODUCTS

2.1 BUY AMERICA COMPLIANCE

A. Products must meet Buy America requirements. Refer to NOTICE TO CONTRACTOR – BUY AMERICA for additional information.

2.1 GROUNDING AND BONDING EQUIPMENT

A. Ground Rods: Solid ground rod, copper or copper-clad steel, 3/4 inch diameter by 10 feet long, or of required length in 10 foot sections. The copper shall have a minimum wall thickness of 0.013 inch.

B. Grounding Conductor: Ground electrode conductors: Insulated or bare conductor as shown, in accordance with the following requirements:

1. Insulated conductor: Conforming to the requirements for wire as specified elsewhere, NEC or ANSI C33.8/UL 467.

2. Bare conductor ASTM B3: Soft-drawn tinned-copper conductor Class B stranded.

3. Size: Ground wire imbedded in foundations and aerial ground wire shall be 4/0 AWG stranded copper conductor. Connections from the ground grid to ground bus, building steel,and electrical panels shall be 4/0 AWG. Connections to buildings, bridges, bungalows, fences, and metal roofs of buildings, shelters, light poles, communication poles, power poles, metal handrails, metal guardrails, signs, vending machines, metal seating, metal expansion joints, and any ramps shall be # 1/0 AWG.

4. Equipment grounding conductor: Conductors for grounding and bonding shall be ASTM B8, Class B stranded annealed copper, and sized as indicated on the plans. Conforming to the requirements of single-conductor cable as specified in Section 260519, size in accordance with Table 250-122 of NEC.

5. Terminal lugs for 4/0 AWG and smaller conductor: Compression type copper terminal lugs.

6. Ground connector: OZ, Type KG or equal, in accordance with the following requirements:

   a. Two piece, designed for connecting grounding conductor to bus bar.

   b. Copper alloy body and silicon bronze bolt, nut and washer with interlocking clamp.

7. Jumpers: Copper braided flexible jumper, size as required.

PART 3 - EXECUTION

3.1 GROUNDING

A. Grounding Connections:

1. Exothermic weld buried ground connections. Make welds in accordance with manufacturer's requirements, clean and coat with before backfilling.

2. Use terminal lug to connect grounding conductor to equipment enclosure. Use ground connector to connect grounding conductor to equipment ground bus furnished within equipment. Secure connector or terminal lugs to the conductor to engage all strands equally. Install terminal lug using tools and pressure recommended by the manufacturer. Indent mark terminal lug with the number of die used for installation.

B. Ground Loop: Install ground grid consisting of grounding electrode conductors and ground rods buried in earth in a pattern and at locations as shown, with the following requirements:

1. Top of ground rod and grid conductor 30 inches below unfinished surface or 6 inches below bottom of finished floor slab.

2. A #4/0 AWG bonding conductor shall be secured to the underside of the platform at least 12 inches from the edge of the train side of platform, by an approved method at no more than 5-foot intervals.

3. The bonding conductor shall run the entire length of each platform and connect to supporting steel and exposed reinforcing bars.

3. Interconnect ground rods using 4/0 AWG conductor.

C. Equipment Grounding Conductor: Provide equipment grounding conductor for following services and as shown:

1. All feeders.

2. All branch circuits.

D. Grounding of Service Equipment: Ground service equipment in accordance with NEC.

E. Grounding for Personnel Safety: Bond and ground exposed metallic structures in open areas to separate grounding electrode in accordance with the following requirements:

1. Light Standards: Bond and ground each light to a separate 3/4 inch diameter by 10-foot long ground rod, located in adjacent handhole, using 1/0 AWG insulated grounding conductor.

2. Platform: Bond and ground all metallic equipment, structures, railings, benches, columns, fencings, trash cans, gutters, pay phones, shelters, TVM, and all metallic items within 25 feet of tracks, ladders, building steel, water piping, etc., to main ground conductor run on underside of platform. For providing electrical continuity, where necessary, install flexible copper braided jumper or 4/0 AWG insulated grounding conductor.

3. Ground all temporary construction equipment and structures.

Ground all separately derived systems according to Article 250 of the NEC. The grounding of these, such as 120/208 volt transformers will not be shown on the drawings but are the responsibility of the Contractor.

3.2 FIELD QUALITY CONTROL

A. The Contractor shall perform a ground Test. The Engineer shall be notified at least 5 days prior to the test. Ground and weather conditions shall be noted at the time of the test. . Ground resistance is to not to exceed 5 ohms for ground grid/bus in main distribution panels. The Contractor shall provide additional grounding equipment until the ground resistance is measured consistently less than 5 ohms under dry conditions. Measure ground resistance not less than two full days after the last trace of precipitation, and without the soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance. Perform tests, by the fall-of-potential method according to IEEE 81.

B. If insulated grounding conductors are connected to ground rods or grounding buses, insulate entire area of connection and seal against moisture penetration of insulation and cable.

C. Install a driven ground rod at handholes close to wall and set rod depth so 4 inches will extend above finished floor. If necessary, install ground rod before handhole is placed and provide a No. 1/0 AWG bare, tinned-copper conductor within handhole.

D. To meet resistance requirements, install additional ground rods and 4/0 AWG cable.

E. Test equipment enclosure, metallic conduit and raceway, fence, and light standards for continuity to grounding system.

F. Padmounted transformers, install four ground rods and cable loop. Ground padmounted equipment and noncurrent-carrying metal items associated with by connecting them to underground cable and grounding electrodes.

END OF SECTION 260526

SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

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. 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.

C. This section specifies the furnishing and installation of electrical equipment supporting devices complete in place.

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

C. Related Sections:

260533 - Raceway and Boxes for Electrical Systems

260548 – Vibration and Seismic Control for Electrical Systems

1.3 CLOSEOUT SUBMITTALS

A. Submit closeout submittals in accordance with Form 816 Article 1.20-1.05.02, NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS.

1.4 QUALITY ASSURANCE

A. 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.

1.6 WARRANTY

A. Refer to Form 816, Article 1.20-1.06.08, and the NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information.

1.7 GENERAL REQUIREMENTS

A. Underground Service: Underground service into buildings shall terminate as indicated, service conductors shall be continuous to the interior terminating point indicated from the utility transformers. Connections of the underground service to the service switch, panelboard is included. Ends of the underground conduit shall be protected by threaded caps until connections are made.

PART 2 - PRODUCTS

2.1 BUY AMERICA COMPLIANCE

A. Products must meet Buy America requirements. Refer to NOTICE TO CONTRACTOR – BUY AMERICA for additional information.

2.2 MATERIALS

A. Fasteners: Furnish all fasteners and hardware compatible with the materials and methods required for attachment of supporting devices.

B. Slotted - PVC coated Type Concrete Inserts: Galvanized pressed steel plate complying with ASTM A283; box-type welded construction with slot designed to receive steelnut and with knockout cover; hot-dipped galvanized in compliance with ASTM A386 and PVC coated.

C. Masonry Anchorage Devices: Expansion shields shall be of Type 316 stainless steel as follows:

1. Furnish expansion shields for machine screws and bolts 1/4 inch; head-out embedded nut type, multiple unit class, Group I, Type 1, Class 1.
2. Furnish expansion shields for machine screws and bolts large than 1/4 inch in size; head-out embedded nut type, multiple unit class, Group I, Type 1, Class 1.
3. Furnish bolt anchor expansion shield for lag bolts, stainless steel, long-shield anchors class, Group II, Type 1, Class 1.

4. Furnish bolt anchor expansion shields for bolts, closed-end bottom bearing class, Group II, Type 2, Class 1.
5. Toggle Bolts: Type 316 stainless steel tumblewing type. Type, class and style as required.

D. Nuts, Bolts, Screws and Washers:

1. General: Furnish Type 316 stainless steel fasteners for exterior use or where built into exterior walls. Furnish fasteners for the type, grade and class required for the particular installation.
2. Standard Nuts and Bolts: Regular hexagon head type, complying with ASTM A307, Grade A, Type 316 stainless steel material.
3. Lag Bolts: Square head type of Type 316 stainless steel.
4. Machine Screws: Type 316 stainless steel.
5. Wood Screws: Flat head Type 316 stainless steel.
6. Plain Washers: Round, general assembly grade Type 316 stainless steel.
7. Lock Washers: Helical spring Type 316 stainless steel.
8. "C" Beam Clamps: for conduit size and loading, malleable iron, PVC-coated.
9. Pipe Straps: 2 hole steel conduit straps Type 316 stainless steel.
10. Pipe Clamps: 1 hole malleable iron type clamps with Type 316 stainless steel clamp backs and hardware.
11. Channel Support System and Accessories: Provide 12 gage Type 316 stainless steel channel and accessories.
12. "C" beam clamps for hanger rods:
    a. Hanger Rods/Rods: Unistrut Corp or approved equal.
    b. All clamps shall be PVC coated with stainless steel rods.

2.3 HARDWARE FOR MOUNTING EQUIPMENT

A. Hardware for mounting equipment shall be high strength (100 percent rust resistant) and conform with the latest American Standards and Practices. Samples shall be submitted for approval. The Engineer will decide on one or more types and he will direct the Contractor to guide himself accordingly in the usage thereof at specific locations.

B. All anchor bolts shall be "Phillips Red Head Stud Anchor" type, or approved equal.

C. All screws and bolts shall be stainless steel with stainless steel nuts and washers where required.

D. Bolts, nuts and washers used for mounting fixtures shall be stainless steel and installed with proprietary screws to reduce vandalism. Heavy duty stainless steel flat washers and lock washers shall be provided with all screws and bolts. If required, and/or as shown on the drawings, equipment mounted in signal enclosures shall be attached to the walls, ceilings, floors, etc., of the enclosures by clamps as manufactured by "Unistrut" or approved equal.

E. "Everdur 651", or approved equal, hexagonal head machine screws, bolts and nuts with bronze flat washers shall be used for installing copper ground bus.

2.4 CONDUIT

A. Rigid hot-dipped galvanized steel conforming to the following:

1. Rigid galvanized steel conduit and fittings shall conform to the requirements of UL 6 and UL 1242, for threaded type, respectively, conforming to NEMA RN1, type A40, manufactured by Allied Tube and Conduit or Wheatland Tube Company, except that hardness shall be nominal 85 shore A durometer, dielectric strength shall be minimum 400 volts per mil at 60 Hz, tensile strength shall be minimum 3500 psi, and aging shall be minimum 1000 hours Atlas Weatherometer.

B. Polyvinyl chloride conduit, conforming to the following:

1. Polyvinyl conduit and fittings U.L. listed, rated for use with 90 degree C conductors and be Schedule 40. Materials shall conform to NEMA specifications TC-2 (conduit), TC-3 (Fittings) and UL 651 (conduit) and 514b (Fittings). Conduit and raceway shall carry a UL label stamped on each 10 foot length; markings shall be legible and permanent.
2. Conduit shall be made from polyvinyl chloride compound which includes inert modifiers to improve weatherability and heat distortion. Conduit and fittings shall be free of cracks, holes or foreign matter.
3. Conduit, fittings and cement shall be produced by the same manufacturer to assure system integrity.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Attachment of Conduit System:

1. Masonry Construction: Attach conduit to masonry construction by means of pipe straps or pipe clamps and masonry anchorage devices.
2. Steel Beams: Attach conduit to steel beams by means of "C" beam clamps and hangers.

B. A bracket and channel type support of PVC coated galvanized steel construction shall be provided wherever required for the support of starters, switches, panels and miscellaneous equipment. Such supports shall be rigidly bolted together and braced to make a substantial supporting framework. Where possible, control equipment shall be grouped together and mounted on a single framework. Wherever this occurs, a pro

vision shall be made for ready access to the wiring for connections to the equipment by means of boxes with screw covers.

C. Actual designs for supporting framework should take the nature of a picture frame of channels and bracket with a plate for mounting components. The Contractor is responsible for the design of supporting structure; he shall submit design details to the Engineer for acceptance before proceeding with the fabrication.

D. PVC coated galvanized steel support systems shall be utilized in all exterior areas.

E. The Contractor shall be responsible for the furnishing and installation of all conduit sleeves, anchor bolts, masonry inserts, and similar devices required for installation of equipment furnished under this Contract.

F. If a time delay for the arrival of any special inserts, or equipment drawings, etc., occurs, the Contractor may, if permitted by the Engineer, make arrangements for providing approved recesses and openings in the concrete or masonry and upon subsequent installation the Contractor shall be responsible for filling in such recesses and openings. Any additional costs that may be incurred by this procedure shall be borne by the Contractor.

G. Where the weight of equipment exceeds 50 pounds and is supported from walls, ceilings, columns and/or beams, such supporting steel sizes, methods and locations shall be approved in writing by a Professional Engineer registered in the State of Connecticut.

H. Metal Frames and Covers: Frames and covers of steel shall be welded by qualified welders in accordance with standard commercial practice. Steel covers shall be rolled steel floorplate having an approved antislip surface. Hinges shall be of wrought steel, 5 by 5 inches by approximately 3/16 inch thick, without screw holes, and shall be for full surface application by fillet welding. Hinges shall have nonremovable pins and 5 knuckles. The surfaces of plates under hinges shall be true after the removal, by grinding or other approved method, of raised lugs. Frames and covers shall be grounded as shown on Drawings.

3.2 CONDUIT INSTALLATION

A. Conduit embedded in concrete shall be hot dip rigid galvanized steel.

B. Exposed conduit and fittings, on platform and wet locations shall be hot dip rigid galvanized steel with 40 mil PVC coating, color as selected by architect.

END OF SECTION 260529

SECTION 260533 RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

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.

C. Section includes conduit, pull and junction boxes.

D. Related Sections:
1. Section 260526 - Grounding and Bonding for Electrical Systems.
2. Section 260529 - Hangers and Supports for Electrical Systems.
3. Section 260553 - Identification for Electrical Systems.

E. The Contractor shall supply, install, test and commission into service, all conduits indicated on the drawings.

F. The Contractor shall be responsible to obtain all existing conduit route details in the field to ensure that the new conduit routes can be accommodated and that all routes can be supplied and installed to fit existing conditions. All existing conduits that will not be used in the future installation will be removed.

G. The Contractor shall provide new conduit route drawings for the new conduit routes being installed.

1.2 REFERENCES

A. American National Standards Institute:
1. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.

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.

C. Underwriters Laboratories, Inc. (UL):
1. 50, Enclosures for Electrical Equipment
2. 514A,B, Metallic Outlet Boxes and Fittings

1.3 SYSTEM DESCRIPTION

A. In Slab: Provide rigid steel conduit. Provide cast or nonmetallic metal boxes.

B. Wet and Damp Outdoor Locations: Provide PVC coated rigid steel conduit. Provide PVC coated cast metal outlet, junction and pull boxes. Provide flush mounting outlet box in finished areas.

C. Concealed Dry indoor Locations: Provide rigid steel. Provide sheet-metal boxes. Provide flush mounting outlet box in finished areas. Provide hinged enclosure for large pull boxes.

D. Exposed Dry Outdoor Locations: Provide PVC coated rigid steel conduit or rigid steel conduit. Provide PVC coated sheet-metal boxes. Provide flush mounting outlet box in finished areas. Provide hinged enclosure for large pull boxes.

1.4 DESIGN REQUIREMENTS

A. Minimum conduit size 3/4”.

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: Submit for the following:
1. Rigid steel conduit
2. Liquidtight flexible metal conduit.
3. Raceway fittings.
4. Conduit bodies.
5. Wireway.
6. 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.

1.6 CLOSEOUT SUBMITTALS

A. Submit closeout submittals in accordance with Form 816 Article 1.20-1.05.02, NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS.

1.7 QUALITY ASSURANCE

A. Source limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

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. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

1.9 WARRANTY

A. Refer to Form 816, Article 1.20-1.06.08, and the NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information.

PART 2 PRODUCTS

2.1 BUY AMERICA COMPLIANCE

A. Products must meet Buy America requirements. Refer to NOTICE TO CONTRACTOR – BUY AMERICA for additional information

2.2 METAL CONDUIT

A. Manufacturers:
1. Allied Tube and Conduit.
Or
2. Approved equal

B. PVC coated Rigid Steel Conduit: UL 6.

C. Fittings and Conduit Bodies: NEMA FB 1; material to match conduit

2.3 LIQUIDTIGHT FLEXIBLE METAL CONDUIT

A. Manufacturers:
1. Electri-Flex Company (Liquatite – Non-PVC).
Or

2. Approved equal

B. Product Description: Interlocked steel construction with weather-tight PVC jacket. Per UL 1660

C. Fittings: NEMA FB 1.

2.4 PULL AND JUNCTION BOXES

A. Manufacturers:

1. OZ Gedney.
Or
2. Approved equal.

B. Sheet Metal Boxes: NEMA OS 1, galvanized steel.

C. Enclosures: comply with NEMA 250 as follows:
1. Generally all areas and dry locations: NEMA 3R.
2. Damp locations: NEMA 4.
3. Wet locations: NEMA 4 or 4X.

D. Sizes shall provide sufficient space for pulling, racking, or splicing.

E. All boxes shall have covered secured with screwed or bolted fixings. Hinged covers shall not be provided.

PART 3 EXECUTION

3.1 PREPARATION

A. Transmit submittals required by this Section.

B. Furnish products as indicated.

C. Ensure substrates are in suitable condition to receive the work.

3.2 EXAMINATION

A. Verify outlet locations and routing and termination locations of raceway prior to rough-in.

3.3 EXISTING WORK

A. Not applicable

3.4 INSTALLATION

A. Ground and bond raceway and boxes in accordance with Section 260526.

B. Fasten raceway and box supports to structure and finishes in accordance with Section 260529.

C. Identify raceway and boxes in accordance with Section 260553.

D. Arrange raceway and boxes to maintain headroom and present neat appearance.

3.5 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. Do not support raceway with wire or perforated pipe straps. Remove wire used for temporary supports

E. Do not attach raceway to ceiling support wires or other piping systems.

F. Route exposed raceway parallel and perpendicular to walls.

G. Route conduit in and under slab from point-to-point.

H. Maintain clearance between raceway and piping for maintenance purposes.

I. Maintain 12 inch clearance between raceway and surfaces with temperatures exceeding 104 degrees F.

J. Install conduit hubs or sealing locknuts to fasten conduit to sheet metal boxes in damp and wet locations.

K. Install no more than equivalent of three 90 degree bends between boxes. Install conduit bodies to make sharp changes in direction, as around beams.

L. Avoid moisture traps; install junction box with drain fitting at low points in conduit system.

M. Install fittings to accommodate expansion and deflection where raceway crosses control and expansion joints.

N. Install suitable pull string or cord in each empty raceway except sleeves and nipples.

O. Install suitable caps to protect installed conduit against entrance of dirt and moisture.

P. 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.

3.6 INSTALLATION – BOXES

A. The location of all boxes shall be approved by the Engineer prior to completion of roughing-in. No final box locations will be permitted without this approval. No thru boxes shall be permitted.

B. Pull boxes and junction boxes shall be installed as required by NEC and in all runs of raceway having more than 100 feet in length or the equivalent of four (4) 90° bends; entirely accessible; #16 gauge galvanized steel up to 12″ × 12″ size and #10 gauge over 12″ × 12″ size; complete with covers of same gauge as boxes and secured to the box with screws; be securely mounted to building structure independent of the raceways connected to them. Pull boxes shall be indicated on the Contractor's Shop Drawings.

C. Install wall mounted boxes at elevations to accommodate mounting heights.

D. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.

E. Do not fasten boxes to ceiling support wires or other piping systems.

F. Install boxes in a secure, substantial manner, supported independently of raceway by attachment to the building structure or a structural member. Use bar hangers in frame construction, or fasten boxes directly with wood screws on wood, bolts and expansion shields on concrete or brick, toggle bolts on hollow masonry units and machine screws or welded threaded studs on steelwork. Threaded studs driven in by a powder charge and provided with lock washers and nuts are not acceptable in lieu of expansion shields. Boxes embedded in concrete or masonry need not be additionally supported. Utilize galvanized mounting hardware in battery room area.

G. Boxes installed in damp areas, and where specified shall be gasketed cast metal type having threaded hubs.

H. Mount all boxes plumb and level. Use flush-mounted boxes with concealed conduits. Make edges of boxes flush with finished surface. Provide proper type

extension rings or plaster covers for this purpose. For flush-mounted boxes, make holes in the surrounding surface no larger than required to receive the box.

3.7 INTERFACE WITH OTHER PRODUCTS

A. Install conduit to preserve fire resistance rating of partitions and other elements

3.8 CLEANING

A. Clean interior of boxes to remove dust, debris, and other material.

B. Clean exposed surfaces and restore finish.

END OF SECTION 260533

SECTION 260548 – VIBRATION AND SEISMIC CONTROLS 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.

C. Drawings and general provisions of the Contract apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Hangers and supports for electrical equipment and systems.
2. Seismic restraints for electrical equipment and systems.
3. Construction requirements for concrete bases.

1.3 DEFINITIONS

A. EMT: Electrical metallic tubing.

B. IBC: International Building Code.

C. IMC: Intermediate metal conduit.

D. NBC: National Building Code.

E. OSHPD: Office of Statewide Health Planning and Development.

F. RMC: Rigid metal conduit.

G. SBC: Standard Building Code.

H. Seismic Restraint: A structural support element such as a metal framing member, a cable, an anchor bolt or stud, a fastening device, or an assembly of these items used to transmit seismic forces from an item of equipment or system to building structure and to limit movement of item during a seismic event.

I. UBC: Uniform Building Code.

1.4 SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

1. Tabulate types and sizes of seismic restraints, complete with report numbers and rated strength in tension and shear as evaluated by an agency acceptable to authorities having jurisdiction.
2. Annotate to indicate application of each product submitted and compliance with requirements.

B. Shop Drawings: Indicate materials and dimensions and identify hardware, including attachment and anchorage devices, signed and sealed by a qualified professional engineer. Professional engineer qualification requirements as specified:

1. Fabricated Supports: Representations of field-fabricated supports not detailed on Drawings.
2. Seismic Restraints: Detail anchorage and bracing not defined by details or charts on Drawings. Include the following:

a. Design Analysis to support selection and arrangement of seismic restraints. Include calculations of combined tensile and shear loads.
b. Details:
Detail fabrication and arrangement.
Detail attachments of restraints to the restrained items and to the structure. Show attachment locations, methods, and spacings.
Identify components, list their strengths, and indicate directions and values of forces transmitted to the structure during seismic events.
c. Preapproval and Evaluation Documentation: By an agency acceptable to authorities having jurisdiction, showing maximum ratings of restraint items and the basis for approval (tests or calculations).

C. Coordination Drawings: Show coordination of seismic bracing for electrical components with other systems and equipment in the vicinity, including other supports and seismic restraints.

D. Welding certificates.

E. Qualification Data: For testing agency.

F. Field quality-control test reports.

1.5 CLOSEOUT SUBMITTALS

A. Submit closeout submittals in accordance with Form 816 Article 1.20-1.05.02, NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS.

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. Comply with seismic-restraint requirements in the UBC unless requirements in this Section are more stringent.

C. Testing of Seismic Anchorage Devices: Comply with testing requirements in Part 3

D. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

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 the NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information.

1.9 PROJECT CONDITIONS

A. Site Class as Defined in the IBC: C.

B. S_s, Mapped Maximum Considered Earthquake Spectral Response at Short Periods: 32.

C. S_1, Mapped Maximum Considered Earthquake Spectral Response at 1-Second Period: 9.

D. Assigned Seismic Use Group or Building Category as Defined in the IBC: III.

PART 2 - PRODUCTS

2.1 BUY AMERICA COMPLIANCE

A. Products must meet Buy America requirements. Refer to NOTICE TO CONTRACTOR – BUY AMERICA for additional information.

2.2 MANUFACTURERS

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to the manufacturers specified below.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.3 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed under this Project, with a minimum structural safety factor of five times the applied force.

B. Steel Slotted Support Systems: Comply with MFMA-3, factory-fabricated components for field assembly.

1. Available Manufacturers:
   a. Unistrut Co.
   Or
   b. Approved equal

2. Finishes:

   a. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-3.
   b. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-3.
   c. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-3.

3. Channel Dimensions: Selected for structural loading and applicable seismic forces.

C. Nonmetallic Slotted Support Systems: Structural-grade, factory-formed, glass-fiber-resin channels and angles with 9/16-inch diameter holes at a maximum of 8 inches o.c., in at least 1 surface.

1. Available Manufacturers:
   a. Cooper Industries.
   Or
   b. Approved equal

2. Fittings and Accessories: Products of channel and angle manufacturer and designed for use with those items.
3. Fitting and Accessory Materials: Same as channels and angles, except metal items may be stainless steel.
4. Rated Strength: Selected to suit structural loading and applicable seismic forces.

D. Raceway and Cable Supports: As described in NECA 1.

E. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

F. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of

conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.

G. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

H. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.

    a. Available Manufacturers:

        1) Hilti, Inc.
        Or
        2) Approved equal

2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated stainless steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.

    a. Available Manufacturers:

        1) Cooper Industries.
        Or
        2) Approved equal

3. Concrete Inserts: Steel or malleable-iron slotted-support-system units similar to MSS Type 18; complying with MFMA-3 or MSS SP-58.
4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
5. Through Bolts: Structural type, hex head, high strength. Comply with ASTM A 325.
6. Toggle Bolts: All-steel springhead type.
7. Hanger Rods: Threaded steel.

2.4 SEISMIC-RESTRAINT COMPONENTS

A. Rated Strength, Features, and Application Requirements for Restraint Components: As defined in reports by an agency acceptable to authorities having jurisdiction.

1. Structural Safety Factor: Strength in tension, shear, and pullout force of components used shall be at least five times the maximum seismic forces to which they will be subjected.

B. Angle and Channel-Type Brace Assemblies: Steel angles or steel slotted-support-system components; with accessories for attachment to braced component at one end and to building structure at the other end.

C. Cable Restraints: ASTM A 603, zinc-coated, steel wire rope attached to steel or stainless-steel thimbles, brackets, swivels, and bolts designed for restraining cable service.

1. Available Manufacturers:

a. Amber/Booth Company, Inc.
Or
b. Approved equal

2. Seismic Mountings, Anchors, and Attachments: Devices as specified in Part 2 "Support, Anchorage, and Attachment Components" Article, selected to resist seismic forces.
3. Hanger Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections to hanger rod, of design recognized by an agency acceptable to authorities having jurisdiction.
4. Bushings for Floor-Mounted Equipment Anchors: Neoprene units designed for seismically rated rigid equipment mountings, and matched to type and size of anchor bolts and studs used.
5. Bushing Assemblies for Wall-Mounted Equipment Anchorage: Assemblies of neoprene elements and steel sleeves designed for seismically rated rigid equipment mountings, and matched to type and size of attachment devices used.

2.5 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

B. Materials: Comply with requirements in Division 05 Section "Metal Fabrications" for steel shapes and plates.

PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with NECA 1 for application of hangers and supports for electrical equipment and systems, except if requirements in this Section are stricter.

B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch in diameter.

C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted or other support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.

1. Secure raceways and cables to trapeze member with clamps approved for application by an agency acceptable to authorities having jurisdiction.
2. Secure raceways and cables to these supports with two-bolt conduit clamps.

D. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

3.2 SUPPORT AND SEISMIC-RESTRAINT INSTALLATION

A. Comply with NECA 1 for installation requirements, except as specified in this Article.

B. Raceway Support Methods: In addition to methods described in NECA 1, EMT, IMC, and RMC may be supported by openings through structure members, as permitted in NFPA 70-2011.

C. Install seismic-restraint components using methods approved by the evaluation service providing required submittals for component.

D. Strength of Support and Seismic-Restraint Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static and seismic loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.

E. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:

1. To Wood: Fasten with lag screws or through bolts.
2. To New Concrete: Bolt to concrete inserts.
3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
4. To Existing Concrete: Expansion anchor fasteners.
5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches thick.
6. To Steel: Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69.
7. To Light Steel: Sheet metal screws.
8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate by means that meet seismic-restraint strength and anchorage requirements.

F. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

A. Comply with installation requirements in Division 05 Section "Metal Fabrications" for site-fabricated metal supports.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

C. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 CONCRETE BASES

A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and seismic criteria at Project.

B. Construct concrete bases of dimensions indicated but not less than 4 inches larger in both directions than supported unit, and so expansion anchors will be a minimum of 10 bolt diameters from edge of the base.

1. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around full perimeter of the base.
2. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
3. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
4. Install anchor bolts to elevations required for proper attachment to supported equipment.
5. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
6. Use 3000-psi, 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Division 03 Section "Cast-in-Place Concrete."

3.5 INSTALLATION OF SEISMIC-RESTRAINT COMPONENTS

A. Install bushing assemblies for anchor bolts for floor-mounted equipment, arranged to provide resilient media between anchor bolt and mounting hole in concrete base.

B. Install bushing assemblies for mounting bolts for wall-mounted equipment, arranged to provide resilient media where equipment or equipment-mounting channels are attached to wall.

C. Restraint Cables: Provide slack within maximums recommended by manufacturer.

D. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, upper truss chords of bar joists, or at concrete members.

3.6 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION

A. Make flexible connections in runs of raceways, cables, wireways, cable trays, and busways where they cross expansion and seismic-control joints, where adjacent sections or branches are supported by different structural elements, and where they terminate with connection to electrical equipment that is anchored to a different structural element from the one supporting them as they approach equipment.

3.7 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Testing: Test pullout resistance of seismic anchorage devices.

1. Provide evidence of recent calibration of test equipment by a testing agency acceptable to authorities having jurisdiction.
2. Schedule test with Owner, through Architect, before connecting anchorage device to restrained component (unless postconnection testing has been approved), and with at least seven days' advance notice.
3. Obtain Architect's approval before transmitting test loads to structure. Provide temporary load-spreading members.
4. Test at least four of each type and size of installed anchors and fasteners selected by Architect.
5. Test to 90 percent of rated proof load of device.
6. If a device fails test, modify all installations of same type and retest until satisfactory results are achieved.

C. Record test results.

END OF SECTION 260548

SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

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. 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.

C. Provide identification as specified herein for all indicated items.

D. Work Included:

1. Nameplates to identify disconnect switches, starting devices, control switches, pushbutton stations, panelboards.
2. Wire tags at each end of all feeders and control wiring, and feeder wires only in all junction and pull boxes.
3. Labels for exposed conduits, conduits containing feeders, fire alarm and communications.
4. "DANGER-HIGH-VOLTAGE" signs shall be securely mounted on the entry doors of all electrical rooms and enclosures.
5. Provide OSHA, IEEE standard 1584, and NFPA-70E compliant Arc flash and shock hazard signage that indicates equipment voltage, all approach boundaries, incident energy levels, fault current levels available and PPE required for all electrical panelboards, safety switches, and transformers.

1.2 SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

1. Descriptive literature for materials specified.

1.3 CLOSEOUT SUBMITTALS

A. Submit closeout submittals in accordance with Form 816 Article 1.20-1.05.02, NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS.

1.4 QUALITY ASSURANCE

A. 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.

1.6 WARRANTY

A. Refer to Form 816, Article 1.20-1.06.08, and the NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information.

PART 2 - PRODUCTS

2.1 BUY AMERICA COMPLIANCE

A. Products must meet Buy America requirements. Refer to NOTICE TO CONTRACTOR – BUY AMERICA for additional information.

2.2 MATERIALS

A. Nameplates:

1. Nameplates shall be black core, white laminated Micarta having engraved letters.
2. Letter size and nomenclature shall be as directed by DOT or Amtrak.

B. Labels:

1. Labels on fire alarm conduits shall consist of "FA" stenciled in red letters on a white painted rectangular background, ¾" high lettering.
2. Labels on communication conduits shall be 2 blue bands painted, each 1-inch wide with 1 inch between them.
3. Wire tags shall be of adhesive backed cloth material with printed identifying numbers and letters which come in strips of individual characters to be wrapped

around the conductor in sequence to comprise the identification. Nomenclature shall be as directed by client.

4. Provide manufacturer's standard "DANGER" signs of baked enamel finish on 20 gage steel; of standard red, black and white graphics; 14 inches by 10 inches size except where 10 inches by 7 inches is the largest size which can be applied where needed, and except where larger size is needed for adequate vision.
5. The conduits of all feeders and branch circuits shall be properly designated at all panelboards, switches and other equipment by an approved round yellow plastic tag, of 0.040-inch minimum thickness and one inch in diameter, Actioncraft Products, or approved equal. The lettering shall be black, 1/8-inch high. No. 18 monel wire, doubled, shall be used to secure the tag. A list of tag descriptions shall be submitted to the Engineer for approval before any lettering is done.
6. All conduits within enclosures shall be properly identified by Seton Nameplate Corporation "Setmark" markers, Brady Snap-On Pipe Markers, or approved equal. The lettering and color coding of the markers shall be black on an orange background or in conformance with the latest revision of the ANSI Z53.1 Scheme for Identification of Piping Systems.

PART 3 - EXECUTION

3.1 PREPARATION

A. All surfaces to receive labels shall be carefully prepared in accordance with the manufacturer's instructions.

3.2 APPLICATION

A. Labels:

1. Labels shall be painted and stenciled on clean dry surfaces.
2. All conduit systems shall require identification when exposed or concealed above accessible ceilings.

B. Nameplates:

1. Nameplates shall be secured to painted surface with suitable Torx Tamperproof stainless steel screws, lockwashers and nuts.
2. Nameplates shall be secured to unpainted surfaces with epoxy cement. Surface shall be properly cleaned before application.

C. Danger Signs:

1. Danger signs shall be secured with Torx Tamperproof stainless steel screws lockwashers and nuts.

END OF SECTION 260553

SECTION 260800 – COMMISSIONING OF ELECTRICAL SYSTEMS

PART 1 - GENERAL REQUIREMENTS

1.1 GENERAL

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.

C. All equipment furnished and installed under this Contract shall be tested as indicated in the Contract Drawings or as specified herein.

D. The Contractor shall hire an independent NETA certified testing company to make such tests as may be necessary to demonstrate that the equipment, as installed, complies with the Contract requirements. He shall provide all labor, instruments and apparatus required for such tests. If any of the equipment fails, under test, to meet the Contract requirements or to function properly, the defects shall be rectified by readjusting or removing and replacing, the faulty equipment until, under test, the requirements are met. The Engineer reserves the right to check the Contractor's instruments or to furnish his own instruments.

E. All tests shall be performed in conformity with the standard test codes of the applicable association(s) as specified in paragraph 1.7 FACTORY TESTS, and shall be witnessed by the Engineer or his representative and by an authorized representative of the User Department.

F. All measuring instruments shall be of the precision type and shall be calibrated immediately before and immediately after the tests. All instruments and other facilities, including labor, for the tests shall be provided by the Contractor. Client will furnish electrical energy to the Contractor without charge for making the tests.

G. The Contractor shall furnish and install all necessary testing apparatus such as calibrated meters, gauges, fittings, thermometers, etc. All apparatus supplied by the Contractor for these tests shall remain his property and be removed by him after the tests.

H. The Contractor shall submit test procedures for the approval of the Engineer, showing in complete detail the manner in which he proposes to perform each test.

I. Contractor shall provide full documentation and certifications of all tests performed.

1.2 SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

1.3 CLOSEOUT SUBMITTALS

A. Submit closeout submittals in accordance with Form 816 Article 1.20-1.05.02, NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS.

1.4 QUALITY ASSURANCE

A. 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.

1.6 WARRANTY

A. Refer to Form 816, Article 1.20-1.06.08, and the NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information.

1.7 FACTORY TESTS

A. All equipment, including machinery, apparatus and materials of construction, shall be tested at the places of manufacture.

B. All service and distribution equipment, switchboards and panelboards shall be given a Hi-Pot test at the place of manufacture in accordance with the requirements of the latest edition of the National Electrical Code and witnessed by the Engineer or his authorized representative.

C. All necessary ratings, capacities, calibration, temperature in operation and other characteristics shall be obtained by methods in accordance with the standard test codes of the applicable association, such as the American National Standards Institute, Underwriters Laboratories, the Institute of Electrical and Electronics Engineers. Six copies of these certified ratings, etc., shall be submitted for the approval of the Engineer. No material or apparatus shall be shipped to the work site unless approved by the Engineer.

1.8 FIELD TESTS

A. Field tests shall be made on apparatus which is not assembled at the shop, such as electrical equipment, to demonstrate the soundness and suitability of the materials, and the adequacy of the craftsmanship of the installation work. In addition, performance tests shall be made on the plant as a whole, upon its major subdivisions and as required by the Engineer, in conformity with the standard test codes of the applicable association(s) as specified in Paragraph 1.7 FACTORY TESTS. All measuring instruments shall be of the precision type and shall be calibrated immediately before and immediately after the tests. All instruments and other facilities, including labor, for the tests shall be provided by the Contractor. The client will furnish to the Contractor, without charge, electrical energy for the tests.

B. The Contractor shall furnish and install all necessary testing apparatus such as calibrated electrical meters, gauges, fittings, thermometers, etc. All the foregoing apparatus supplied by the Contractor for these tests shall remain his property and be removed by him after the tests.

C. The Contractor shall submit, for the approval of the Engineer, test procedures showing in complete detail, the manner in which he proposes to perform each test.

D. All defects in the new systems shall be corrected to the satisfaction of the Engineer. All equipment shall be retested after the correction of defects.

E. The Contractor shall make insulation resistance and ground tests of all wiring installed under this Contract in conformity with the requirements of this Section and as elsewhere specified herein during the progress of the work, and at such time as the Engineer may desire. These tests shall be made previous to connection to equipment and in the presence of the Engineer.

F. Apparatus such as circuit breakers, contactors, motor starters, push button stations, etc., shall be checked for free movement and alignment of parts and contacts.

G. The ground fault protection system shall be performance tested, as required by the National Electrical Code, Article 230-95(c).

H. The grounding system shall be tested and verified with accepted methods and standards by actual measurements in the field. The proposed method of measurement shall be submitted for approval. Unless otherwise specified grounding resistance shall not exceed 5 ohms. The resistance values and the soil conditions at the time measurements were made, along with location of each ground rod shall be submitted to the Engineer.

I. A performance test shall be made to verify proper electrical operation of all power and control circuits and electrical apparatus.

J. After installation performance tests shall be made on the station as a whole, upon its major subdivisions and as required by the Engineer. The tests shall be performed with all rated loads connected.

K. Similar test shall be performed on the emergency equipment with all rated emergency loads connected.

L. Motors shall be checked for proper rotation, and for balancing of the currents in all three phases.

1.9 ELECTRICAL TESTS AFTER INSTALLATION

A. All electrical equipment, including wire and cable, shall be tested after completion of installation in accordance with the following specifications:

B. Wiring shall be installed so that when completed, the system will be free from shorts, crosses or grounds. All electrical feeders and other wire and cable prior to being connected as requested by the Engineer shall be subject to an insulation resistance test using a "megger" with the following D.C. voltages applied between the connected system and ground.

1. 250 volt system - apply 500 volts

C. Insulation Resistance: All wiring shall be so installed that when completed, the system will be free from shorts or grounds.

D. The Contractor shall make such tests as may be necessary, including polarity test of the sockets, to demonstrate that the equipment, as installed, complies with the Contract requirements. He shall provide all labor, instruments and apparatus required for such tests. If any of the equipment fails, under test, to meet the Contract requirements or to function properly, the defects shall be rectified by readjusting, or removing and replacing, the faulty equipment until, under test, the requirements are met. The Engineer reserves the right to check the Contractor's instruments or to furnish his own instruments.

END OF SECTION 260800

SECTION 260923 - LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.01 SUMMARY

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.

C. General: Extent of lighting control system work is indicated on drawings and schedules.

D. The extent of lighting control work includes, but is not limited to, the furnishing and installation of all lighting control components into complete and working lighting control systems as specified in this section, on the drawings, and as required by job conditions. System components include, but are not limited to:

a. Factory pre-assembled and pre-wired microprocessor controlled relay panels with electrically held, latched relay panels.
b. Control stations, including wall mounted low voltage remote controls.
c. Control system network low voltage wiring for interconnection of lighting control relay panels, remote switches and master control stations.
d. Digital Photosensor(s) for operation of selected circuits.
e. Interfaces to dimming systems.
f. Permanently installed terminal(s), Lighting Management Stations and master control stations for system programming and feedback.
g. Digital Time Clock (DTC)

1.02 DESIGN AND PERFORMANCE REQUIREMENTS

A. The submission of a bid by the Contractor will be construed as evidence that a careful, complete and thorough examination of the premises, existing job conditions and Contract Documents has been made and later

claims for labor, materials or equipment required or for difficulties encountered, which could have been foreseen had such an examination been made, will not be recognized. It shall also constitute a representation that the Contractor has checked and verified all quantities, work and materials involved and shall take complete responsibility for any deficiencies encountered thereafter.

B. The Contractor shall ensure that the lighting control system manufacturer shall keep on file and make available for review by the Engineer and the Authority complete Quality Control and Quality Assurance records for all phases of production for all lighting equipment to be supplied under this project.

C. Upon request the Contractor shall submit for review by the Engineer and the Authority verification that he has solicited pricing from all manufacturers which have been listed as "prime spec" and "approved equal." Upon request the Contractor shall submit for review itemized (line item) unit equipment costs for all equipment to be provided under the Scope of this Contract.

D. The Contractor shall be solely responsible for coordinating and expediting the timely procurement and delivery for the lighting control system, equipment and related components for the project.

E. Specifications and drawings are intended to convey the salient features, function and character of the control system only, and do not undertake to illustrate or set forth every item or detail necessary for the work. Minor details not usually indicated on the drawings nor specified, but that are necessary or normally required for the proper execution, completion, installation and operation of the control systems shall be included, the same as if they were herein specified or indicated on the drawings.

F. Omissions: The full and complete responsibility for accurately fabricating the control systems described herein to the fulfillment of those specifications shall rest solely with the Contractor.

1.03 RELATED SECTIONS

A. Contract Documents: Drawings and General and Special provisions of the Contract, including bidding requirements, General Conditions, General Requirements of the Specifications apply to work of this section.

B. Related Sections: Refer to other sections of Division 26 for the following:

a. 260553 - Identification for Electrical Systems.
b. 260519 - Low Voltage Electrical Power Conductors and Cables.
c. 265200 - Emergency Lighting
d. 262726 - Wiring Devices
e. 265600 - Exterior Lighting

1.04 REFERENCES

A. American National Standards Institute (ANSI)

a. C2 - National Electrical Safety Code

B. ASTM International (ASTM)

C. Illuminating Engineering Society of North America (IESNA)

D. National Equipment Manufacturers Association (NEMA)

a. WD6 - Wiring devices – Dimensional requirements
b. OD3 - Physical and electrical interchangeability of photo control devices and mating receptacles

E. National Fire Protection Association (NFPA)

a. 70 - National Electric Code
b. 101 - Life Safety Code

F. Underwriters Laboratories (UL)

G. Occupation Safety and Health Administration (OSHA)

a. The Energy Policy of 1992: Lamp Efficiency Labeling and Standards
b. The Energy Policy of 2005: Lamp Efficiency Labeling and Standards

H. Applicability of Standards:

a. Except where more explicit or stringent requirements are written into the Contract Documents, applicable construction industry standards have the same force and effect as if found in or copied directly into the Contract Documents. Such industry standards are made a part of the Contract Documents by reference.
b. Referenced standards (standards referenced directly in the contract documents) take precedence over standards that are not referenced but generally recognized in the industry for applicability to the work.

c. Unreferenced standards are not directly applicable to the work, except as a general requirement of whether the work complies with recognized construction industry standards.

I. Publication Dates: Except as otherwise indicated, where compliance with an industry standard is required, comply with the latest standard in effect as of date of Contract Documents.

J. Conflicting Requirements: Where compliance with two or more standards or criteria is specified and where these standards establish different or conflicting requirements for minimum quantities or performance quality levels, the most stringent requirement will be enforced, and henceforth provided by the Contractor unless the Contract Documents specifically indicate otherwise. Refer requirements that are different, but apparently equal, and uncertainties as to which quality level is more stringent, to the Engineer for a decision before proceeding

K. Minimum Quantities or Quality Levels: In every instance the quantity or quality level shown or specified is intended to be the minimum to be provided or performed. Unless otherwise indicated, the actual work may either comply exactly, within specified tolerances, with the minimum quantity or quality specified, or may exceed that minimum within reasonable limits. In complying with these requirements, the indicated numeric values are minimum or maximum values, as noted or as appropriate for the context of the requirements. Refer instances of uncertainly to the Engineer for a decision before proceeding.

L. Copies of Standards:

a. The Contract Documents require that each entity performing work be experienced in that part of the work being performed. Each entity is also required to be familiar with industry standards applicable to that part of the work. Copies of applicable standards are not bound with the Contract Documents.
b. Where copies of standards are needed for proper performance of the work the Contractor is required to obtain such copies directly from the publication source.
c. Although copies of standards needed for enforcement of requirements may be required submittals, the Engineer reserves the right to require the Contractor to submit additional copies as necessary for enforcement of requirements.

1.05 QUALITY ASSURANCE

A. Source limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

B. All lighting control systems, components and sub-components shall be manufactured, furnished and installed in compliance with all government agencies having jurisdiction. All fixtures shall bear the appropriate UL (or ETL) and IBEW identifications. Panelboards and integral Lighting Control Chassis are to be UL listed under UL 916 Energy Management Equipment, UL 67 Panelboard Interiors and UL 5 panelboard box. Lighting control panels controlling emergency circuits shall be ETL listed to UL 924.

C. Manufacturers: Provide products of firms regularly engaged in the manufacture of lighting control equipment of the types and ratings whose products have been in satisfactory use in similar service for not less than ten years.

D. National Fire Protection Association (NFPA): Comply with NFPA 70, "National Electrical Code," as applicable to construction and installation of interior building lighting fixtures and emergency lighting.

E. Regulatory Requirements: Cabinets and all related components and subsystems shall comply with the following regulatory requirements:

a. National Electric Code (NEC)
b. National Electrical Manufacturer's Association (NEMA)
c. Underwriter's Laboratories, Inc. (UL) or (ETL)
d. Any local jurisdictional codes

F. Materials and equipment, as well as workmanship, shall conform to the highest commercial standards and shall be as specified and/or as indicated on the drawings. Parts not specifically identified shall be made of materials most appropriate for their intended use.

G. Manufacturers: Manufacturers shall be assumed capable of supplying the listed systems unless clearly written exceptions are set forth in their quotations. Any such exceptions shall immediately be brought to the attention of the Engineer. Manufacturers not listed (as prime or approved equal) must comply with the following:

a. Experience: Manufacturers shall have not less than ten years experience in design and manufacturing of lighting control equipment of the type and quality shown. Submission must include a list of completed projects and dated catalogue pages or drawings indicating length of experience.
b. Samples: Manufacturers shall submit a prototype sample of each panel and control equipment for review by the Engineer. Prototype samples shall be sufficiently detailed and operational to allow evaluation of compliance with the salient features of the

specification. Preliminary design or shop drawings shall not be accepted in place of prototype samples (see Section 1.08).

H. All major system components shall be manufactured and supplied by one company.

I. All components and assemblies are to be factory pre-tested and burned-in as a system for 48 hours prior to installation.

1.06 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 data on panels, communication devices and controllers.

C. Shop Drawings: Submit dimensioned drawings of control system components. Submit shop drawings with proposed component and accessories clearly indicated on each sheet. Shop drawings must be submitted for review before fabrication. Shop drawings shall indicate the exact location of each device.

D. One Line Diagram: Submit a One Line Diagram of the Lighting Control System, indicating every component in the system and the type, size and number of conductors between each component. Submittals that show typical rise diagrams are not acceptable.

E. Manuals: Prior to final inspection, provide complete set of operating and maintenance manuals. Include technical data sheets and parts ordering information. Include testing and maintenance requirements and instructions for emergency transfer components.

F. Shop drawings shall be submitted in reproducible form. Fixture fabrication details shall be drawn at either full size or half size scale. Fabrication details shall illustrate a minimum of three critical views indicating all fabrication and assembly methods, materials, material gauges and finishes to be employed.

G. Catalogue submittals lacking sufficient detail to indicate compliance with contract documents shall not be acceptable.

H. "Approved Equal" specification status does not and shall not exempt the identified manufacturers from full and complete compliance with all criteria identified either in the specifications or as attributed to "prime specification" equipment with regards to performance, control capability, size finishes, etc. Consideration, acceptance or rejection of any proposed submittal at any time shall rest solely upon the evaluation of the Lighting Designer for those areas within the project scope. The control system shall be compatible with all selected light fixtures.

1.07 CLOSEOUT SUBMITTALS

A. Submit closeout submittals in accordance with Form 816 Article 1.20-1.05.02, NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS.

1.08 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.

1.09 WARRANTY

A. Refer to Form 816, Article 1.20-1.06.08, and the NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information

B. The entire lighting control system shall carry a warranty for one year from date of start-up after final written acceptance by the Authority.

C. For the duration of the warranty the control system manufacturer shall provide 24-hour, 7-day emergency service contact with trained factory personnel. Maximum acceptable response time to a call for service shall be 12 hours. At the end of the warranty period, the manufacturer shall submit to the Authority a proposal for a continued maintenance contract for the entire control system.

D. The manufacturer of the control system shall guarantee that replacement parts for all new components shall be available for a minimum of seven years after the system's installation and acceptance by the Authority.

E. At the time of Bid Submission each manufacturer shall submit for review and approval the name of the person/persons or agency who will be

charged with the responsibility of fulfilling the manufacturer's field service obligations for the life of the warranty.

F. Warranty shall ensure that the Lighting Control System manufactured and supplied will be the kind and quality described in the specification and will be free of defects in workmanship and material.

1.10 SAMPLES

A. Upon request, submit for review one representative sample of each lighting control component required under this Contract. After sample acceptance, the control equipment shall be sent to the project for use as a standard. In the event the submission is rejected, the control component will be returned to the manufacturer who shall immediately make a new submission which meets the contract requirements.

B. Shipping: The samples must be actual working devices to be supplied and shall be submitted complete, ready for energizing and examining and shall be shipped (prepaid) to the Engineer or as otherwise specified or directed.

1.11 SUBSTITUTIONS

A. Equipment included under this section is specified by approved manufacturer, type, function to establish minimum standards of quality for bidding. Furnish equipment as specified unless substitutions are agreed upon as follows:

a. Submit a written Request for Substitution of Specified Equipment to the Construction Manager at least two weeks prior to bid date. Make the request an Alternate, separate proposal accompanied by complete descriptive and technical date in comparison to the "Accepted" manufacturers. Show cost comparison of "Accepted" manufacturer's equipment to the proposed substitution. Substitutions proposed less than two weeks prior to bid date, or not including proper documentation will not be considered.

b. Where proposed substitutions will alter the functional or visual design, or change the space requirements form those shown in the drawings, detail such changes in the proposal and include costs for revised design and construction for all trades involved.

c. No requested for substitutions will be considered more than ninety days after the contract is awarded.

d. If equipment to be supplied, including that supplied by approved manufacturers, meets the broad scope requirements of the drawings and specifications, but differed in some details, bring such

differences to the Authority's attention and obtain a written interpretation before submitting the bid, or proceeding with the work. Otherwise no variations or differences are permitted.

e. The Engineer approve/disapprove any requests for substitution.

PART 2 - PRODUCTS

2.01 BUY AMERICA COMPLIANCE

A. Products must meet Buy America requirements. Refer to NOTICE TO CONTRACTOR – BUY AMERICA for additional information.

2.02 MANUFACTURERS

The approved manufacturer is shown below:

1. Acuity Brand/Lighting Control and Design, Glendale, California, 323 226-0000

   Or

2. Approved equal.

2.03 NETWORKABLE LIGHTING CONTROL SYSTEM DESCRIPTION

A. The lighting control system shall be a networked system that communicates via RS485. The system must be able to communicate with fully digital centralized relay panels, local relay panels, SO breaker panels, digital switches, photocells, various interfaces and shall include all operational software. The intent of the specification is to integrate all lighting control into one system, except for areas controlled by emergency fixtures designed to operate 24/7. Distributed lighting control shall be provided using networked lighting relay panels. Centralized relay panels shall control the station lighting and site lighting. Lighting control system shall include all hardware and software. Software shall be resident within the lighting control system. System shall provide local access to all programming functions at the master Lighting Control Panel (LCP) and remote access to all programming functions via dial up if available. Lighting control system shall have server built into the master LCP that “serves” HTML pages to any authorized workstation.

B. System software shall provide real time status of each relay, each zone and each group.

C. Lighting control system shall be able to be monitored by and take commands from a remote PC. At any time, should the remote PC go off-line all system

programming uploaded to the lighting control system shall continue to operate as intended. Systems requiring an on line PC or server for normal operation are not acceptable

D. All devices shall be pre-addressed at the factory. Field addressing is not acceptable.

E. All programs, schedules, time of day, etc, shall be held in non-volatile memory for a minimum of 10 years at power failure. At restoration of power, lighting control system shall implement programs required by current time and date.

F. System shall be capable of flashing lights Off/On any relay or any zone prior to the lights being turned Off. The warning interval time between the flash and the final lights off signal shall be definable for each zone. Occupant shall be able to override any scheduled Off sweep using local wall switches within the occupied space. Occupant override time shall be locally and remotely programmable and not exceed 2-hours.

G. The system shall be capable of implementing On commands, Off commands, Raise (dimming) commands, Lower (dimming) commands for any relay, group or zone by means of digital wall switches, specification grade line voltage type wall switches, photocell, web based software or other devices connected to programmable inputs in a lighting control panel.

H. The Lighting Control System shall provide the ability to control each relay and each relay group per this specifications requirement. All programming and scheduling shall be able to be done locally at the master LCP and remotely via dial up modem and via the Internet. Remote connection to the lighting control system shall provide real time control and real time feedback.

I. System shall consist of centralized relay panels, local relay panels, Solenoid Operated (SO) breaker panels, digital switches, photocells and/or various digital interfaces. Verify exact components specified. Local relay panels, SO breaker panels, centralized relay panels and digital switches shall communicate as one network via RS485. Local relay panels, mounted in each local area, per plans shall control all lighting fixtures in that space, provide power to occupancy sensors and take input from daylight sensor and occupancy sensors. Local relay panels shall be capable of taking inputs from standard, line voltage type switches and outputting up to 8 independent 0v to 10v dimming signals. All local relay panels and all devices connected to local relay panels (switches, photocells and occupancy sensors, etc) shall be wired per lighting control manufacturers instructions.

2.04 MATERIALS AND COMPONENTS

A. RELAY PANELS

1. NEMA rated enclosures with screw cover or hinged door. Other NEMA enclosure types will be optional.

2. Lighting Control Panels (LCP) input power shall be capable of accepting 277V without rewiring.

3. Control electronics in the low voltage section shall be capable of driving 8, 30 Amp, 18,000 SCCR rated latching relays, control any individual or group of relays, provide individual relay overrides, provide a master override for each panel, store all programming in non-volatile memory, after power is restored return system to current state, provide programmable blink warn timers for each relay and every zone, and be able to control relays that default to Open, Normally Open Latching (NOL) or relays that default to Closed, Normally Closed Latching (NCL).

4. Lighting control system shall be digital and consist of a Master LCP, Local LCPs with up to 8 individual relays, digital switches, digital interface cards and if required, SO breaker panels. All system components shall connect and be controlled via a single Category 6, 4 twisted pair cable with RJ45 connectors, providing real time two-way communication with each system component. Analog systems are not acceptable.

5. The lighting control system shall be a networked system that communicates via RS485 and includes centralized relay panels, local relay panels, digital switches, photocells, various interfaces and operational software. The intent of the specification is to integrate all lighting control into one system. Lighting control system shall include all hardware and software. Software to be resident within the lighting control system. System shall provide local access to all programming functions at the DTC and remote access to all programming functions via dial up modem. Lighting control system shall have server built into the master LCP that “serves” HTML pages to any authorized workstation.

B. LOCAL RELAY PANELS

1. Local relay panels shall have up to 8-30 Amp, 18,000 Short Circuit Rating (SCCR) rated lighting relays and shall control all lighting in the designated area indicated on the plans and be networked to centralized relay panels, local relay panels, SO breaker panels, digital switches, photocells, various interfaces. Each local relay panel shall provide minimum 300ma at 12/24vdc for powering occupancy sensors. Local relay panels that require a separate occupancy sensor power pack are not acceptable.

2. Local relay panel shall provide a minimum 4-programmable photocell inputs, a minimum 4-programmable occupancy sensor inputs and matrixed

contact closure inputs. This requirement is to insure integration of entire lighting system into one networked, lighting control system.

3. Local relay panels shall be capable of outputting minimum 4 and up to 8 independent 0v to 10v dimming signals, one independent dimming signal at each of 8 relays. In order to maximize daylight harvesting and minimize disruption to occupants, each dimming output shall provide adjustment for baseline, start point, mid point, end point, trim, fade up rate, fade down rate, time delay and enable/disable masking. All photocell setting must be remotely accessible. Systems providing On, Off with Time Delay only, and system that do not provide remote access are not acceptable.

C. STANDARD OUTPUT RELAYS

1. Relays shall be individually replaceable. Relay terminal blocks shall be capable of accepting two (2) #8AWG wires on both the line and the load side. Systems that do not allow for individual relay replacement or additions are not acceptable.

2. Relays to be rated for 250,000 operations minimum at a full 30 Amp lighting load, default to closed at normal power loss, Normally Closed Latching (NCL). All incandescent circuits shall be energized by use of a Normally Closed Soft Start relay rated at 100,000 operations at full 20 Amp load. No exceptions.

3. Optional relay types available shall include: Normally Open Latching (NOL) relay rated for 250,000 operations, a 600v 2-pole NO and NC and a Single Pole, Double Throw (SPDT) relay.

D. LOW VOLTAGE SWITCHES

1. All switches shall be digital and communicate via RS 485. Contact closure style switches, except as specified for connection to the local relay panel matrixed contact closure inputs, shall not be acceptable. The programming for a digital switch will reside in the switch itself, via double EPROM memory. Any digital switch button function shall be able to be changed locally (at the DTC or a PC) or remotely, via modem, Internet or Ethernet.

2. Digital low voltage switch shall be a device that sits on the lighting control system bus. Digital switch shall connect to the system bus using the same cable and connection method required for relay panels. System shall provide capability to locally and remotely program each individual switch button, monitor and change function of each button locally and remotely. Each

button shall be capable of being programmed for On only, Off only, On/Off (toggle), Raise (Dim up) and Lower (Dim down). Switches requiring low voltage control wires to be moved from one input terminal to another to accomplish these functions are not acceptable.

3. Keyed switches shall be programmable and connect to the lighting controls system bus.

4. Digital switches for high abuse areas (public areas, etc.) shall be vandal resistant, contain no moving parts, and be touch sensitive and available with up to three buttons in a single gang. Multi gang versions shall also be available. Touch pads shall be Stainless Steel and capable of handling both high abuse and wash down locations. High abuse switches shall connect to the lighting control system digital bus. Each high abuse switch touch button shall be able to be control any relay or any group in any panel or panels that is part of the lighting control system. Each touch button shall be able to be programmed for On, Off, Toggle or Maintain operation. All programming shall be done locally or remotely via dial up modem; or web interface as described in other paragraphs of this section. High abuse switches shall be able to be enabled or disabled digitally. Each touch pad is to be identified as to function by an engraved label. Switches must be capable of handling electrostatic discharges of at least 30,000 volts (1cmspark) without any interruption or failure in operation.

E. DTC – DIGITAL ELECTRONIC TIME CLOCK

1. A Digital Time Clock (DTC) shall control and program the entire lighting control system and supply all time functions and accept interface inputs. DTC shall be capable of up to 32 schedules. Each schedule shall consist of one set of On and Off times per day for each day of the week and for each of two holiday lists. The schedules shall apply to any individual relay or group of relays.

2. The DTC shall be capable of controlling up to 126 digital devices on a single bus and capable of interfacing digitally with other individual busses using manufacturer supplied interface cards.

3. The DTC shall accept control locally using built in button prompts and use of a 8 line 21-letter display or from a computer or modem via an onboard RS 232 port. All commands shall be in plain English. Help pages shall display on the DTC screen.

4. The DTC shall be run from non-volatile memory so that all system programming and real time clock functions are maintained for a minimum of 15 years with loss of power.

5. Pre-installed Unity™ lighting control software provides a visual representation of each device on the bus, show real time status and the ability to change the status of any individual device, relay or zone. System shall be capable of running optional Unity GX lighting control software, which shall provide for directly importing vector based graphics.

6. Pre-Installed modem allows for remote programming from any location using a PC. Modem to include all necessary software for local or remote control.
   DTC shall provide system wide timed overrides. Any relay, group or zone that is overridden On, before or after hours, shall automatically be swept Off by the DTC a maximum of 2 hours later.

F PHOTOCELL: Photocells shall be mounted in locations indicated by the manufacturer. Photocells used for exterior lights shall provide multiple trips point from 1 roof mounted unit. All trips points shall be able to be changed remotely via Internet or dial up modem. Photocells requiring manual trip point adjustment are not acceptable. Photocell used for interior lighting control shall have multiple settings such as start-point, mid-point, off-point, fade-up, fade-down, etc. All settings shall be remotely accessible and adjustable. Systems providing local adjustment only are not acceptable. Photocells to be certified to comply with the current energy code covering this project at time of submittal of plans for building permit.

G INTERFACES: For future expansion capability, system to have available all of the following interfaces. Verify and install only those interfaces indicated on the plans

.

1. A dry contact input interface card that provides 14 programmable dry contact closure inputs. Use shielded cable to connect input devices to interface card.

2. Interface card providing digital communication from one system bus to another system bus, allowing up to 12,000 devices to communicate.

3. Interface cards shall allow the DTC to control up to 32 digital XCI brand thermostats. Programming of thermostats shall be able to done locally (at the DTC or a PC) or remotely, via modem, Internet or Ethernet

.

4. Voice prompted telephone override interface modules shall be provided. Interface module shall accept up to 3 phone lines and allow up to 3 simultaneous phone calls. Voice prompted menu and up to 999 unique pass codes shall be standard with each interface module.

5. Software pre-installed to run Unity GX Graphical Interface Software. Unity GX software shall provide via local or remote PC a visual representation of a specific area or the total area of the project. GX full graphic pages shall be designed to the Authority's requirements.

6. Direct digital interface to SO Breaker panelboards shall be available. Relay panel and SO Breaker panelboards circuits shall appear on the system software as similar, yet distinct, items and maintain all functions and features of the system software.

7. Direct digital interface to DMX 512 based systems. DMX interface shall provide 14 global commands, each of which can be modified locally or remotely using lighting controls manufacturer supplied software. DMX interface shall be integral to the system bus and shall connect and be controlled via a single Category 6, 4 twisted pair cable, providing real time response from the lighting control system to DMX commands.

PART 3- INSTALLATION

3.01 INSTALLATION

A Delivery Storage Handling: Deliver products to the job site in manufacturer's original containers marked with job name, Contractor's name and labeling that clearly indicates the contents. Deliver, store and handle products in accordance with manufacturer's written admonishments.

B. Job Conditions: Maintain job site conditions in accordance with manufacturer's recommendations.

C. Reject and do not install any damaged or unsatisfactory equipment. Replace unsatisfactory equipment with new equipment that is satisfactory if so directed by the Authority or their representative.

D. The system shall be installed utilizing complete manufacturer's shop drawings and in accordance with these specifications.

E. Install Control Stations only after "wet" work such as plastering and painting is complete and the area is cleaned.

F. The breaker cabinets and controls shall be stored in their original cartons or crates in a dry location free from dirt and dust until ready to install. Provide protection and protective coverings as appropriate to prevent damage to the equipment during installation and until Authority's acceptance. Repair or replace damaged equipment as directed.

G. Mount equipment at locations and heights indicated on approved shop drawings, or as directed by Authority. Locations indicated on the electrical drawings are general and approximate - carefully verify locations with Engineer's plans prior to installation. Check for adequacy of headroom and clearance with other equipment such as ducts, pipes and openings. The installing contractor shall bring all conflicts to the Authority's attention prior to proceeding with the work.

H. Upon completion of the installation Contractor shall test all line voltage and control wiring for continuity and accuracy of all connections.

I. Upon completion of the installation, the lighting control equipment shall operate per specifications and be free from defects in condition and finish. Moveable parts must operate freely and with uniform friction throughout their range. Any components damaged prior to the final inspection must be replaced by the Contractor prior to inspection.

J. Contractor shall ensure that the factory start up engineer makes any calibrations and adjustments necessary for proper operation of the system.

3.02 SYSTEM START-UP

K. Upon completion of the installation, the system shall be checked out and started up by a factory trained technician. Contractor to have completed and tested all wiring, installed all controls and lamped all fixtures before start up.

L. Upon completion of system start up, the factory trained technician shall demonstrate the operation of the system to the Contractor and the Authority's representative. Contractor to advise Authority's representative prior to scheduling start up so all persons designated by the Authority and Engineer are present for training. [See Sect. 3.03] The following system start-up services shall be supplied by a factory trained Technician during a single site visit.

a. Check installation of all Lighting Control Panelboards
b. Test operation of all Breakers and Lighting Breakers
c. Test operation of all Low Voltage Inputs

d. Test operation of all Telephone Override Lines
e. Test operation of all Network Communication
f. Test operation of the Associated Printers
g. Load Application Specific software Control Modules and test operation
h. Repair or replace any defective component
i. Test operation of the complete Lighting Management System

M. Equipment manufacturer to provide four bound copies of a "Maintenance and Operation Manual" to the Authority's representative. Manuals shall contain "As Built" shop drawings, wiring diagrams, description of all control functions, all instruction sheets for all components, calibration and adjustment procedures for all applicable components, maintenance procedures and instructions, component specifications, copy of warranty and service contract (if applicable), address and phone contacts for troubleshooting and service help. Manufacturer's start up engineer to review contents of manual with Authority's representative.

N. The Authority or his representative will schedule a final inspection with the Contractor. The Contractor will make any necessary adjustments and calibrations, whether the inspection is scheduled within or outside normal working hours, at no additional cost to the Authority.

O. If deficiencies that can be corrected immediately are apparent, correct them as soon as possible and schedule another final inspection with the Authority. The Contractor will reimburse the Engineer or his representative for his costs, including travel costs, to return for re-inspection. The Contractor will also bear costs of any additional inspections until the system is approved of system. System must be approved prior to Authority's acceptance.

3.03 TRAINING

A. Factory technician will schedule, in coordination with the Authority, a training period for the Authority's staff [minimum five personnel] or designated appointees. This training period to be a minimum of three hours. Training to encompass entire scope of the system including operation, adjustments, maintenance and troubleshooting until completely understood. Manufacturer shall submit names and period of attendance of those instructed.

B. The following system training services shall be supplied by a factory Field Engineer during a single site visit:

a. System review of all Hardware Components and their functions

b. System review of all software Components and their function
c. Hands-On "Operator" training to develop experience with Supplied Control Functions
d. Hands-On "Building Engineer" training to develop experience with system Software Programming
e. Walk through of User's Guide and Programmer's Guide

3.04 SYSTEM PROGRAMMING

A. The following system programming services shall be supplied by a factory Field Engineer during a single site visit:

a. Advise the Building Engineer on developing a control scenario for each application
b. Program the Building Engineer supplied control scenario into the Lighting Management System
c. Review the programmed information with the Building Engineer and walk through the operation of the program
d. Provide program on a CD.

3.05 DOCUMENTATION

A. The following documentation shall be supplied:

a. System Single-Line Diagram: show system components and quantities including panelboards, breakers, low-voltage switches and sensors, dataline, telephone override lines and Lighting or Building Management Station.
b. Panelboard Configuration Diagram: Show PC board configuration, breaker configuration and power supply location.
c. Panelboard Wiring Schedule: Show breaker/load relationship with direct switch override if applicable.
d. Wiring Diagram: Show typical wiring application diagram for each system component supplied.
e. Installation Guide: Provide instructions as to how to install system components.
f. Manual: Provide User's Guide and Programmer's Guide in a loose leaf three ring binder with step by step illustrated instructions.
g. Riser Diagram: Provided by specifier along with reflected ceiling plans showing control schematic.

END OF SECTION 260923

SECTION 262200 - LOW-VOLTAGE TRANSFORMERS

PART 1 - GENERAL

1.1 SUMMARY

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.

C. Section includes dry-type distribution transformers rated 600 V and less, with capacities up to 1000 kVA.

D. Related Sections:
1. Section 260526 - Grounding and Bonding for Electrical Systems.
2. Section 260500 – Common Work Results for Electrical Systems.

1.2 Product Data: Include rated nameplate data, capacities, weights, dimensions, minimum clearances, installed devices and features, and performance for each type and size of transformer indicated.

1.3 Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

1. Wiring Diagrams: Power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

1. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
2. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

A. Qualification Data: For testing agency.

B. Source quality-control test reports.

C. Field quality-control test reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For transformers to include in emergency, operation, and maintenance manuals.

B. Manufacturer shall provide copies of following documents to owner for review and evaluation:

1. Product data and spare parts list.

1.6 QUALITY ASSURANCE

A. Testing Qualifications: Engage manufacturer with the experience and capability to conduct the testing to NETA standards.

B. Source Limitations: Obtain each transformer type through one source from a single manufacturer.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

D. Comply with IEEE C57.12.91, "Test Code for Dry-Type Distribution and Power Transformers."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Temporary Heating: Apply temporary heat according to manufacturer's written instructions within the enclosure of each ventilated-type unit, throughout periods during which equipment is not energized and when transformer is not in a space that is continuously under normal control of temperature and humidity.

1.8 COORDINATION

A. Coordinate size and location of concrete bases with actual transformer provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.

B. Coordinate installation of wall-mounting and structure-hanging supports with actual transformer provided.

PART 2 - PRODUCTS

2.1 BUY AMERICA COMPLIANCE

Products must meet Buy America requirements. Refer to NOTICE TO CONTRACTOR – BUY AMERICA for additional information.

2.2 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Acme Electric Corporation.
2. Controlled Power Company.
3. Eaton Electrical Sector; Eaton Corporation; Cutler-Hammer
4. Square D Co./Schneider Electric.
5. Or approved equal

2.3 GENERAL TRANSFORMER REQUIREMENTS

A. Description: Factory-assembled and -tested, air-cooled units for 60-Hz service.

B. Cores: Grain-oriented, non-aging silicon steel.

C. Coils: Continuous windings without splices except for taps.

1. Internal Coil Connections: Brazed or pressure type.
2. Coil Material: Copper unless otherwise specified.

2.4 DISTRIBUTION TRANSFORMERS

A. Comply with NEMA ST 20, and list and label as complying with UL 1561.

B. Cores: One leg per phase.

C. Indoor Transformer Enclosure: Ventilated, NEMA 250, Type 2.

1. Core and coil shall be encapsulated within resin compound, sealing out moisture and air.

D. Outdoor Transformer Enclosure: Totally enclosed, nonventilated, NEMA 250, Type 4X, stainless steel

1. Core and coil shall be encapsulated within resin compound, sealing out moisture and air.

E. Transformer Enclosure Finish: Comply with NEMA 250.

1. Finish Color: ANSI 61 gray.

F. Taps for Transformers smaller than 3 kVA: One 5 percent tap above normal full capacity.

G. Taps for Transformers 7.5 to 24 kVA: One 5 percent tap above and one 5 percent tap below normal full capacity.

H. Taps for Transformers 25 kVA and Larger: Two 2.5 percent taps above and two 2.5 percent taps below normal full capacity.

I. Insulation Class: 220 deg C, UL-component-recognized insulation system with a maximum of 115 deg C rise above 40 deg C ambient temperature.

J. Energy Efficiency for Transformers Rated 15 kVA and Larger:

1. Complying with NEMA TP 1, Class 1 efficiency levels.
2. Tested according to NEMA TP 2.

K. K-Factor Rating: Transformers indicated to be K-factor rated shall comply with UL 1561 requirements for nonsinusoidal load current-handling capability to the degree defined by designated K-factor.

1. Unit shall not overheat when carrying full-load current with harmonic distortion corresponding to designated K-factor.
2. Indicate value of K-factor on transformer nameplate.

L. Electrostatic Shielding: Each winding shall have an independent, single, full-width copper electrostatic shield arranged to minimize interwinding capacitance.

1. Arrange coil leads and terminal strips to minimize capacitive coupling between input and output terminals.
2. Include special terminal for grounding the shield.
3. Shield Effectiveness:

a. Capacitance between Primary and Secondary Windings: Not to exceed 33 picofarads over a frequency range of 20 Hz to 1 MHz.
b. Common-Mode Noise Attenuation: Minimum of minus 120 dBA at 0.5 to 1.5 kHz; minimum of minus 65 dBA at 1.5 to 100 kHz.
c. Normal-Mode Noise Attenuation: Minimum of minus 52 dBA at 1.5 to 10 kHz.

M. For wall mounted transformers, wall Brackets: Manufacturer's standard brackets.

N. For tropical or sub tropic environments, provide fungus proofing, permanent fungicidal treatment for coil and core.

O. Low-Sound-Level Requirements: Minimum of 3 dBA less than NEMA ST 20 standard sound levels when factory tested according to IEEE C57.12.91.

P. Low-Sound-Level Requirements: Maximum sound levels, when factory tested according to IEEE C57.12.91, as follows:

1. 9 kVA and Less: <40 dBA
2. 30 to 50 kVA: <45 dBA
3. 51 to 150 kVA: <50 dBA
4. 151 to 300 kVA: <55 dBA
5. 301 to 500 kVA: <60 dBA
6. 501 to 750 kVA: <62 dBA
7. 751 to 1000 kVA: <64 dBA

2.5 IDENTIFICATION DEVICES

A. Nameplates: Engraved, laminated-plastic or metal nameplate for each distribution transformer, mounted with corrosion-resistant screws. Nameplates and label products are specified in Section 260553 "Identification for Electrical Systems."

2.6 SOURCE QUALITY CONTROL

A. Test and inspect transformers according to IEEE C57.12.91.

B. Factory Sound-Level Tests: Conduct sound-level tests on equipment for this Project.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions for compliance with enclosure- and ambient-temperature requirements for each transformer.

B. Verify that field measurements are as needed to maintain working clearances required by NFPA 70 and manufacturer's written instructions.

C. Examine walls, floors, roofs, and concrete bases for suitable mounting conditions where transformers will be installed.

D. Verify that ground connections are in place and requirements in Section 260526 "Grounding and Bonding for Electrical Systems" have been met..

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install wall-mounting transformers level and plumb with wall brackets fabricated by transformer manufacturer.

1. Brace wall-mounting transformers as specified in Section 260548.16 "Seismic Controls for Electrical Systems."

B. Construct concrete bases and anchor floor-mounting transformers according to manufacturer's written instructions Section 260548.16 "Seismic Controls for Electrical Systems.", and requirements in Section 260529 "Hangers and Supports for Electrical Systems."

3.3 CONNECTIONS

A. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

B. Connect wiring according to Section 260519 "Low-Voltage Power Conductors and Cables."

3.4 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

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.

B. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.

C. Remove and replace units that do not pass tests or inspections and retest as specified above.

D. Infrared Scanning: Two months after Substantial Completion, perform an infrared scan of transformer connections.

1. Use an infrared-scanning device designed to measure temperature or detect significant deviations from normal values. Provide documentation of device calibration.
2. Perform 2 follow-up infrared scans of transformers, one at 4 months and the other at 11 months after Substantial Completion.

3. Prepare a certified report identifying transformer checked and describing results of scanning. Include notation of deficiencies detected, remedial action taken, and scanning observations after remedial action.

E. Test Labeling: On completion of satisfactory testing of each unit, attach a dated and signed "Satisfactory Test" label to tested component.

3.5 ADJUSTING

A. Record transformer secondary voltage at each unit for at least 48 hours of typical occupancy period. Adjust transformer taps to provide optimum voltage conditions at secondary terminals. Optimum is defined as not exceeding nameplate voltage plus 10 percent and not being lower than nameplate voltage minus 3 percent at maximum load conditions. Submit recording and tap settings as test results.

B. Output Settings Report: Prepare a written report recording output voltages and tap settings.

C. Adjust all access doors and operating handles for free mechanical operation as described in manufacturer's instructions.

3.6 CLEANING

A. Vacuum dirt and debris; do not use compressed air to assist in cleaning.

B. Repaint scratched or marred exterior surfaces to match original finish.

END OF SECTION 262200

SECTION 262416 - PANELBOARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of the Contract apply to this Section.

1.2 SUMMARY:

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.

C. Section Includes:

1. Distribution panelboards for platforms.
2. Lighting and appliance branch-circuit panelboards.

1.3 DEFINITIONS:

A. SVR: Suppressed voltage rating.

B. TVSS: Transient voltage surge suppressor.

1.4 PERFORMANCE REQUIREMENTS:

A. Seismic Performance: Panelboards shall withstand the effects of earthquake motions determined according to SEI/ASCE 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 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 panelboard, switching and overcurrent protective device, transient voltage suppression device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

C. Shop Drawings: For each panelboard and related equipment.

1. Include dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings.
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 overcurrent 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 overcurrent protective device included in panelboards. Submit on translucent log-log graft paper; include selectable ranges for each type of overcurrent protective device.

D. Qualification Data: For qualified testing agency.

E. Seismic Qualification Certificates: Submit certification that panelboards, overcurrent protective devices, accessories, and components will withstand seismic forces defined in 260548 "Vibration and Seismic Controls for Electrical Systems." Include the following:

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.

F. Field Quality-Control Reports:

1. Test procedures used.
2. Test results that comply with requirements.
3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

G. Panelboard Schedules: For installation in panelboards.

H. Operation and Maintenance Data: For panelboards and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Standard Form 816 include the following:

1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
2. Time-current curves, including selectable ranges for each type of overcurrent protective device that allows adjustments.

1.6 CLOSEOUT SUBMITTALS:

A. Submit closeout submittals in accordance with Form 816 Article 1.20-1.05.02, NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS.

1.7 QUALITY ASSURANCE:

A. Testing Agency Qualifications: Member company of NETA or an NRTL.

1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.

B. Source limitations: Obtain products from a single manufacturer in accordance with Form 816 Article 1.20-1.06.01.

C. Product Selection for Restricted Space: Drawings indicate maximum dimensions for panelboards including clearances between panelboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.

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 NEMA PB 1.

F. Comply with NFPA 70.

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. Remove loose packing and flammable materials from inside panelboards; install temporary electric heating (250 W per panelboard) to prevent condensation.

C. Handle and prepare panelboards for installation according to NEMA PB 1.

1.9 PROJECT CONDITIONS:

A. Environmental Limitations:

1. Do not deliver or install panelboards until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above panelboards is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
2. Rate equipment for continuous operation under the following conditions unless otherwise indicated:

a. Ambient Temperature: Not exceeding minus 22 deg F to plus 104 deg F
b. Altitude: Not exceeding 6600 feet

B. Service Conditions: NEMA PB 1, usual service conditions, as follows:

1. Ambient temperatures within limits specified.
2. Altitude not exceeding 6600 feet

1.10 COORDINATION:

A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

B. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.

1.11 WARRANTY:

A. Refer to Form 816, Article 1.20-1.06.08, and the NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information.

B. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace transient voltage suppression devices that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

1.12 EXTRA MATERIALS:

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Keys: Two spares for each type of panelboard cabinet lock.

PART 2 - PRODUCTS

2.1 BUY AMERICA COMPLIANCE

A. Products must meet Buy America requirements. Refer to NOTICE TO CONTRACTOR – BUY AMERICA for additional information.

2.2 GENERAL REQUIREMENTS FOR PANELBOARDS:

A. Fabricate and test panelboards according to IEEE 344 to withstand seismic forces defined in Division 26 Section "Vibration and Seismic Controls for Electrical Systems."

B. Enclosures: Surface-mounted cabinets.

1. Rated for environmental conditions at installed location.

a. Indoor Dry and Clean Locations: NEMA 250, Type 1.

2. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box.
3. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover.
4. Gutter Extension and Barrier: Same gage and finish as panelboard enclosure; integral with enclosure body. Arrange to isolate individual panel sections.
5. Finishes:

a. Panels and Trim: Galvanized steel, factory finished immediately after cleaning and pretreating 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.

6. Directory Card: Inside panelboard door, mounted in transparent card holder.

C. Incoming Mains Location: Top and 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 Connectors: Suitable for use with conductor material and sizes.

1. Material: Hard-drawn copper, 98 percent conductivity.
2. Main and Neutral Lugs: Compression type.
3. Ground Lugs and Bus-Configured Terminators: Compression type.

F. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals, contractor to submit short circuit calculations after selecting equipment.

2.3 DISTRIBUTION PANELBOARDS:

Manufacturers:

1. Eaton Cutler-Hammer
   Or
2. Approved equal.

B. Panelboards: NEMA PB 1, power and feeder distribution type.

C. Doors: Secured with vault-type latch with tumbler lock; keyed alike.

1. For doors more than 36 incheshigh, provide two latches, keyed alike.

D. Mains: Lugs only.

E. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes Larger than 125 A: Bolt-on circuit breakers; plug-in circuit breakers where individual positive-locking device requires mechanical release for removal.

F. Branch Overcurrent Protective Devices: Fused switches.

2.4 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS:

A. Manufacturers:

1. Eaton Cutler-Hammer
   Or
2. Approved equal

B. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.

C. Mains: Circuit breaker or lugs only.

D. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.

E. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.

2.5 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES:

A. Manufacturers:
   1. Eaton Cutler-Hammer
   2. Or
   3. Approved equal.

B. Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with 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. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
   2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
   3. Electronic trip circuit breakers with rms sensing; field-replaceable rating plug or field-replicable electronic trip; and the following field-adjustable settings:

      a. Instantaneous trip.
      b. Long- and short-time pickup levels.
      c. Long- and short-time time adjustments.
      d. Ground-fault pickup level, time delay, and I^2t response.

   4. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let-through ratings less than NEMA FU 1, RK-5.
   5. GFCI Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip).
   6. Ground-Fault Equipment Protection (GFEP) Circuit Breakers: Class B ground-fault protection (30-mA trip).
   7. Molded-Case Circuit-Breaker (MCCB) shall be bolt-on type.
      Features and Accessories:
      a. Standard frame sizes, trip ratings, and number of poles.
      b. Lugs: Compression style, suitable for number, size, trip ratings, and conductor materials.
      c. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge (HID) lighting circuits.
      d. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
      e. Shunt Trip: 120 24-V trip coil energized from separate circuit, set to trip at 55 75 percent of rated voltage.
      f. All MCCB

C. Fused Switch: NEMA KS 1, Type HD; clips to accommodate specified fuses; lockable handle.

1. Fuses, and Spare-Fuse Cabinet: Comply with requirements specified in Division 26 Section "Fuses."
2. Fused Switch Features and Accessories: Standard ampere ratings and number of poles.
3. Auxiliary Contacts: Two normally open and normally closed contact(s) that operate with switch handle operation.

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.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION:

A. Install panelboards and accessories according to NEMA PB 1.1.

B. Equipment Mounting: Install freestanding panelboards on concrete bases, 4-inchnominal thickness. Comply with requirements for concrete base specified in Division 03 Section "Cast-in-Place Concrete."

1. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around full perimeter of base.
2. For panelboards, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
4. Install anchor bolts to elevations required for proper attachment to panelboards.
5. Attach panelboard to the vertical finished or structural surface behind the panelboard.

C. Temporary Lifting 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 260548 "Vibration and Seismic Controls for Electrical Systems."

E. Mount top of trim 90 inchesabove finished floor unless otherwise indicated.

F. Mount panelboard cabinet plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.

G. Install overcurrent protective devices and controllers not already factory installed.

1. Set field-adjustable, circuit-breaker trip ranges.

H. Install filler plates in unused spaces.

I. Arrange conductors in gutters into groups and bundle and wrap with wire ties.

J. Comply with NECA 1.

3.3 IDENTIFICATION:

A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with Division 26 Section 260553 "Identification for Electrical Systems."

B. Create a directory to indicate installed circuit loads; incorporate Owner's final room designations. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.

C. Panelboard Nameplates: Label each panelboard with a nameplate complying with Division 26 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. Acceptance Testing Preparation:

1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

D. Tests and Inspections:
1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.

2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
3. Perform the following infrared scan tests and inspections and prepare reports:

    a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each panelboard. Remove front panels so joints and connections are accessible to portable scanner.
    b. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each panelboard 11 months after date of Substantial Completion.
    c. Instruments and Equipment:

        1) Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

E. Panelboards will be considered defective if they do not pass tests and inspections.

F. Prepare test and inspection reports, including a certified report that identifies panelboards included and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 ADJUSTING:

A. Adjust moving parts and operable component to function smoothly, and lubricate as recommended by manufacturer.

B. Load Balancing: After Substantial Completion, but not more than 60 days after Final Acceptance, measure load balancing and make circuit changes.

1. Measure as directed during period of normal system loading.
2. Perform load-balancing circuit changes outside normal occupancy/working schedule of the facility and at time directed. Avoid disrupting critical 24-hour services such as fax machines and on-line data processing, computing, transmitting, and receiving equipment.
3. After circuit changes, recheck loads during normal load period. Record all load readings before and after changes and submit test records.
4. Tolerance: Difference exceeding 20 percent between phase loads, within a panelboard, is not acceptable. Rebalance and recheck as necessary to meet this minimum requirement.

3.6 PROTECTION:

A. Temporary Heating: Apply temporary heat to maintain temperature according to manufacturer's written instructions.

END OF SECTION 262416

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.

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.

C. Drawings and general provisions of the Contract apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Receptacles, receptacles with integral GFCI, and associated device plates.
2. Snap switches.
3. Wall-switches.
4. Contactors.

1.3 DEFINITIONS

A. EMI: Electromagnetic interference.

B. GFCI: Ground-fault circuit interrupter.

C. Pigtail: Short lead used to connect a device to a branch-circuit conductor.

D. RFI: Radio-frequency interference.

E. TVSS: Transient voltage surge suppressor.

F. UTP: Unshielded twisted pair.

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: For each type of product indicated.

C. Shop Drawings: List of legends and description of materials and process used for pre-marking wall plates.

D. Samples: One for each type of device and wall plate specified, in each color specified.

E. Field quality-control test reports.

F. Operation and Maintenance Data: Wiring device manufacturers' packing label warnings and instruction manuals to be included.

1.5 CLOSEOUT SUBMITTALS

A. Submit closeout submittals in accordance with Form 816 Article 1.20-1.05.02, NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS.

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. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70-2011, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Comply with NFPA 70-2011.

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 the NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information.

PART 2 - PRODUCTS

2.1 BUY AMERICA COMPLIANCE

A. Products must meet Buy America requirements. Refer to NOTICE TO CONTRACTOR – BUY AMERICA for additional information.

2.2 MANUFACTURERS

A. Manufacturers' Names:

1. Cooper Industries, Inc.
   Or
2. Approved equal.

2.3 STRAIGHT BLADE RECEPTACLES

A. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration 5-20R, and UL 498.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:
   a. Cooper; 5352 (duplex).
      or
   b. Approved equal

2.4 GFCI RECEPTACLES

A. General Description: Straight blade, feed-through type. Comply with NEMA WD 1, NEMA WD 6, UL 498, and UL 943, Class A, and include indicator light that is lighted when device is tripped.

B. Duplex GFCI Convenience Receptacles, 125 V, 20 A:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:
   a. Cooper;
      or
   b. Approved equal

2.5 SNAP SWITCHES

A. Comply with NEMA WD 1 and UL 20.

B. Switches, 120/277 V, 20 A:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:
   a. Cooper;
      or
   b. Approved equal

C. Key-Operated Switches, 120/277 V, 20 A:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:
   a. Cooper;
      or
   b. Approved equal
3. Description: Single pole, with factory-supplied key in lieu of switch handle.

D. Single-Pole, Double-Throw, Momentary Contact, Center-Off Switches, 120/277 V, 20 A; for use with mechanically held lighting contactors.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:
   a. Cooper;
      or
   b. Approved equal

2.6 WALL PLATES

A. Single and combination types to match corresponding wiring devices.

1. Plate-Securing Screws: Metal with head color to match plate finish.
2. Material for Finished Spaces: Satin-finished stainless steel
3. Material for Unfinished Spaces: Galvanized steel.
4. Material for Damp Locations: Cast aluminum with spring-loaded lift cover, and listed and labeled for use in "wet locations."

B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with type 3R weather-resistant equal to Pass & Seymour WICU-10.

2.7 FINISHES

A. Color: Wiring device catalog numbers in Section Text do not designate device color.

1. Wiring Devices Connected to Normal Power System: Ivory, unless otherwise indicated or required.

2.8 LIGHTING SWITCHES

A. Lighting control switches shall be furnished and installed as shown on the Contract Drawings.

B. Unless otherwise indicated on the Contract Drawings, the boxes for the switches shall be provided with cadmium plated sheet steel cover plates, Crouse-Hinds Co. Cat. No. DS32, or approved equal, for surface mounted boxes and Crouse-Hinds Co. Cat. No. DSS32, or approved equal, for flush mounted boxes.

C. Toggle Switches: UL standard 20, totally enclosed with bodies of thermosetting plastic and a mounting strap. Handles shall be ivory. Wiring terminals shall be of the screw type, back or side wired. Switches shall be rated quiet type with the number of poles, and other features indicated.

D. Pilot lights shall consist of yoke-mounted, candelabra-base sockets rated at 75 watt, 125 volts, and fitted with glass or plastic jewels. A clear 6-watt lamp shall be furnished and installed in each pilot switch. Jewels for use with switches controlling motors shall be green and jewels for other purposes shall be white.

E. Lighting Contactors: Lighting contractors to be Square D Company or approved equal, Type S Series with NEMA I enclosure with hand-off auto selector switches.

F. All switches shall be mounted four feet above the finished floor, unless otherwise indicated on the Contract Drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1, including the mounting heights listed in that standard, unless otherwise noted.

B. Coordination with Other Trades:

1. Take steps to insure that devices and their boxes are protected. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of the boxes.

2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
4. Install wiring devices after all wall preparation, including painting, is complete.

C. Conductors:

1. Do not strip insulation from conductors until just before they are spliced or terminated on devices.
2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
4. Existing Conductors:
   a. Cut back and pigtail, or replace all damaged conductors.
   b. Straighten conductors that remain and remove corrosion and foreign matter.
   c. Pigtailing existing conductors is permitted provided the outlet box is large enough.

D. Device Installation:

1. Replace all devices that have been in temporary use during construction or that show signs that they were installed before building finishing operations were complete.
2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, 2/3 to 3/4 of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by the manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device mounting screws in yokes, allowing metal-to-metal contact.

E. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles down, and on horizontally mounted receptacles to the right.

F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

G. Light switches shall be mounted 48 inches above finished floor to centerline. Fire alarm pull stations shall be mounted 48 inches above finished floor to operating handle.

H. Receptacles, in general, shall be mounted 24 inches above finished floor except where unable, due to obstructions; receptacles may be mounted at a minimum of 18 inches above finished floor. Receptacles in the same room, space or area are required to be at the same elevation.

I. Heights given are from finished floor to centerline of outlet or devices

END OF SECTION 262726

SECTION 262813 - FUSES

PART 1 - GENERAL

1.1 SUMMARY

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.

C. Section includes: Cartridge fuses rated 600V ac and less for use in control circuits and enclosed switches.

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: For each type of product indicated.

C. Operation and maintenance data.

1.3 CLOSEOUT SUBMITTALS

A. Submit closeout submittals in accordance with Form 816 Article 1.20-1.05.02, NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS.

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. 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 NEMA FU 1 for cartridge fuses.

D. Comply with NFPA 70.

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.

1.6 WARRANTY

A. Refer to Form 816, Article 1.20-1.06.08, and the NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information.

PART 2 - PRODUCTS

2.1 BUY AMERICA COMPLIANCE

A. Products must meet Buy America requirements. Refer to NOTICE TO CONTRACTOR – BUY AMERICA for additional information

2.2 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. Cooper Ind.
   or
2. Approved equal.

2.3 CARTRIDGE FUSES

A. Characteristics: NEMA FU 1, nonrenewable cartridge fuses with voltage ratings consistent with circuit voltages.

PART 3 - EXECUTION

3.1 FUSE APPLICATIONS

A. Motor Branch Circuits: Class RK1, time delay.

B. Other Branch Circuits: Class RK1, time delay.

C. Control Circuits: Class CC, fast acting.

3.2 INSTALLATION

A. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.

3.3 IDENTIFICATION

A. Install labels complying with requirements for identification specified in Division 26 Section 260553 "Identification for Electrical Systems" and indicating fuse replacement information on inside door of each fused switch and adjacent to each fuse block and holder.

END OF SECTION 262813

SECTION 262816 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

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. 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.

C. This section specifies the furnishing and installation of safety switches complete in place.

1.2 SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

1. Manufacturer's catalog sheets for products should be included in this section.

1.3 CLOSEOUT SUBMITTALS

A. Submit closeout submittals in accordance with Form 816 Article 1.20-1.05.02, NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS.

1.4 QUALITY ASSURANCE

A. 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.

1.6 WARRANTY

A. Refer to Form 816, Article 1.20-1.06.08, and the NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information.

PART 2 - PRODUCTS

2.1 BUY AMERICA COMPLIANCE

B. Products must meet Buy America requirements. Refer to NOTICE TO CONTRACTOR – BUY AMERICA for additional information.

2.2 SAFETY SWITCHES

A. Safety type disconnecting switches shall be Type "HD", heavy duty, Class 3, Design 3, unless otherwise indicated, mounted in NEMA I enclosures. Enclosures exposed to wet or rain conditions shall be NEMA 4X stainless steel, water tight. Switches shall be rated at 600 minimum volts or as required by the voltage of the circuit on which they are utilized. They shall be rated in horsepower, and each shall be capable of interrupting the locked rotor current of the motor for which it is to be used, which current will be assumed as ten (10) times the full rated load current.

B. The switches shall be of the quick-make, quick-break type, and all parts shall be mounted on insulating bases to permit replacement of any part from the front of the switch. All current-carrying parts shall be of high-conductivity copper, designed to carry rated load without excessive heating. Switch contacts shall be silver-tungsten type or plated to prevent corrosion, pitting and oxidation and to assure suitable conductivity. The switch operating mechanism shall be designed to retain its effectiveness with continuous use at rated capacity without the use of auxiliary springs in the current path.

C. Safety switches located at motors and which are used as disconnects for maintenance only, shall be unfused and capable of being locked in the open position.

D. Accessories:

1. Equipment ground kit, internally-mounted and labeled for copper and aluminum.

2. Auxiliary contact kit.

2.3 MOLDED-CASE CIRCUIT BREAKERS

C. 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 Cutler-Hammer
Or
2. Approved equal

D. General Requirements: Bolt-on, Comply with UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents.

E. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

F. Adjustable, Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.

G. Features and Accessories:

1. Standard frame sizes, trip ratings, and number of poles.
2. Lugs: Compression type, suitable for number, size, trip ratings, and conductor material.
3. Shunt Trip: Trip coil energized from separate circuit, with coil-clearing contact.
4. Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage without intentional time delay.
5. Auxiliary Contacts: Two SPDT switches] with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts, "b" contacts operate in reverse of circuit-breaker contacts.

2.4 ENCLOSURES

A. Enclosed Switches and Circuit Breakers: NEMA AB 1, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.

1. Indoor, Dry and Clean Locations: NEMA 250, Type 1.
2. Outdoor Locations: NEMA 250, Type 4X stainless steel.

2.5 NAMEPLATES

A. Standard phenolic nameplates with 3/8 inch minimum size lettering engraved thereon.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.

B. Comply with mounting and anchoring requirements specified in Division 26 Section 260548 "Vibration and Seismic Controls for Electrical Systems."

C. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

D. Install fuses in fusible devices.

E. Comply with NECA 1.

3.3 IDENTIFICATION

A. Comply with requirements in Division 26 Section 260553 "Identification for Electrical Systems."

1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
2. Label each enclosure with engraved metal or laminated-plastic nameplate.

END OF SECTION 262816

SECTION 263353 - STATIC UNINTERRUPTIBLE POWER SUPPLY

PART 1 - GENERAL

1.1 SUMMARY:

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.

C. This Section includes the furnishing and installing of a three-phase, on-line, static-type, UPS installations, complete with transient voltage surge suppression, input harmonics reduction, rectifier-charger, battery, battery disconnect device, inverter, static bypass transfer switch and all accessories. UPS systems shall be installed for the station and platform lighting and communication racks.

1.2 DEFINITIONS:

A. EMI: Electromagnetic interference.

B. LCD: Liquid-crystal display.

C. LED: Light-emitting diode.

D. THD: Total harmonic distortion.

E. UPS: Uninterruptible power supply.

1.3 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 data on features, components, ratings, and performance for each uninterruptible power supply component indicated.

C. Shop Drawings: Detail assemblies of equipment indicating dimensions, weights, components, and location and identification of each field connection. Show access,

workspace, and clearance requirements; details of control panels; and battery arrangement.

1. Wiring Diagrams: Detail internal and interconnecting wiring; and power, signal, and control wiring. Differentiate between field-installed and factory-installed wiring and components.

D. Manufacturer Certificates: Signed by manufacturers certifying that they comply with requirements.

E. Qualification Data: For firms and persons specified in "Quality Assurance" Article.

F. Factory Test Reports: Comply with specified requirements.

G. Field Test Reports: Indicate test results compared with specified performance requirements, and provide justification and resolution of differences if values do not agree.

H. Maintenance Data: For UPS units to include in maintenance manuals. Include the following:

1. Lists of spare parts and replacement components recommended being stored at Project site for ready access.
2. Detailed operating instructions covering operation under both normal and abnormal conditions.

I. Warranties: Special warranties specified in this Section.

1.4 CLOSOUT SUBMITTALS:

A. Submit closeout submittals in accordance with Form 816 Article 1.20-1.05.02, NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS.

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: An experienced installer who is an authorized representative of UPS manufacturer for both installation and maintenance of units required for this Project.

C. Power Quality Consultant Qualifications: A registered professional electrical engineer or engineering technician, currently certified by the National Institute for Certification in Engineering Technologies, NICET level 4, minimum, experienced in functional

performance testing UPS installations and in performing power quality surveys similar to that required in Part 3 "Functional Performance Testing" Article.

D. Manufacturer Qualifications: A firm who maintains a service center capable of providing training, parts, and emergency maintenance and repairs for equipment at Project site with eight hours' maximum response time.

E. Testing Agency Qualifications: An independent testing agency with experience and capability to conduct testing indicated without delaying the Work, as documented according to OSHA criteria for accreditation of testing laboratories, 29 CFR 1910.7; or a full member company of the International Electrical Testing Association.

1. Testing Agency's Field Supervisor: Person currently certified by the International Electrical Testing Association or the National Institute for Certification in Engineering Technologies to supervise on-site testing specified in Part 3.

F. Source Limitations: Obtain the UPS and associated components specified in this Section from a single manufacturer with responsibility for entire UPS installation.

G. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70-2011, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.

1. UPS Units: Listed and labeled under UL 1778.
2. Mark UPS components as suitable for installation in computer rooms according to NFPA 75.

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 equipment in fully enclosed vehicles after specified environmental conditions have been permanently established in spaces where equipment is to be placed.

C. Store equipment in spaces with environments controlled within manufacturers' ambient temperature and humidity tolerances for non-operating equipment.

1.7 WARRANTY:

A. Refer to Form 816, Article 1.20-1.06.08, and the NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information

B. Warranties, General: Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract

Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

C. Special Battery Warranties: Written warranty, signed by manufacturer and Installer agreeing to replace UPS system storage batteries that fail in materials or workmanship within specified warranty period.

1. Warranted Cycle Life for Sealed Lead-Acid Batteries: Equal to or greater than that represented in manufacturer's published table, including figures corresponding to the following, based on annual average battery temperature of 77 deg F (25 deg C):

Discharge Rate	Discharge Duration	Discharge End Voltage	Cycle Life
8 hours	8 hours	1.67	6 cycles
30 minutes	30 minutes	1.67	20 cycles
15 minutes	1 minute	1.67	120 cycles

2. Warranted Cycle Life for Premium Sealed Lead-Acid Batteries: Equal or greater than that represented in manufacturer's published table, including figures corresponding to the following, based on annual average battery temperature of 77 deg F (25 deg C):

Discharge Rate	Discharge Duration	Discharge End Voltage	Cycle Life
8 hours	8 hours	1.67	40 cycles
30 minutes	30 minutes	1.67	125 cycles
15 minutes	1 minute	1.67	750 cycles

3. Warranted Cycle Life for Wet-Cell Batteries: Equal to or greater than that represented in manufacturer's published table, including figures corresponding to the following, based on annual average battery temperature of 77 deg F (25 deg C):

Discharge Rate	Discharge Duration	Discharge End Voltage	Cycle Life
8 hours	8 hours	1.75	40 cycles
1 hour	1 hour	1.75	80 cycles
15 minutes	0 to 30 seconds	1.67	2700 cycles

D. Special UPS Warranties: Written warranties, signed by manufacturer and Installer agreeing to replace components that fail in materials or workmanship within special warranty period.

1. Special Warranty Period: Three years from date of Substantial Completion.

1.8 EXTRA MATERIALS:

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents. Deliver extra materials to the client.

1. Fuses: One for every 10 of each type and rating, but not less than 1 of each.
2. Cabinet Ventilation Filters: One complete set.
3. One spare circuit board for each critical circuit.

PART 2 - PRODUCTS

2.1 BUY AMERICA COMPLIANCE

A. Products must meet Buy America requirements. Refer to NOTICE TO CONTRACTOR – BUY AMERICA for additional information

2.2 MANUFACTURERS:

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Deltec Corporation.
   or
2. Approved equal.

2.3 FUNCTIONAL DESCRIPTION:

A. Automatic operation includes the following:

1. Normal Conditions: Supply the load with ac power flowing from the normal ac power input terminals, through the rectifier-charger and inverter, with the battery connected in parallel with the rectifier-charger output.
2. Abnormal Supply Conditions: If normal ac supply deviates from specified and adjustable voltage, voltage waveform, or frequency limits, the battery supplies

energy to maintain constant, regulated inverter ac power output to the load without switching or disturbance.

3. If normal power fails, energy supplied by the battery through the inverter continues supply-regulated ac power to the load without switching or disturbance.
4. When power is restored at the normal supply terminals of the system, controls automatically synchronize the inverter with the external source before transferring the load. The rectifier-charger then supplies power to the load through the inverter and simultaneously recharges the battery.
5. If battery becomes discharged and normal supply is available, the rectifier-charger charges the battery. On reaching full charge, the rectifier-charger automatically shifts to a float-charge mode.
6. If any element of the UPS system fails and power is available at the normal supply terminals of the system, the static bypass transfer switch switches the load to the normal ac supply circuit without disturbance or interruption of supply.
7. If a fault occurs in the system supplied by the UPS and current flows in excess of the overload rating of the UPS system, the static bypass transfer switch operates to bypass the fault current to the normal ac supply circuit for fault clearing.
8. When the fault has cleared, the static bypass transfer switch returns the load to the UPS system.
9. If battery is disconnected, the UPS continues to supply power to the load with no degradation of its regulation of voltage and frequency of the output bus.

B. Manual operation includes the following:

1. Turning the inverter off causes the load to be transferred by the static bypass transfer switch directly to the normal ac supply circuit without disturbance or interruption.
2. Turning the inverter on causes the static bypass transfer switch to transfer the load to the inverter.

C. Maintenance Bypass/Isolation Switch Operation: Switch is interlocked so it cannot be operated unless static bypass transfer switch is in the bypass mode. Device provides manual selection between the following three conditions without interrupting supply to the load during switching:

1. Full Isolation: Load is supplied, bypassing the UPS. Normal UPS ac input circuit, static bypass transfer switch, and UPS load terminals are completely disconnected from external circuits.
2. Maintenance Bypass: Load is supplied, bypassing the UPS. UPS ac supply terminals are energized to permit operational checking, but system load terminals are isolated from the load.
3. Normal: Normal UPS ac supply terminals are energized and the load is supplied through either the static bypass transfer switch and UPS rectifier-charger and inverter, or the battery and the inverter.

2.4 SERVICE CONDITIONS:

A. Environmental Conditions: UPS shall be capable of operating continuously in the following environmental conditions without mechanical or electrical damage or degradation of operating capability, except battery performance.

1. Ambient Temperature for Electronic Components: 32 to 104 deg F (0 to 40 deg C).
2. Ambient Temperature for Battery: 41 to 95 deg F (5 to 35 deg C).
3. Relative Humidity: 0 to 95 percent, noncondensing.
4. Altitude: Sea level to 4000 feet (1220 m).

2.5 PERFORMANCE REQUIREMENTS:

A. UPS shall perform as specified in this Article while supplying rated full-load current, composed of any combination of linear and nonlinear load, up to 100 percent nonlinear load with a load crest factor of 3.0, under the following conditions or combinations of the following conditions:

1. Inverter is switched to battery source.
2. Steady-state ac input voltage deviates up to plus or minus 10 percent from nominal voltage.

3. Steady-state input frequency deviates up to plus or minus 5 percent from nominal frequency.
4. THD of input voltage is 15 percent or more with a minimum crest factor of 3.0, and the largest single harmonic component is a minimum of 5 percent of the fundamental value.
5. Load is 30 percent unbalanced continuously.

B. Minimum Duration of Supply: If battery is sole energy source supplying UPS-rated full-output load current at 80 percent power factor, duration of supply is 4 hours, with ambient temperature between 68 to 86 deg F (20-30 deg C).

C. Input Voltage Tolerance: System steady-state and transient output performance remains within specified tolerances when steady-state ac input voltage varies plus 10, minus 20 percent from nominal voltage.

D. Overall UPS Efficiency: Equal to or greater than 80 percent at 100 percent load, 80 percent at 75 percent load, and 80 percent at 50 percent load.

E. Maximum Energizing Inrush Current: Eight times the full-load current.

F. Maximum AC Output-Voltage Regulation for Loads up to 50 Percent Unbalanced: Plus or minus 2 percent over the full range of battery voltage.

G. Output Frequency: 60 Hz, plus or minus 0.5 percent over the full range of input voltage, load, and battery voltage.

H. Limitation of harmonic distortion of input current to the UPS shall be as follows:

1. Description: Either a tuned harmonic filter or an arrangement of rectifier-charger circuits shall limit THD to 5 percent, maximum, at full-rated UPS load current, for power sources with X/R ratio between 2 and 30.
2. Description: THD is limited to a maximum of 32 percent, at full-rated UPS load current, for power sources with X/R ratio between 2 and 30.

I. Maximum Harmonic Content of Output-Voltage Waveform: 5 percent RMS total and 3 percent RMS for any single harmonic, for 100 percent rated nonlinear load current with a load crest factor of 3.0.

J. Maximum Harmonic Content of Output-Voltage Waveform: 5 percent RMS total and 3 percent RMS for any single harmonic for rated full load with THD up to 50 percent, with a load crest factor of 3.0.

K. Minimum Overload Capacity of UPS at Rated Voltage: 125 percent of full-load rating for 10 minutes, and 150 percent for 10 seconds in all operating modes.

L. Maximum Output-Voltage Transient Excursions from Rated Value: For the following instantaneous load changes, stated as percentages of rated full UPS load, voltage shall remain within stated percentages of rated value and recover to, and remain within, plus or minus 2 percent of that value within 100 ms:

1. 50 Percent: Plus or minus 8 percent.
2. 100 Percent: Plus or minus 10 percent.
3. Loss of AC Input Power: Plus or minus 5 percent.
4. Restoration of AC Input Power: Plus or minus 5 percent.

M. Input Power Factor: A minimum of 0.85 lagging when supply voltage and current are at nominal rated values and UPS is supplying rated full-load current.

N. EMI Emissions: Comply with FCC Rules and Regulations, 47 CFR 15 for Class A equipment.

2.6 SYSTEM COMPONENTS, GENERAL:

A. Electronic Equipment: Solid-state devices using hermetically sealed, semiconductor elements. Devices include rectifier-charger, inverter, static bypass transfer switch, and system controls.

B. Enclosures: Comply with NEMA 250, Type 1, unless otherwise indicated.

C. Control Assemblies: Mount on modular plug-ins, readily accessible for maintenance.

D. Surge Suppression: Protect internal UPS components from surges that enter at each ac power input connection including main disconnect, static bypass transfer switch. Protect rectifier-charger, inverter, controls, and output components.

1. Use factory-installed surge suppressors tested according to IEEE C62.41, Category B.
2. Additional Surge Protection: Protect internal UPS components from low-frequency, high-energy voltage surges described in IEEE C62.41. Design the circuits connecting with external power sources and select circuit elements, conductors, conventional surge suppressors, and rectifier components and controls so input assemblies will have adequate mechanical strength and thermal and current-carrying capacity to withstand stresses imposed by 40-Hz, 180 percent voltage surges described in IEEE C62.41.

E. Maintainability Features: Mount rectifier-charger and inverter sections and static bypass transfer switch on modular plug-ins, readily accessible for maintenance.

F. Capacity Upgrade Capability: Arrange wiring, controls, and modular component plug-in provisions to permit future 25 percent increase in UPS capacity.

G. Seismic-Restraint Design: UPS assemblies, subassemblies, and components; and fastenings and supports, mounting, and anchorage devices for them, shall be designed and fabricated to withstand static and seismic forces in any direction.

H. UPS Cabinet Ventilation: Redundant fans or blowers draw in ambient air near the bottom of the cabinet and discharge it near the top rear.

I. Output Circuit Neutral Bus, Conductor, and Terminal Ampacity: Rated phase current times a multiple of 1.73, minimum.

2.7 RECTIFIER-CHARGER:

A. Capacity: Adequate to supply the inverter during full-rated output load conditions and simultaneously recharge the battery from fully discharged condition to 95 percent of full charge within 10 times the rated discharge time for duration of supply under battery power at full load.

B. Output Ripple: Limited by output filtration to less than 0.5 percent of rated current, peak to peak.

C. Rectifier-Charger Control Circuits: Immune to frequency variations within rated frequency ranges of normal and emergency power sources.

1. Response Time: Field adjustable for maximum compatibility with local generator-set power source.

D. Battery Float-Charging Conditions: Comply with battery manufacturer's written instructions for battery terminal voltage and charging current required for maximum battery life.

2.8 INVERTER:

A. Description: Pulse-width modulated, with sinusoidal output.

2.9 STATIC BYPASS TRANSFER SWITCH:

A. Description: Solid-state switching device providing uninterrupted transfer. A contactor or electrically operated circuit breaker automatically provides electrical isolation for the switch.

B. Switch Rating: Continuous duty at the rated full-load current of the UPS, minimum.

2.10 BATTERY:

A. Description: Sealed, valve-regulated, recombinant, lead-calcium units, factory assembled in an isolated compartment of UPS cabinet, and complete with battery disconnect switch.

B. Description: Sealed, premium, heavy-duty, valve-regulated, recombinant, lead-calcium units, factory assembled in an isolated compartment or in a separate matching cabinet, complete with battery disconnect switch.

1. Arrange for drawout removal of battery assembly from cabinet for test and inspection.

C. Description: Wet-cell, lead-calcium, heavy-duty industrial units in styrene acrylonitrile containers mounted on three-tier, acid-resistant, painted steel racks. Assembly includes a battery disconnect switch, intercell connectors, a hydrometer syringe, and a thermometer with specific gravity-correction scales.

2.11 UPS CONTROL AND INDICATION:

A. Description: Group displays, indications, and basic system controls on a common control panel on front of UPS enclosure.

B. Minimum displays, indicating devices, and controls include those in lists below. Provide sensors, transducers, terminals, relays, and wiring required to support listed items. Alarms include an audible signal and a visual display.

C. Indications: Plain-language messages on a digital LCD or LED.

1. Quantitative indications shall include the following:
    a. Input voltage, each phase, line to line.
    b. Input current, each phase, line to line.
    c. Bypass input voltage, each phase, line to line.
    d. Bypass input frequency.
    e. System output voltage, each phase, line to line.
    f. System output current, each phase.
    g. System output frequency.
    h. DC bus voltage.
    i. Battery current and direction (charge/discharge).
    j. Elapsed time-discharging battery.

2. Basic status condition indications shall include the following:
    a. Normal operation.
    b. Load-on bypass.
    c. Load-on battery.
    d. Inverter off.
    e. Alarm condition exists.

3. Alarm indications shall include the following:
    a. Bypass ac input overvoltage or undervoltage.
    b. Bypass ac input overfrequency or underfrequency.
    c. Bypass ac input and inverter out of synchronization.
    d. Bypass ac input wrong-phase rotation.
    e. Bypass ac input single-phase condition.
    f. Bypass ac input filter fuse blown.
    g. Internal frequency standard in use.
    h. Battery system alarm.
    i. Control power failure.
    j. Fan failure.
    k. UPS overload.
    l. Battery-charging control faulty.
    m. Input overvoltage or undervoltage.
    n. Input transformer overtemperature.
    o. Input circuit breaker tripped.
    p. Input wrong-phase rotation.
    q. Input single-phase condition.
    r. Approaching end of battery operation.
    s. Battery undervoltage shutdown.
    t. Maximum battery voltage.
    u. Inverter fuse blown.
    v. Inverter transformer overtemperature.
    w. Inverter overtemperature.
    x. Static bypass transfer switch overtemperature.
    y. Inverter power supply fault.
    z. Inverter transistors out of saturation.

aa. Identification of faulty inverter section/leg.
bb. Inverter output overvoltage or undervoltage.
cc. UPS overload shutdown.
dd. Inverter current sensor fault.
ee. Inverter output contactor open.
ff. Inverter current limit.

4. Controls shall include the following:
   a. Inverter on-off.
   b. UPS start.
   c. Battery test.
   d. Alarm silence/reset.
   e. Output-voltage adjustment.

D. Dry-form "C" contacts shall be available for remote indication of the following conditions:

1. UPS on battery.
2. UPS on-line.
3. UPS load-on bypass.
4. UPS in alarm condition.
5. UPS off (maintenance bypass closed).

2.12 OUTPUT DISTRIBUTION SECTION:

A. Panelboard: Comply with Section 262416.

2.13 BASIC BATTERY MONITORING:

A. Battery Ground-Fault Detector: Initiates alarm when resistance to ground of positive or negative bus of battery is less than 5000 ohms.

B. Battery compartment smoke/high-temperature detector initiates an alarm when smoke or a temperature greater than 75 deg C occurs within the compartment.

C. Annunciation of Alarms: At UPS control panel.

2.14 BATTERY CYCLE WARRANTY MONITORING:

A. Description: Electronic device, acceptable to battery manufacturer as a basis for warranty action, for monitoring of charge-discharge cycle history of batteries covered by a cycle-life warranty.

B. Basic Functional Performance: Automatically measures and records each discharge event, classifies it according to duration category, and totals discharges according to warranty criteria, displaying remaining warranted battery life on integral LCD.

C. Additional monitoring functions and features shall include the following:

1. Measuring and Recording: Total voltage at battery terminals, providing alarm for excursions outside the proper float voltage level.
2. Monitors: Ambient temperature at battery and initiates an alarm if temperature deviates from normally acceptable range.
3. Keypad on Device Front Panel: Provides access to monitored data using front panel display.
4. Alarm Contacts: Arranged to provide local alarm for abnormal battery voltage or temperature.
5. Memory: Device stores recorded data in nonvolatile electronic memory.
6. RS-232 Port: Permits downloading data to a portable personal computer.
7. Modem: Makes measurements and recorded data accessible to remote personal computer via telephone line. Computer is not specified in this Section.

2.15 SOURCE QUALITY CONTROL:

A. Factory test complete UPS, including battery, before shipment. Include the following tests:

1. Functional test and demonstration of all functions, controls, indicators, sensors, and protective devices.
2. Full-load test.
3. Transient-load response test.
4. Overload test.
5. Power failure test.
6. Efficiency test at 50, 75, and 100 percent of rated full-load current at rated power factor.

B. Observation of Test: Give 14 days advance notice of tests and provide opportunity for the client’s representative to observe tests at their option.

C. Report test results. Include the following data:

1. Description of input source and output loads used. Describe actions required to simulate source load variation and various operating conditions and malfunctions.
2. List of indications, parameter values, and system responses considered satisfactory for each test action. Include tabulation of actual observations during test.
3. List of instruments and equipment used in factory tests.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. Install system components on 4-inch- (100-mm-) high concrete bases. Cast-in-place concrete, reinforcing, and formwork are specified in Division 3.

B. Maintain minimum clearances and workspace at equipment according to manufacturer's written instructions and NFPA 70-2011.

C. Connections: Interconnect system components. Make connections to supply and load circuits according to manufacturer's wiring diagrams, unless otherwise indicated.

3.2 GROUNDING:

A. Comply with Section 260526 - Grounding for materials and installation requirements.

B. Separately Derived Systems: If not part of a listed power supply for a data-processing room, comply with NFPA 70-2011 requirements for connecting to grounding electrodes and for bonding to metallic piping near isolation transformer.

3.3 IDENTIFICATION:

A. Identify components and wiring according to Section 260553 – Identification for Electrical Systems.

1. Identify <u>each</u> battery cell <u>individually</u>.

3.4 BATTERY EQUALIZATION:

A. Equalize charging of battery cells according to manufacturer's written instructions. Record individual-cell voltages.

3.5 FIELD QUALITY CONTROL:

A. Manufacturer's Field Service: Engage the services of a factory-authorized service representative to supervise UPS installation, startup, and preliminary testing and adjustment and to participate in final tests, inspections, and adjustments.

B. Electrical Tests and Inspections: Perform tests and inspections according to manufacturer's written instructions and as listed below to demonstrate condition and performance of each component of the UPS:

1. Inspect interiors of enclosures, including the following:

a. Integrity of mechanical and electrical connections.

b. Component type and labeling verification.

c. Ratings of installed components.

2. Test manual and automatic operational features and system protective and alarm functions.
3. Test communication of status and alarms to remote monitoring equipment.

C. Electrical Tests and Inspections: Perform tests and inspections listed below by an independent testing agency meeting the qualifications specified in "Quality Assurance" Article according to manufacturer's written instructions and as listed below to demonstrate condition and performance of each UPS:

1. Inspect interiors of enclosures, including the following:
   a. Integrity of mechanical and electrical connections.
   b. Component type and labeling verification.
   c. Ratings of installed components.

2. Load the system using a variable-load bank to simulate kilovolt amperes, kilowatts, and power factor of loads for the unit's rating. Use instruments calibrated, within the previous six months according to NIST standards.
   a. Simulate malfunctions to verify protective device operation.
   b. Test duration of supply on emergency, low-battery voltage shutdown, and transfers and restoration due to normal source failure.
   c. Test harmonic content of input and output current less than 25, 50, and 100 percent of rated loads.
   d. Test output voltage under specified transient-load conditions.
   e. Test efficiency at 50, 75, and 100 percent rated loads.
   f. Test remote status and alarm panel functions.
   g. Test battery-monitoring system functions.

D. Seismic-restraint tests and inspections shall include the following: Inspect type, size, quantity, arrangement, and proper installation of mounting or anchorage devices.

E. Retest: Correct deficiencies and retest until specified requirements are met.

F. Record of Tests and Inspections: Maintain and submit documentation of tests and inspections, including references to manufacturers' written instructions and other test and inspection criteria. Include results of tests, inspections, and retests.

3.6 DEMONSTRATION:

A. Engage a factory-authorized service representative to train CTDOT (Amtrak) maintenance personnel to adjust, operate and maintain the UPS.

1. Train Owner's maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, and maintaining equipment.

2. Review data in maintenance manuals.
3. Schedule training with client's personnel, through Architect, with at least seven days advance notice.

3.7 FUNCTIONAL PERFORMANCE TESTING:

A. Monitoring and Testing Schedule: Perform monitoring and testing a single 10-day period.

1. Schedule monitoring and testing activity with client's personnel, through Architect, with at least 14 days' advance notice.
2. Schedule monitoring and testing after Substantial Completion, when UPS is supplying power to its intended load.

B. Monitoring and Testing Instruments: Three-phase, recording power monitors. Instruments shall provide continuous simultaneous monitoring of electrical parameters at input terminals of the UPS and at input terminals of a load served by the UPS. Instruments shall monitor, measure, and graph voltage current and frequency simultaneously and provide full-graphic recordings of the values of those parameters before and during power line disturbances that cause the values to deviate from normal beyond the adjustable threshold values. Instruments shall be capable of recording either on paper or on magnetic media and have a minimum accuracy of plus or minus 2 percent for electrical parameters. Parameters to be monitored include the following:

1. Current: Each phase and neutral and grounding conductors.
2. Voltage: Phase to phase, phase to neutral, phase to ground, and neutral to ground.
3. Frequency transients.
4. Voltage swells and sags.
5. Voltage impulses, phase to phase, phase to neutral, phase to ground, and neutral to ground.
6. High-frequency noise.
7. Radio-frequency interference.
8. THD of the above currents and voltages.
9. Harmonic content of currents and voltages above.

C. Monitoring and Testing Procedure: As follows for each test period:

1. Exploratory Period: For approximately the first two days of the first scheduled monitoring and testing period, make recordings at various circuit locations and with various parameter-threshold and sampling-interval settings. Make these preliminary measurements with the objective of identifying optimum UPS, power system, load, and instrumentation set-up conditions for subsequent test and monitoring operations.
2. Remainder of Test Period: Perform continuous monitoring of at least two circuit locations selected on the basis of data obtained during exploratory period.

a. Set thresholds and sampling intervals for recording data at values selected to optimize data on performance of the UPS with respect to values specified in Part 2 of this Section, and to highlight any need to adjust, repair, or modify the UPS or any distribution system or load component that may influence its performance or that may require better power quality.
b. Perform load and UPS power source switching and operate the UPS on generator power during portions of the test period according to directions of client's Power Quality Consultant.
c. Operate the UPS and UPS loads in each mode of operation permitted by UPS controls and by the power distribution system design.
d. Create and simulate unusual operating conditions, including outages, voltage swells and sags, and voltage, current, and frequency transients that can be performed using loads and devices available as part of the facility's installed systems and equipment. Maintain normal operating loads in operation on system to maximum extent possible during tests.
e. Make adjustments and repairs to UPS, distribution, and load equipment to correct deficiencies disclosed by monitoring and testing and repeat appropriate monitoring and testing to verify success of corrective action.

D. Correlation with Specified UPS Monitoring Functions: Obtain printout recordings of built-in monitoring functions specified for UPS and UPS components in this Section that are simultaneous with those made with portable instruments in this Article.

1. Provide the temporary use of an appropriate personal computer and printer equipped with required connections and software for recording and printing if such units are not available on-site.
2. Correlate printouts with recordings for monitoring performed according to this Article, and resolve and report any anomalies in and discrepancies between the two sets of records.

E. Monitoring and Testing Assistance by Contractor: As follows:

1. Open UPS and electrical distribution and load equipment and wiring enclosures to make monitoring and testing points accessible for temporary monitoring probe and sensor placement and removal as requested.
2. Observe monitoring and testing operations and ensure UPS and distribution and load equipment warranties are not compromised.
3. Perform switching and control of various UPS units, electrical distribution systems, and load components as directed by Power Quality Consultant. The consultant shall design this portion of monitoring and testing operations to expose the UPS to various operating environments, conditions, and events while response is observed, electrical parameters are monitored, and system and equipment deficiencies are identified.
4. Make repairs and adjustments to the UPS and to electrical distribution system and load components, and retest and repeat monitoring as needed to verify validity of results and correction of deficiencies.

5. Engage the services of UPS manufacturer's factory-authorized service representative periodically through functional performance testing operations for repairs, adjustments, and consultations.

F. Documentation: Record test point and sensor locations, instrument settings, and circuit and load conditions for each monitoring summary and power disturbance recording. Correlate simultaneous recordings made on UPS input and load circuits.

G. Analysis of Recorded Data and Report: Review and analyze test observations and recorded data and submit a detailed written report. Include the following in report:

1. Description of corrective actions performed during monitoring and survey work and their results.
2. Recommendations for further action to provide optimum performance by the UPS and appropriate power quality for non-UPS loads. Include a statement of priority ranking and a cost estimate for each recommendation that involves system or equipment revisions.
3. Copies of monitoring summary graphics and graphics illustrating harmonic content of significant voltages and currents.
4. Copies of graphics of power disturbance recordings that illustrate findings, conclusions, and recommendations.
5. Recommendations for operating, adjusting, or revising UPS controls.
6. Recommendation for alterations to the UPS installation.
7. Recommendations for adjusting or revising generator-set or automatic transfer switch installations or their controls.
8. Recommendations for power distribution system revisions.
9. Recommendations for adjusting or revising electrical loads, or their connections or controls.

H. Interim and Final Reports: Provide an interim report at the end of each test period and a final comprehensive report at the end of the final test and analysis period.

END OF SECTION 263353

SECTION 264313 – SURGE PROTECTIVE DEVICES FOR LOW VOLTAGE

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.

C. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section.

1.2 SUMMARY:

A. Section Includes:

1. Distribution panelboards for station, platforms.

2. Lighting and appliance branch-circuit panelboards.

B. The Contractor shall furnish and install the Transient Voltage Surge Suppression (TVSS) equipment having the electrical characteristics, ratings and modifications as specified herein and as shown on the contract drawings. To maximize performance and reliability, the AC surge protection shall be integrated into electrical distribution equipment such as switchgear, switchboards, panelboards, busway and/or motor control centers. Refer to related sections for surge requirements in:

1. Section 262416 – Panelboards

1.3 DEFINITIONS:

A. SVR: Suppressed voltage rating.

B. TVSS: Transient voltage surge suppressor.

1.4 PERFORMANCE REQUIREMENTS:

A. Seismic Performance: TVSS equipment shall withstand the effects of earthquake motions determined according to SEI/ASCE 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 REFERENCES

A. Electrical Codes: All electrical work covered by the Contract Documents shall conform to the requirements of National Electrical Code, 2011 Edition, state and other local codes.

B. Listings: All equipment and materials for which Underwriters' Laboratories, Inc. provides product listing service shall be Underwriters' Laboratories' approved and bear the U.L. Label

C. Standards: TVSS units and all components shall be designed, manufactured and tested in accordance with the latest applicable following standards:

1. National Electrical Manufacturers Association (NEMA).

2. Institute of Electrical and Electronic Engineers (IEEE).

3. American National Standards Institute (ANSI) ANSI/IEEE C62.41& C62.45.

4. Underwriters Laboratory (UL) Listed standards (UL 1449, & UL 1283)

1.6 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 transient voltage suppression device, accessory, and component provide verification that the TVSS device complies with this specification and UL 1449. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

C. Shop Drawings: For each panelboard and related TVSS equipment:

1. Include dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings.

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 overcurrent 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 overcurrent protective device included in panelboards. Submit on translucent log-log graft paper; include selectable ranges for each type of overcurrent protective device.

9. Provide actual let through voltage test data

10. Provide spectrum analysis of each unit based on MIL-STD-220A test procedures between 50 kHz and 200 kHz verifying the devices noise attenuation equal or exceeds 50 dB at 100 kHz

11. Provide test report in compliance with NEMA LS1 from a recognized independent testing laboratory verifying the suppressor components can survive published surge current rating on both a per mode and per phase basis using the IEEE C62.41, 8 x 20 microsecond current wave. Note that test data on individual module is not accepted.

D. Seismic Qualification Certificates: Submit certification that TVSS and the panelboards, accessories, and components will withstand seismic forces defined in Division 26 Section "Vibration and Seismic Controls for Electrical Systems." Include the following:

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.

E. Field Quality-Control Reports:

1. Test procedures used.

2. Test results that comply with requirements.

3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

F. Operation and Maintenance Data: For panelboards and components to include in emergency, operation, and maintenance manuals.

1. Manufacturer's written instructions for testing and adjusting TVSS devices.

1.7 CLOSEOUT SUBMITTALS:

A. Submit closeout submittals in accordance with Form 816 Article 1.20-1.05.02, NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS.

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. Testing Agency Qualifications: Member company of NETA or an NRTL.

1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.

C. Product Selection for Restricted Space: Drawings indicate maximum dimensions for panelboards including clearances between panelboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.

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 NEMA PB 1.

F. Comply with NFPA 70.

1.9 PROJECT CONDITIONS:

A. Environmental Limitations:

1. Do not deliver or install TVSS equipment until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above panelboards is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

2. Rate equipment for continuous operation under the following conditions unless otherwise indicated:

   a. Ambient Temperature: Not exceeding minus 22 deg F to plus 104 deg F
   b. Altitude: Not exceeding 6600 feet

B. Service Conditions: NEMA PB 1, usual service conditions, as follows:

1. Ambient temperatures within limits specified.

2. Altitude not exceeding 6600 feet

1.10 COORDINATION:

A. Coordinate layout and installation of TVSS equipment and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

B. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases.

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.

1.12 WARRANTY:

A. Refer to Form 816, Article 1.20-1.06.08, and the NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information.

B. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace transient voltage suppression devices that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 BUY AMERICA COMPLIANCE

A. Products must meet Buy America requirements. Refer to NOTICE TO CONTRACTOR – BUY AMERICA for additional information.

2.2 GENERAL REQUIREMENTS FOR PANELBOARDS:

A. Electrical Requirements:

1. Unit Operating Voltage – Refer to drawings for operating voltage and unit configuration.

2. Maximum Continuous Operating Voltage (MCOV) – The MCOV shall be greater than 115% of the nominal system operating voltage.

3. The suppression system shall incorporate a hybrid designed Metal-Oxide Varistors (MOV) surge suppressor for the service entrance and other distribution level. The system shall not utilize components that may crowbar the system voltage leading to system upset or create any environmental hazards.

4. Protection Modes – For a Wye configured system, the device must have directly connected suppression elements between line-neutral (L-N), line-ground (L-G), and neutral-ground (N-G). For a Delta-configured system, the device must have suppression elements between line to line (L-L) and line to ground (L-G).

5. The maximum Suppressed Voltage Rating (SVR) per UL 1449 2nd Edition must not exceed the following:

Modes	208Y/120 & 120/240	480Y/277
L-N and/or L-G	400V	800V
N-G	400V	800V
L-L	800V	1500V

6. ANSI/IEEE Cat. C3 Let Through Voltage – The let through voltage based on IEEE C62.41 and C62.45 recommended procedures for Category C3 surges (20 kV, 10 kA) shall be less than:

Modes	208Y/120 & 120/240	480Y/277
L-N	550V	900V

B. TVSS Design:

1. Balanced Suppression Platform – The surge current shall be equally distributed to all MOV components to ensure equal stressing and maximum performance. The surge suppression platform must provide equal impedance paths to each matched MOV. Designs incorporating TVSS modules shall not be acceptable.

2. Electrical Noise Filter – Each unit shall include a high-performance EMI/RFI noise rejection filter. Noise attenuation for electric line noise shall be 50 dB at 100 kHz using the MIL-STD-220A insertion loss test method. Products not able to demonstrate noise attenuation of 50 dB @ 100 kHz shall be rejected.

3. Extended Range Filter – The Surge Protective Device shall have a High Frequency Extended Range Tracking Filter in each Line to Neutral mode with compliance to UL 1283 and NEMA LS1. The filter shall have published high frequency attenuation rating in the attenuation frequencies.

Attenuation Frequency	50kHz	100kHz	500kHz	1MHz	10MHz	100MHz
Insertion Loss (ratio)	40	316	316	89	200	79
Insertion Loss (dB)	32	50	50	39	46	38

4. Internal Connections – No plug-in component modules or printed circuit boards shall be used as surge current conductors. All internal components shall be hardwired with connections utilizing low impedance conductors and compression fittings.

5. Standard Monitoring Diagnostics – Each TVSS shall provide integral monitoring options:

   a) Each unit shall provide a green / red solid state indicator light shall be provided on each phase. The absence of a green light and the presence of a red light, shall indicate which phase(s) have been damaged.

   b) Audible Alarm – The TVSS shall provide an audible alarm with a reset pushbutton that will be activated under any fault condition.

   c) Event Counter – The TVSS shall be equipped with an LCD display system designed to indicate to the user how many surges, sags, swells and outages have occurred at the location. The event counter triggers each time under each respective category after significant event occurs. A reset pushbutton shall also be standard allowing all counters to be zeroed.

   d) Push to Test – The TVSS shall be equipped with push-to-test feature, designed to provide users with real time testing of the suppressor's monitoring and diagnostic system. By depressing the test button, the diagnostic system initiates

a self test procedure. If the system is fully operational, the self test will activate all indicator lights.

e) Voltage Monitoring – The TVSS shall display true Root Mean Square (RMS) on three L-N voltage protection mode on Wye configuration and three L-L voltage on Delta configuration.

6. Overcurrent Protection shall allow protection during high surge (kA) events with individually fused MOV's

7. The TVSS shall be immediately installed on the load side of the main breaker

8. A direct bus bar connection shall be used to mount the TVSS component to the panelboard bus bar to reduce the impedance of the shunt path

9. The TVSS shall be included and mounted within the panelboard by the manufacturer of the panelboard.

10. All monitoring diagnostics features shall be visible from the front of the equipment

C. Fabricate and test TVSS equipment according to requirements listed above.

D. Enclosures: Surface-mounted cabinets.

1. Rated for environmental conditions at installed location.

a. Indoor Dry and Clean Locations: NEMA 250, Type 1.

2. All enclosed equipment shall be the same type enclosures as the panelboards, unless otherwise noted. Provide enclosures suitable for locations as indicated on the drawings and as described below:

E. Conductor Connectors: Suitable for use with conductor material and sizes.

1. Material: Hard-drawn copper, 98 percent conductivity.

2. Main and Neutral Lugs: Compression type.

3. Ground Lugs and Bus-Configured Terminators: Compression type.

F. TVSS Short-Circuit Current Rating: Fully rated to withstand symmetrical short-circuit current available at terminals.

2.3 TVSS MANUFACTURES:

A. Manufacturers: Eaton Electrical Inc.; Cutler-Hammer Business Unit or approved equal.

2.4 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES:

A. Manufacturers: Eaton Electrical Inc.; Cutler-Hammer Business Unit or approved equal.

PART 3 - EXECUTION

3.1 DELIVERY, STORAGE, AND HANDLING:

A. Remove loose packing and flammable materials from inside TVSS, prevent condensation if stored outdoors.

B. Handle, store and prepare TVSS for installation in accordance with manufacturer’s instructions, and NEMA PB 1.

C. Examine TVSS before installation. Reject panelboards that are damaged or rusted or have been subjected to water saturation.

3.2 INSTALLATION:

A. Install TVSS and accessories a per the manufacturer's recommendations and the contract drawings.

B. Comply with mounting and anchoring requirements specified in Division 26 Section "Vibration and Seismic Controls for Electrical Systems."

C. Mount top of trim 90 inches above finished floor unless otherwise indicated.

D. Mount plumb and rigid without distortion of box.

E. Install overcurrent protective devices and controllers not already factory installed.

1. Set field-adjustable, circuit-breaker trip ranges.

F. Install filler plates in unused spaces.

G. Arrange conductors in gutters into groups and bundle and wrap with wire ties.

3.3 IDENTIFICATION:

A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with Division 26 Section "Identification for Electrical Systems."

B. Create a directory to indicate installed circuit loads; incorporate Owner's final room designations. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.

C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

3.4 TESTING:

A. Perform tests and inspections.

1. Standard factory tests shall be performed on the equipment under this section. All tests shall be in accordance with the latest version of NETA, NEMA and UL standards.

2. Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

B. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.

2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

3. TVSS will be considered defective if they do not pass tests and inspections.

4. Prepare test and inspection reports, including a certified report that identifies panelboards included and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

END OF SECTION 264313

SECTION 265200 EMERGENCY LIGHTING

PART 1 GENERAL

1.1 SUMMARY

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.

C. Section includes emergency lighting units and exit signs.

D. Related Sections:
1. Section 260526 - Grounding and Bonding for Electrical Systems.
2. Section 260533 - Raceway and Boxes for Electrical Systems.

1.2 REFERENCES

A. National Electrical Manufacturers Association:
1. NEMA WD 6 - Wiring Devices-Dimensional Requirements.

B. Underwriters Laboratories, Inc. (UL):
1. UL 924 Listed (Emergency Lighting).

1.3 SYSTEM DESCRIPTION

A. Emergency lighting to comply with requirements of NFPA 101 and IESNA Illumination Guide – Transportation and Facilities Sections.

B. Station: Emergency lighting fixtures will be supplied from the UPS making sure that the illumination level on the egress path will not be under 1fc.

C. Exit signs shall be located as per NFPA 101 and shall be continuous illuminated to mark the means of egress.

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 dimensions, ratings and performance data.

1.5 CLOSEOUT SUBMITTALS

A. Submit closeout submittals in accordance with Form 816 Article 1.20-1.05.02, NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years' 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.

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.

1.9 WARRANTY

A. Refer to Form 816, Article 1.20-1.06.08, and the NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information.

PART 2 PRODUCTS

2.1 BUY AMERICA COMPLIANCE

A. Products must meet Buy America requirements. Refer to NOTICE TO CONTRACTOR – BUY AMERICA for additional information.

2.2 EXIT SIGNS

A. Manufacturers:
1. Dual Light
or
2. Approved equal.

B. Product Description: Exit sign fixture, injection-model, flame retardant, high impact construction with LED lamp, directional arrows and universal mounting kit

C. Input Voltage: 277 volts.

D. Directional Arrows: As indicated on Drawings

2.3 LED LAMP EMERGENCY POWER SUPPLY

A. See 263353 for the Static Uninterruptible Power Supply system.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install suspended exit signs using pendants supported from swivel hangers. Install pendant length required to suspend sign at indicated height.

B. Install surface-mounted emergency lighting units and exit signs plumb and adjust to align with building lines and with each other. Secure to prevent movement.

C. Install wall-mounted emergency lighting units and exit signs at height as indicated in manufacturer literature

D. Install accessories furnished with each exit sign.

E. Connect emergency lighting units and exit signs to branch circuit supplied by UPS

F. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within unit.

G. Ground and bond emergency lighting units and exit signs in accordance with Section 26 05 26.

3.2 FIELD QUALITY CONTROL

A. Field inspecting, testing, adjusting, and balancing.

B. Operate each unit after installation and connection. Inspect for proper connection and operation.

3.3 PROTECTION OF FINISHED WORK

A. Re-lamp emergency lighting units and exit signs having failed lamps at Substantial Completion.

END OF SECTION 265200

SECTION 265600 – EXTERIOR LIGHTING

PART 1 - GENERAL

1.1 WORK INCLUDED

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.

C. The Contractor shall provide all lighting fixtures, labor, material, etc., in accordance with the preceding specifications, the requirements of this Section and as shown on the Contract Drawings.

D. Outdoor platform fixtures, handrail lighting for the south stair and pole fixtures for the north dispersal area are included under this Section.

E. Lighting shall be in accordance with the Contract Drawings - Lighting Fixture Schedule or approved equal. All lighting fixtures shall have the Underwriters' Laboratories label which indicates compliance with appropriate standards or performance in a specified manner.

F. All wiring shall be placed in conduit and shall comply with the specifications for conduits, outlet boxes, pull and junction boxes, wires and cables, grounding, etc., as set forth in these specifications and as noted herein.

G. The Contractor shall submit for approval catalog cuts showing performance and construction details of standard fixtures and complete working drawings showing all proposed construction details for special or modified standard fixtures, and shall submit photometric calculations.

H. Manufacturer's catalog number and description in the fixture schedule establishes quality, style, finish, etc. The Contractor shall provide pigtails and flexible conduit where required and connections to the outlet box. The use of catalog number describing the various types of fixtures shall be used as a guide only, and does not exclude all the required accessories or hardware that may be required for a complete installation.

I. Contractor shall accept responsibility for the coordination and proper relation of his work to the work of all trades. Contractor will visit the premises and thoroughly familiarize himself with all details of the work and working conditions, verify all dimensions in the field and advise the Engineer of any discrepancy before performing any work.

J. Replace or repair defective equipment damaged in the course of installation or test.

K. Protect metallic materials against corrosion. All equipment intended for outdoor use shall be given corrosion-inhibiting treatment and standard finish by the manufacturer. Aluminum shall not be used in contact with the earth, and where connected to dissimilar metal shall be protected by approved fittings and treatment.

L. Compliance of the above specification shall be done according to the following:

1. Ray-trace diagrams by computer graphics for each and every individual prism design for the lens shall be provided.

2. Photometric test for compliance must be performed by an independent testing laboratory.

3. Compliance of specifications must be certified by a registered Professional Electrical Engineer with at least 10 years experience in design of lens optics for luminaries.

4. Successful supplier must have at least 10 years experience in manufacturing of ornamental luminaries, and demonstrate successful installations in at least two major mass transit projects.

5. The Contractor shall not proceed with the manufacturer or installation of any lighting fixtures before approval is obtained.

6. The following engineering data for the fixtures to be installed under this Contract shall be submitted: distribution data and brightness characteristics of luminaire, photometric candle power charts for the mounting heights required and as specified herein. If other fixtures than the ones specified in Contract drawings are used, recalculation of lighting levels will be required.

1.2 MANUFACTURERS

A. The equipment covered by these specifications shall be standard equipment of proven performance as manufactured by reputable concerns. Equipment shall be

designed, constructed and installed in accordance with the best practices of the trade, and shall operate satisfactorily when installed as shown on the Contract Drawings.

B. Approved equal manufacturers are acceptable if approved by the Engineer

1.3 TESTING

A. All tests shall be performed in accordance with the requirements of the General Conditions. The following tests are required:

1. Witnessed Shop Tests: None required.

2. Field Acceptance Tests: Field tests shall be performed in accordance with requirements of Section 260800 Commissioning of Electrical Systems.

1.4 SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

B. Submit the following:

1. Shop drawings and data for lighting fixtures. Drawings shall show types, size, accessories, installation details, and other details of construction. Data accompanying shop drawings shall include aiming diagram and computerized footcandle array.

2. Manufacturer's data for all fixtures indicating mechanical and electrical construction.

3. Certified laboratory test reports for the following:
   a. Computerized candlepower distribution data taken in perpendicular plane in angles of every five degrees between 0 and 90 degrees. Data shall have a mean deviation of 10 percent and a maximum deviation of 20 percent.

4. Sample of each lighting fixture (one sample for each type).

5. Submit duplicate samples of railing showing style and finish. One approved sample will be returned to contractor

B. Each submittal shall be identified by the applicable Equipment Identification Number and Specification Section.

1.5 CLOSEOUT SUBMITTALS

A. Submit closeout submittals in accordance with Form 816 Article 1.20-1.05.02, NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS.

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.

1.8 WARRANTY

A. Refer to Form 816, Article 1.20-1.06.08, and the NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information.

1.9 SHOP DRAWINGS

A. Each submittal shall be complete in all respects, incorporating all information and data listed herein and all additional information required for evaluation of the proposed equipment's compliance with the Contract Documents.

B. Partial, incomplete or illegible submissions will be returned to the Contractor without review for resubmittal.

C. Shop drawings shall include but not be limited to:

1. Equipment specifications and data sheets identifying all materials used and methods of fabrication.

2. Complete assembly, layout, and installation drawings with clearly marked dimensions.

3. Example equipment nameplate data sheet.

4. Interconnecting wiring diagrams.

5. All fixture photometric data.

1.10 OPERATION AND MAINTENANCE MANUALS

A. The Contractor shall submit operation and maintenance manuals in accordance with the procedures and requirements set forth in the General Conditions.

1.11 TOOLS, SUPPLIES AND SPARE PARTS

A. The panels and accessories shall be furnished with all special tools necessary to disassemble, service, repair, and adjust the equipment, all spare parts as recommended by the equipment manufacturer.

B. Spare parts lists, included with the shop drawing submittal shall indicate specific sizes, quantities, and parts numbers of the items to be furnished. Terms such as "1 lot of packing material" are not acceptable.

C. Parts shall be completely identified with a numerical system to facilitate parts inventory control and stocking. Each part shall be properly identified by a separate number. Those parts which are identical for more than one size, shall have the same parts number.

1.12 IDENTIFICATION

A. Each unit of equipment shall be identified with the equipment item numbers given on the Contract Drawings. A corrosion resistant tag or nameplate, securely affixed in a conspicuous place on each unit shall give the equipment item number, manufacturer's name or trademark and such other information as the manufacturer may consider necessary, or as specified, to complete identification.

1.13 REFERENCES

A. Section 260529 – Hangers and Supports for ES.

1.14 CODES, LISTINGS AND STANDARDS

A. Electrical Codes: All electrical work covered by the Contract Documents shall conform to the requirements of National Electrical Code, 2011 Edition, state and other local codes.

PART 2 - PRODUCTS

2.1 BUY AMERICA COMPLIANCE

A. Products must meet Buy America requirements. Refer to NOTICE TO CONTRACTOR – BUY AMERICA for additional information.

2.2 FIXTURES

A. LED fixtures shall be high quality, homogeneous in texture, uniform in quality, free from defects, of uniform thickness throughout, and properly annealed. Edges shall be well rounded and free from chips or rough edges.

B. These fixtures are intended as ones subject to abuse, and damp locations, and as such shall bear listing with the Underwriters' Laboratories as a damp-location fixture, enclosed and gasketed. Electrical feeds shall be through hubs at the end of the fixture.

1. Vandal-resistant construction shall consist of a 0.125 inch minimum uninterrupted thickness, color corrective, acrylic lens, retained by concealed stainless steel spring-loaded fasteners and interlocking extrusions. Entire mechanism shall be concealed within the extruded outer housing, such that the tamper resistant stainless hardware is flush with the outer wall of the luminaire.

C. All fixtures shall be complete with poles, hangers, supports, lamps, shielding, diffusers, insulation and all other accessories required for mounting and proper operation as per contract drawings and specifications. All fixtures shall be UL labels. Check architectural drawings to verify ceiling types. Verify color of exposed trim and shielding medium with Engineer before ordering fixtures.

D. All fixture assemblies to be factory pre-wired to prescribed circuitry.

E. Lamp wattage shall be as indicated, and all fixtures shall be suitable for outdoor and vandal-resistant installation.

F. The lighted railing system shall comprise a system of mechanical connectors with inserted high output LED lights in aluminum, stainless steel or custom slotted cap rails. LED will be dimmable, with color temperature 3000K, transparent lenses and listed for wet location. Driver shall be 277VAC.
The system shall include all grab bars and accessories, mounting brackets and clips and shall be installed conform manufacturer’s instructions.
The manufacturer and the contractor will take final field measurements for final fit of the lighting rails and submit final drawings for approval by the Engineer.

2.3 LAMPS and POLES

A. The Contractor shall furnish and install all fixtures as per lighting schedule or approved equal.
B. The Contractor shall furnish and install lighting poles as per lighting schedule and contract drawings or approved equal.

2.6 ACCEPTABLE MANUFACTURERS

Manufacturers:

1. Philips LUMEC or Approved equal.
2. Wagner Lumenrail or Approved equal.

2.7 LIGHTING CONTROL

A. Lighting control specified in 260923.

2.8 EXIT SIGNS

A. Exit lighting units, with high impact housing and internal high output LEDs will be fed from the emergency panel via UPS. Contractor will specify exit signs as per contract drawings and lighting schedule or approved equal.

PART 3 - EXECUTION

3.1 INSTALLATION

A. All lighting fixtures shall be installed in a neat and workmanlike manner and shall be mounted evenly and in line. Contractor shall determine the best location for fixtures and conduit runs. If, at any point, the construction will not permit the installation of the type of fixture shown on the Contract Drawings, the Contractor shall install a fixture of such type in such manner as directed by the Engineer. Where bracket fixtures are required, each fixture shall be adjusted to suit local conditions. Where pendant fixtures are required, approved suspension devices or rigid fittings shall be supplied and installed. Support pendant mounted fixtures with stems, 3/8" in diameter minimum, vertically attached to structural steel, concrete, beams, joists, and trusses. Contractor shall provide channel supports required to support the pendant fixtures. Wiring to pendant fixtures shall be run through the stem and iron bushing. All stem to box connections shall be secured with double nuts. All fixtures and hardware to be installed with Torx tamperproof screws. Stems for pendant fixtures shall be provided where necessary to make the height of all lamps uniform and in the same plane being dependent upon the minimum height of the ceiling in the areas indicated on the Contract Drawings. All steel and ceiling heights shall be verified in the field. All steel parts for the attachment of fixtures shall be hot-dip galvanized. Lead gaskets shall be provided between dissimilar metal mounting surfaces and metal to masonry interfaced.

B. All fixtures shall be made clean and free of dust and all other foreign matter both on visible surfaces and on surfaces that affect the lighting performance of the fixture including diffusers, lenses, louvers, reflectors and lamps.

C. Lighting fixtures location is subject to coordination with other trades and final location will be determine by the contractor and approved by the Engineer.

D. The Contractor shall provide and install all inserts, conduit, structural supports as required, wiring, etc., and properly adjust and test, to the satisfaction of the Engineer, the entire lighting system.

E. The Contractor shall protect all fixtures at all times from damage, dirt, dust, etc. Before final acceptance, all fixtures and devices shall be cleaned of all dust, dirt or other material, be fully relamped and in operating condition to the satisfaction of the Engineer.

F. Circuiting shall be as shown on the Contract Drawings and as follows:

1. Bus loads in all panelboards shall be balanced between phases to within a tolerance of one (1) kVA. Convenience receptacles shall be distributed evenly among all phase buses as much as practicable.

2. Voltage drop to the most remote lighting fixture shall be limited to 3 percent.

G. The Contractor shall supply all pendant trapezes and pendant stem hangers with durable swivel or equivalent trapeze hangers permitting normal fixture motion and self-alignment. Pendant lengths shall be adequate and adjusted to provide uniformity of installation heights above the reference datum. Stems shall be one piece, with matching canopies and fittings.

H. The Contractor shall provide recessed fixtures with a separate junction box concealed and located as to be accessible when fixture is removed.

I. All lighting units, when installed, shall be set true and be free of light leaks, warps, dents, and other irregularities. All hangers, cables, supports, channels, and brackets of all kinds for safely erecting this equipment in place, shall be furnished and erected in place by the Contractor.

J. The Contractor shall install fixtures at mounting heights indicated or as instructed by the Engineer. In areas with exposed ducts and/or piping, installation of lighting fixtures shall be adapted to field conditions as determined by the Engineer.

K. The Contractor shall support each fixture securely. The Contractor shall not secure fixtures to the work of other trades, unless specified or noted otherwise, and shall not support fixtures to plaster. The Contractor shall furnish and install all steel members and supports as required to fasten and suspend fixtures from the structure.

L. In all mechanical equipment areas, the Contractor shall install lighting fixtures on ceiling after all piping and equipment therein have been installed. Exact locations for such fixtures may be determined by the Engineer on the site during the course of the work.

M. Upon completion of work, and after the area is broom clean, all fixtures shall be made clean and free of dust and all other foreign matter both on visible surfaces, and on surfaces that affect the lighting performance of the fixture including diffusers, lenses, louvers, reflectors, and lamps.

N. All fixtures that require physical adjustment shall be so adjusted in accordance with the directions of the Engineer. The Contractor shall also adjust angular direction of fixtures and/or lamps, as directed.

O. Re-lamping access shall require no special tools. All optical control surfaces such as lenses and reflectors shall be safely and securely attached to fixtures and shall be easily and quickly removed and replaced for cleaning without the use of tools. No fixture part that may be removed, for maintenance, shall be held in place by metal tabs that must be bent to remove said part.

P. The Contractor shall install switches 4 ft. above the floor at the locations shown, and shall be single pole or double pole, as indicated.

R. All switches shall be enclosed in cast boxes and shall be furnished with waterproof, cast covers having external operating arms equal to Russell and Stoll; Appleton Electric or equal, for surface mounting. The Contractor shall provide all covers with rubber or neoprene gaskets.

S. Evenly proportion all fixtures in the room except where adjusted to conform with ceiling pattern as described below and where otherwise shown on drawings. Edges of the fixture shall be parallel with the walls.

T. All fixtures must hang true to vertical, free from finger marks, flaws, scratches, dents or other imperfections. Take care when hanging fixtures not to deface in any way, ceiling or walls.

U. Install continuous rows of fixtures in a straight line and at the same level. Fixtures must not be rotated about longitudinal axis with respect to one another. Mount surface fixtures tight to surface without distorting it. Provide proper mounting equipment for recessed fixtures to adapt them to the ceiling or wall construction and to prevent light leaks around trim. All stem mounted fixtures shall be hung level from self-aligning hangers in canopies.

V. Securely support all ceiling fixtures, hangers, and outlet boxes from structural members, not ceiling members. Plastic inserts are not permitted. Supports for each fixture shall be capable of supporting four times fixture weight.

W. At acceptance of the work, the Contractor shall clean all fixtures and install new lamps. Contractor shall supply 10 percent spare lamps for all fixtures. Spare lamps shall be stored in the original manufacturer supply carton.

X. Cables shall be installed in accordance with the requirements of NFPA 70. If paving or Railroad track is already in place wrought-iron or galvanized steel pipes shall be driven under it. Where rigid steel conduit installed underground without concrete encasement is indicated, the conduit shall have a factory-applied coating with minimum thickness not less than the following:

1.	Low-density or medium-density plastic	0.040-inch
2.	Epoxy resin	0.08-inch
3.	Coal-tar enamel	0.63-inch

3.2 FIELD TESTS AND INSPECTIONS

A. Perform all field tests and provide all labor, equipment, and incidentals required for testing, except when the client will provide electric power required for field tests when available.

B. After installation has been completed, the Contractor shall conduct an operating test. The equipment shall be demonstrated to operate in accordance with the requirements of this Section.

C. Show by demonstration in service that circuits, fixtures, and equipment are in good operating condition. Tests shall be such that each piece of control equipment shall function not less than 5 times. The Contractor shall give the Engineer 5 days advance notice of the dates and times for tests and inspections.

D. Interior installations shall be tested for insulation resistance after all wiring is completed and connected, ready for the attachment of fixtures and equipment, and again when fixtures and equipment are connected, ready for use. Test shall be as specified in Section 260800. All defective material and workmanship disclosed as the result of the tests given herein shall be corrected at no cost to the client. Demonstrate in service that all circuits and devices are in good operating condition.

E. Deficiencies shall be rectified and work affected by such deficiencies shall be completely retested at the Contractor's expense.

END OF SECTION 265600

SECTION 271116 – COMMUNICATIONS CABINETS, RACKS, FRAMES AND ENCLOSURES

PART 1 - GENERAL

1.1 WORK INCLUDED

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.

C. The Contractor shall provide all labor, materials, and equipment for the complete installation of work called for in the Contract Documents.

D. All wiring shall be placed in conduit or cable tray and shall comply with the specifications for conduits, outlet boxes, pull and junction boxes, wires and cables, grounding, etc., as set forth in these specifications and as noted herein.

E. Contractor shall accept responsibility for the coordination and proper relation of his work to the work of all trades. Contractor will visit the premises and thoroughly familiarize himself with all details of the work and working conditions, verify all dimensions in the field and advise the Engineer of any discrepancy before performing any work.

F. Included in this section are the minimum composition requirements and installation methods for racks.

1.2 MANUFACTURERS

A. The equipment covered by these specifications shall be standard equipment of proven performance as manufactured by reputable concerns. Equipment shall be designed, constructed and installed in accordance with the best practices of the trade, and shall operate satisfactorily when installed as shown on the Contract Drawings.

1.3 TESTING

A. All tests shall be performed in accordance with the requirements of the General Conditions.

1.4 SUBMITTALS

A. Submit the following in accordance with Form 816 Article 1.20-1.05.02 and NOTICE TO CONTRACTOR – SUBMITTALS.

1. Shop drawings shall be submitted in accordance with the general requirements of the contract.

a. Catalog information and descriptive literature of all hardware components

b. Detailed layout of each rack

2. Material test certifications and manufacturer's material certifications.

B. Each submittal shall be identified by the applicable Equipment Identification Number and Specification Section.

C. Submit records of installation, compliance, and final configuration settings of all equipment installed or utilized under this Section.

1.5 CLOSEOUT SUBMITTALS

A. Submit closeout submittals in accordance with Form 816 Article 1.20-1.05.02, NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS.

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. QUALITY CONTROL

1 The Contractor shall verify that all hardware is configured per the manufacturer’s recommended practices prior to proceeding with the Factory Acceptance Tests and final commissioning of the project.

2 The Contractor shall verify that the installation is in accordance with manufacturer’s installation recommendations and that the warranty is in effect based on the Contractor’s installation.

3 The Contractor shall submit a certification to the engineer stating that the proposed networking equipment meets the design intent as part of the shop

drawing submittal process.

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 the NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information.

B. The Contractor shall provide a manufacturer's warranty covering the full replacement of all equipment specified within this section.

1.9 SHOP DRAWINGS

A. Each submittal shall be complete in all respects, incorporating all information and data listed herein and all additional information required for evaluation of the proposed equipment's compliance with the Contract Documents.

B. Partial, incomplete or illegible submissions will be returned to the Contractor without review for resubmittal.

C. Shop drawings shall include but not be limited to:

1. Specifications and data sheets identifying all materials used and methods of fabrication.

2. Complete assembly, layout, and installation drawings with clearly marked dimensions.

1.10 OPERATION AND MAINTENANCE MANUALS

A. The Contractor shall submit operation and maintenance manuals in accordance with the procedures and requirements set forth in the General Conditions.

1.11 TOOLS, SUPPLIES AND SPARE PARTS

A. The racks and accessories shall be furnished with all special tools necessary to disassemble, service, repair, and adjust the equipment, all spare parts as recommended by the equipment manufacturer.

B. Spare parts lists, included with the shop drawing submittal shall indicate specific sizes, quantities, and parts numbers of the items to be furnished.

C. Parts shall be completely identified with a numerical system to facilitate parts inventory control and stocking. Each part shall be properly identified by a separate number. Those parts which are identical for more than one size, shall have the same parts number.

1.12 CODES, LISTINGS AND STANDARDS

A. National Fire Protection Association (NFPA):

B. Occupational Safety & Health Administration (OSHA)

PART 2 - PRODUCTS

2.1 BUY AMERICA COMPLIANCE

A. Products must meet Buy America requirements. Refer to NOTICE TO CONTRACTOR – BUY AMERICA for additional information.

2.2 RACKS

A. Racks shall have adjustable mounting depth, lockable doors, side panels, rear cable management channels and roof and base cable access.

B. Racks not containing heat producing equipment shall be sealed to prevent the entry of dust.

C. All racks containing heat producing equipment shall be supplied with forced air cooling systems. All forced air cooling systems shall be filtered.

D. All racks shall be AC ready.

E. Load capacity: 1000lb maximum

F. Panels shall have adjustable mounting depth 24”L x 40”D x 86”H and shall be lockable

G. Doors and side panels (if needed) shall have numbered positions

H. Material and Paint: Black composite material with powder coat paint finish

I. Rear cable management channels

J. Power strips, wire management systems, shelves, and filler plates shall be as needed.

K. The rack shall be UL and cUL Listed as a Communications Circuit Accessory

L. A UPS for backup power shall be provided

2.6 ACCEPTABLE MANUFACTURERS

Manufacturers:

1. Hoffman or approved equal.

PART 3 – EXECUTION

3.01 GENERAL

A. Assemble racks according to manufacturer's instructions. Verify that equipment mounting rails are sized properly for rack-mount equipment before attaching the rack to the floor.

B. All racks must be attached to the floor in four places using appropriate floor mounting anchors. When placed over a raised floor, threaded rods should pass through the raised floor tile and be secured in the structural floor below.

C. Racks shall be grounded to the telecommunication grounding busbar (TGB) using appropriate hardware provided by the contractor. The ground will meet local code requirements and will be approved by the Authority Having Jurisdiction (AHJ).

D. In seismic areas, the rack should have additional bracing as required by building codes and the recommendations of a licensed structural engineer.

E. Ladder rack may be attached to the top of the rack to deliver cables to the rack. The rack shall not be drilled, use appropriate hardware from the ladder rack manufacturer.

F. Access to equipment and cabling shall be provided from both the front and rear of the racks.

G. The equipment load will be evenly distributed and uniform on the rack. Place large and heavy equipment towards the bottom of the rack. Secure all equipment to the rack with equipment mounting screws. In seismic areas, secure equipment to shelves with additional bracing.

H. Supply and install racks as specified herein and per manufacturer's instructions.

3.02 FIELD TESTS AND INSPECTIONS

A. Perform all field tests and provide all labor, equipment, and incidentals required for testing.

B. Deficiencies shall be rectified and work affected by such deficiencies shall be completely retested at the Contractor's expense.

END OF SECTION 271116

SECTION 273226 - BLUE LIGHT / EMERGENCY TELEPHONE (BL/ETEL) SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

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.

C. This Section specifies the minimum requirements for Blue Light/Emergency Telephone (BL/ETEL) System. This section includes Furnishing, installing, and testing new pedestal mounted phones, cabling and connection to, miscellaneous equipment required for connectivity. Work shall include all necessary coordination to assure all BL/ETEL components, cabling and infrastructure are provided and installed (in conjunction with equipment provided by others) to provide a complete aesthetic and functional BL/ETEL system.

D. The System shall be integrated with the Video Surveillance Systems as necessary to allow automatic camera call-up upon activation.

E. Communication between blue light stations and Operations/Emergency Response Personnel shall be by the use of the blue light station per NFPA 130 and a PBX phone circuits.

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: All equipment shall conform to the requirements of the Amtrak Police Department Corporate Security – Guidance, Practices and Recommendations 2011 rev 3.

C. Shop Drawings: Include block diagrams, detail mounting locations, and rack layouts.

D. Product Samples: The Designer will not make a color selection until it can be coordinated with other Division 9 color selections.

1.3 CLOSEOUT SUBMITTALS:

A. Submit closeout submittals in accordance with Form 816 Article 1.20-1.05.02, NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS.

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. 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.

1.5 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.

1.6 WARRANTY:

A. Refer to Form 816, Article 1.20-1.06.08, and the NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information.

PART 2 - PRODUCTS

2.1 BUY AMERICA COMPLIANCE

A. Products must meet Buy America requirements. Refer to NOTICE TO CONTRACTOR – BUY AMERICA for additional information.

2.2 BLUE LIGHT/EMERGENCY TELEPHONE (BL/ETEL) SYSTEM

A. Low-voltage power, signal and data cabling is provided under Division 26. Coordinate all cabling size requirements to assure compatibility with equipment and installed by others.

2.3 EMERGENCY TELEPHONE (ETEL) UNIT:

A. Coordinate with the Architect regarding equipment dimensions, pedestal mounting requirements/locations, and cabling size requirements to assure that the BL/ETEL System infrastructure provided is compatible with the ETEL Unit.

B. Activation of a BL/ETEL station by lifting the ETEL handset from its on-hook position shall initiate communication to the Amtrak Police Department

2.4 BLUE LIGHT (BL) UNIT

A. Blue Light (BL) Unit to be provided and as an integral part of the BL/ETEL System.

B. The BL Unit shall be constantly illuminated and be located directly above the ETEL Unit per NFPA 130.

2.5 LOOP DETECTOR BOARD (LDB) UNIT

A. Loop Detector Board Unit to be mounted within the ETEL Unit housing.

B. The LDB shall interface the ETEL Unit with the VSS camera call-up. Lifting the ETEL handset from its “on-hook” position shall cause the LDB to initiate a dry relay contact signaling an alarm and call-up the designated security camera.

C. When the ETEL Unit is activated, the LDB’s output contact will trigger an alarm and activate automatic call-up action on the VSS.

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL:

A. Inspect all Blue Light/Emergency Telephone Station (BL/ETEL) System equipment for quality of installation and verify system performance in accordance with manufactures instructions.

3.2 TRAINING:

A. Refer to Form 816 Article 1.20-1.08.14 subsection 3 for additional information.

END OF SECTION 273226

SECTION 274216 - PASSENGER INFORMATION DISPLAY (PID) SYSTEMS

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. 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.

C. The Work specified in this Section consists of furnishing and installing communication conduit and cables, power conduit and cables, and LED matrix displays for the Passenger Information Display (PID) system as indicated. PID Network Rack is provided by others.

1.2 RELATED DOCUMENTS

A. Drawings and Contract Terms and Conditions

B. Amtrak Graphic Standard Signage Manual and Station Guidelines

C. Requirements of the following Division 26 Sections apply to this Section:

1. Common Work Results for Electrical - Section 260500.
2. Low Voltage Electrical Power Conductors and Cables - Section 260519.
3. Hangers and Support for Electrical Systems - Section 260529.
4. Public Address System – 275116

1.3 SUMMARY:

A. This Section includes requirements for the Passenger Information Display systems.

B. The Contractor shall furnish and install all LED matrix displays, cable and conduit associated with the PID systems. The supply and installation of the PA/PID system head-end equipment enclosure within the Telecom Room and final terminations to this equipment shall be by others.

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 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.

1.5 CLOSEOUT SUBMITTALS:

A. Submit closeout submittals in accordance with Form 816 Article 1.20-1.05.02, NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS.

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. Electrical Component Standard: Provide work complying with applicable requirements of NFPA 70 "National Electrical Code".

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 the NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information.

PART 2 – PRODUCTS

2.1 BUY AMERICA COMPLIANCE

A. Products must meet Buy America requirements. Refer to NOTICE TO CONTRACTOR – BUY AMERICA for additional information.

2.2 PASSENGER INFORMATION DISPLAY (PID):

A. PID system LED matrix displays and visual messaging monitors shall be:

1. Single Face: Daktronics Galaxy Model AF-6121-32x144-8-A-SF.
2. Double Face: Daktronics Galaxy Model AF-6121-32x144-8-A-DF

3. Single sided 46” LCD flat screen monitor, wall or ceiling mounted

B. PID cable shall consist of two 4 pair #23AWG solid copper conductors bonded in pairs within an overall foil shield. Belden # 7953A Cat 6/RS-422 cable or equal

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 PA and PID system field tests and provide all labor, equipment, and incidentals required for testing.

B. After installation of PA and PIDs has been completed and final terminations have been made to the head-end equipment by others, the Contractor shall participate in an operating test of the PA/PID system to demonstrate it operates in accordance with the requirements of this Section.

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 274216

SECTION 275116 – PUBLIC ADDRESS SYSTEMS

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. 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.

C. The Work specified in this Section consists of furnishing and installing communication conduit, cables and speakers for the Public Address (PA) system as shown on drawings. Public Address System is located in the PID Network Rack which is provided by others.

1.2 RELATED DOCUMENTS

A. Drawings and Contract Terms and Conditions

B. Amtrak Graphic Standard Signage Manual and Station Guidelines

C. Requirements of the following Division 26 Sections apply to this Section:

1. Common Work Results for Electrical - Section 260500.
2. Low Voltage Electrical Power Conductors and Cables - Section 260519.
3. Hangers and Support for Electrical Systems - Section 260529.
4. Passenger Information Display System (PIDS) – Section 274216

1.3 SUMMARY:

A. This Section includes Amtrak requirements for the Public Address systems.

B. The Contractor shall furnish and install all speakers, cable and conduit associated with the PA systems including the PA/PID system head-end equipment enclosure within the Telecom Room and make final terminations to this equipment.

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 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.

1.5 CLOSEOUT SUBMITTALS:

A. Submit closeout submittals in accordance with Form 816 Article 1.20-1.05.02, NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS.

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. Electrical Component Standard: Provide work complying with applicable requirements of NFPA 70 "National Electrical Code".

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 the NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information.

PART 2 – PRODUCTS

2.1 BUY AMERICA COMPLIANCE

A. Products must meet Buy America requirements. Refer to NOTICE TO CONTRACTOR – BUY AMERICA for additional information.

2.2 PUBLIC ADDRESS SYSTEMS:

A. PA system speakers shall be grey baked epoxy double re-entrant type with compression driver mounted within a Flange weather-resistant housing. Audio power capability shall be 15 Watts continuous. Transformer-equipped loudspeaker shall have impedance selection position switch. Power taps shall be

available on 70.7V line. Loudspeaker mounting shall be as shown on drawings.

1. Interior: Atlas Sound Model APF-15T with Model L20-100 grille.
2. Exterior: Atlas Sound Model APF-15T installed in Model VP410-S vandal-proof enclosure with FAMT-6 adapter plate.

B. 1. Speaker wire shall be two #18 awg high conductivity copper conductors such as Belden # 8460 or equal.

C. 1. Multi-channel, amplified monitor panel shall be Atlas Sound Model MVXA-2008 or MVXA-2016 or approved equal. Unit shall be capable of visually monitoring 8 or 16 channels simultaneously. Independent aural monitoring of each channel shall be provided by an internal speaker, a headphone jack, a 3-watt speaker level output, and a line level output to drive an external amplifier. It shall be able to monitor any combination of line level, inputs. It shall feature standard E.I.A.

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 PA system field tests and provide all labor, equipment, and incidentals required for testing the PA/PID equipment.

B. After installation has been completed the Contractor shall demonstrated the PA and PID systems operate in accordance with the requirements of this

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 275116

SECTION 282301 - VIDEO SURVEILLANCE 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. 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.

C. The Work specified in this Section consists of furnishing and installing Video Surveillance System (VSS) Network Rack, communication conduit and cables, power conduit and cables, and cameras for the VSS as indicated.

1.2 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 Amtrak Police Department Corporate Security – Guidance, Practices and Recommendations 2011 rev 3 and specification entitled "SAFETY AND PROTECTION OF RAILROAD TRAFFIC AND PROPERTY" and other Amtrak Specifications contained in the Contract.

1.3 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.

1.4 DEFINITIONS

A. AGC: Automatic gain control.

B. BNC: Bayonet Neill-Concelman - type of connector.

C. B/W: Black and white.

D. FO: Fiber Optic.

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.

1.5 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.

1.6 ACTION SUBMITTALS

A. 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: Load requirements for sizing calculations.

5. Wiring Diagrams: For power, signal, and control wiring.

6. Room HVAC requirements.

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.

1.7 INFORMATIONAL SUBMITTALS

A. 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.

1.8 CLOSEOUT SUBMITTALS

A. Submit closeout submittals in accordance with Form 816 Article 1.20-1.05.02, 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 emergency, operation, and maintenance manuals include the following:

1. Lists of spare parts and replacement components recommended to be stored at the site for ready access.

1.9 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.

1.10 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.

1.11 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.

1.12 WARRANTY

A. Refer to Form 816, Article 1.20-1.06.08, and the 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 BUY AMERICA COMPLIANCE

A. Products must meet Buy America requirements. Refer to NOTICE TO CONTRACTOR – BUY AMERICA for additional information

2.2 SYSTEM REQUIREMENTS

A. Video-signal format shall comply with NTSC standard, composite interlaced video.

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.

2.3 CAMERAS

A. Cameras for Platforms, Stair towers, Pedestrian Bridge, and Lobby areas shall be fixed dome HD network type cameras as manufactured by Pelco, or equal in accordance with the following:

1. Fixed color/day-night high definition digital megaplex IP network camera.
2. Externally powered by 120 volt AC.
3. Lens: Vari-focal 2.8 – 12mm (F1.2 to 2.1) IR Corrected, Auto Iris, and 4x zoom ratio.
4. Resolution: 3 Megapixel (2048 x 1536) in color and day/night.
5. Sensitivity: 0.03 lux at F1.4 and Day/Night IR sensitive.
6. Two Simultaneous video streams of 720p High Definition H.264 and M-JPEG at 30fps.
7. Cabling: Multi-Mode Fiber optic cable .
8. Vandal resistant and weatherproof heated enclosure (Pelco Mini Dome or Equal).

B. Cameras for end of track viewing shall be outdoor IP network fixed infa-red long distance camera by Pelco or equal in accordance with the following:

1. 1/3" CCD Image Sensor
2. Lens: 3-90mm Varifocal lens with 12x electronic zoom auto focus and Iris
3. Resolution: 500 lines (Day) 700 lines (Night).
4. Sensitivity: 0.02 lux .
5. IR LED Illuminators capable of 300 ft. range and 40° angle.
6. Intelligent Video Analysis (IVA) enabling the camera to be programmed to detect loitering, line crossing and other potential threats
7. Vandal resistant and weatherproof heated enclosure

C. Cameras shall be rigidly mounted with stainless steel fasteners. Wiring shall be in armored flexible cable to local junction box (within 3'). Provide rigid steel conduit mounted to underside of canopy back to head-end equipment.

D. The cameras shall be connected by Fiber optic cable having the following features:

1. 62.5/125um Multi-Mode fibers with sufficient spares.

2. Flame retardant polyvinyl chloride (PVC) insulation and jacket.

3. Flexible buffer tube assembly.

4. Each fiber optic cable shall be identified by means of surface ink printing indicating manufacturer, type and quantity.

E. Remote cameras shall be connected by CAT 6 4 pair 24 AWG Ethernet cable.

2.4 EQUIPMENT RACK

A. Provide a free standing rack to house surge suppressor, Media Converter, Network switch NVR Server/DVD burner, power supply, fold out keyboard and 17"LCD monitor.

B. Rack shall be a steel free standing enclosure 70"high, 40" deep, 24"wide, nominal and include 40 rack units.

C. Provide service light, vertical power strip (entire height of rack), and cable management ladder.

D. Provide cooling fans and temperature monitor with a thermostat.

2.5 NETWORK SWITCH

A. Cisco 2960 Series or equal.

B. Product Description:

1. Up to 48 10/100/1000 ports plus four Small Form-Factor Pluggable plus (SFP+) providing fast transition to 10 Gigabit Ethernet.

2. Ethernet Connections: 24 ports or 48 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 48 Service Ports: 15.4 Watts max per port. Dual zone power – separate power supply for each group of 24 Ethernet ports

C. The rack shall be equipped with fiber to copper 100 Mb media converters with the following features:
   1. AC powered Fiber Media Converter for multi-mode and single-mode fiber connector types to copper Ethernet for outdoor environments.

2.6 NETWORK VIDEO RECORDER WITH DVD BURNER

A. Pelco Digital Sentry or equal

B. Network Video Recorder (NRV) shall have :

1. Latest generation processor with 8 GB of RAM and a fully Open Architecture.

2. HD video recording for up to 128 combined IP and analog cameras.

3. Available throughput of 280 Mbps

4. Up to 12TB of storage with a optical disk drive.

2.7 UNINTERRUPTIBLE POWER SUPPLY (UPS):

A. An external UPS circuit shall be provided sized to provide 90 minutes operation of the security system under normal operating conditions (recording).

B. Provide all load information for UPS sizing calculations, including each piece of security equipment, to support same equipment for 90 minutes.

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 or Equal

A. Internal storage: 12 Terabyte hard disk drive.

1. Video and audio recording over TCP/IP network.

2. Video recording of H.264, MJPEG, and MPEG-4 IP Streams.

3. Video recording up to 280 Mbps available throughput.

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 24 TB.

11. Full integration with LAN, Intranet, or Internet through standard Web browser or video management software.

12. Integrated Web server FTP server functionality.

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 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 final camera position and to obtain the field of view required for camera. Connect all controls and alarms, and adjust.

D. Avoid ground loops by making ground connections only at the control station.

E. 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 provide 8 hours on site to train Owner's maintenance personnel. The training shall include the following:

1. An intensive course covering setup, retrieval, adjusting, operating, and maintaining video-surveillance equipment learning on the installed commissioned systems.

END OF SECTION 282301

SECTION 283101 – FIRE ALARM SYSTEM

PART 1 - GENERAL

1.1 SUMMARY:

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.

C. This Section covers the Work required to add the new initiating devices and notification appliances shown on the drawings to the existing building fire alarm system. The Work also includes demolition of existing devices and associated conduits and cabling as indicated on the drawings.

D. Work covered by this section includes the furnishing of labor, equipment, and materials for installation of the fire alarm system as indicated on the drawings and specifications.

E. The Fire Alarm System shall consist of all necessary hardware equipment and software programming to perform the following functions:

1. Fire alarm and detection operations for new devices.

1.2 ACCEPTABLE MANUFACTURERS:

A. Manufacturers:

1. Subject to compliance with specification requirements, suitable products by one of the following manufacturers will be considered by Engineer:
   a. Gamewell-FCI by Honeywell or approved equal

B. Being listed as an acceptable Manufacturer in no way relieves obligation to provide all equipment and features in accordance with these specifications.

C. The Manufacturer, or its approved representative shall employ factory trained and NICET certified technicians, and shall maintain a service organization within 30 miles of this project location. The Manufacturer and service organization shall have a minimum of 10 years experience in the fire protective signaling systems industry.

1.3 RELATED DOCUMENTS:

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

B. 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."

C. 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 72, National Fire Alarm Code
3. NFPA 70, National Electrical Code
4. NFPA 70E, Electrical Safety Requirements for Employee Workplaces
5. NFPA 101, Life Safety Code
6. NFPA 90A, Standard for the Installation of Air Conditioning and Ventilating Systems
7. FM Global approved Fire Alarm Control Panel as well as all associated signal and notification devices.
8. Local Jurisdictional Adopted Codes and Standards
9. ADA Accessibility Guidelines

1.4 SYSTEM DESCRIPTION:

A. General: Provide initiating devices, notification appliances, and monitoring and control devices as indicated on the drawings and as specified herein.

B. Wiring/Signal Transmission:

1. Transmission shall be hard-wired, using addressable signal transmission, dedicated to fire alarm service only.

2. System connections for initiating circuits and notification appliance circuits shall be Class B.

C. Power Requirements:

1. All circuits requiring system-operating power shall be 24 VDC and shall be individually fused at the control unit.

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 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-by-line comparison of how the submitted product meets, exceeds, or does not comply with this specification.

C. Wiring schematics from manufacturer.

D. Shop drawings showing system details including location of FACP, all devices and circuiting.

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 or use of IDC, NAC, relay, sensor, and auxiliary control circuits.

F. Operation and maintenance data for inclusion in Operating and Maintenance Manual. 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.

G. Product certification signed by the manufacturer of the fire alarm system components certifying that their products comply with indicated requirements.

1.6 CLOSEOUT SUBMITTALS:

A. Submit closeout submittals in accordance with Form 816 Article 1.20-1.05.02, NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS.

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: A factory-authorized installer is to perform the work of this section.

C. Each and all items of the Fire Alarm System shall be FM Global approved and listed as a product of a single fire alarm system manufacturer under the appropriate category by Underwriters Laboratories, Inc. (UL), and shall bear the "UL" label.

D. 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.

1.8 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.

1.9 WARRANTY:

A. Refer to Form 816, Article 1.20-1.06.08, and the NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information.

PART 2 - PRODUCTS

2.1 BUY AMERICA COMPLIANCE

A. Products must meet Buy America requirements. Refer to NOTICE TO CONTRACTOR – BUY AMERICA for additional information

2.2 ADDRESSABLE MANUAL PULL STATIONS:

A. Description: Addressable single- or double-action type, red LEXAN, with molded, raised-letter operating instructions of contrasting color. Station will mechanically latch upon operation and remain so until manually reset by opening with a key common with the control units.

B. Protective Shield: Provide a tamperproof, clear LEXAN shield and red frame that easily fits over manual pull stations. When shield is lifted to gain access to the station, a battery powered piercing warning horn shall be activated. Lowering and realigning the shield shall silence the horn. The horn shall provide 85dB at 10 feet and shall be

powered by a 9 VDC battery. Provide and install pull stations as shown on the drawings.

2.3 SMOKE SENSORS:

A. General: Comply with UL 268, "Smoke Detectors for Fire Protective Signaling Systems." Include the following features:

1. Factory Nameplate: Serial number and type identification.
2. Operating Voltage: 24 VDC, nominal.
3. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore normal operation.
4. Plug-In Arrangement: Sensor and associated electronic components are mounted in a module that connects to a fixed base with a twist-locking plug connection. Base shall provide break-off plastic tab that can be removed to engage the head/base locking mechanism. No special tools shall be required to remove head once it has been locked. Removal of the detector head shall interrupt the supervisory circuit of the fire alarm detection loop and cause a trouble signal at the control unit.
5. Each sensor base shall contain an LED that will flash each time it is scanned by the Control Unit (once every 4 seconds). In alarm condition, the sensor base LED shall be on steady.
6. Each sensor base shall contain a magnetically actuated test switch to provide for easy alarm testing at the sensor location.
7. Each sensor shall be scanned by the Control Unit for its type identification to prevent inadvertent substitution of another sensor type. Upon detection of a "wrong device", the control unit shall operate with the installed device at the default alarm settings for that sensor; 2.5% obscuration for photoelectric sensor, 135-deg F and 15-deg F rate-of-rise for the heat sensor, but shall indicate a "Wrong Device" trouble condition.
8. The sensor's electronics shall be immune from false alarms caused by EMI and RFI.
9. Sensors include a communication transmitter and receiver in the mounting base having a unique identification and capability for status reporting to the FACP. Sensor address shall be located in base to eliminate false addressing when replacing sensors.
10. Removal of the sensor head for cleaning shall not require the setting of addresses.

B. Type: Smoke sensors shall be of photoelectric. Where acceptable per manufacturer specifications, ionization type sensors may be used.

C. Bases: Relay output, sounder and isolator bases shall be supported alternatives to the standard base.

D. Duct Smoke Sensor: Photoelectric type, addressable, sampling tube of design and dimensions as recommended by the manufacturer for the specific duct size and installation conditions where applied. Sensor includes relay as required for fan shutdown.

1. Environmental compensation, programmable sensitivity settings, status testing, and monitoring of sensor dirt accumulation for the duct sensor shall be provided by the FACP.
2. The Duct Housing shall provide a supervised relay driver circuit for driving up to 15 relays with a single "Form C" contact rated at 7A@ 28VDC or 10A@ 120VAC. This auxiliary relay output shall be fully programmable. Relay shall be mounted within 3 feet of HVAC control circuit.
3. Duct Housing shall provide a relay control trouble indicator Yellow LED.
4. Compact Duct Housing shall have a transparent cover to monitor for the presence of smoke. Cover shall secure to housing by means of four (4) captive fastening screws.
5. Duct Housing shall provide two (2) Test Ports for measuring airflow and for testing. These ports will allow aerosol injection in order to test the activation of the duct smoke sensor.
6. Duct sensor shall be housed in a separate weatherproof gasketed enclosure.

2.4 HEAT SENSORS:

A. Thermal Sensor: Combination fixed-temperature and rate-of-rise unit with plug-in base and alarm indication lamp; 135-deg F fixed-temperature setting unless noted as 200 – deg F fixed on plans.

B. Thermal sensor shall be of the epoxy encapsulated electronic design. It shall be thermistor-based, rate-compensated, self-restoring and shall not be affected by thermal lag.

C. Sensor fixed temperature sensing shall be independent of rate-of-rise sensing and programmable to operate at 155-deg F. Sensor rate-of-rise temperature detection shall be selectable at the FACP for either 15-deg F or 20-deg F per minute.

D. Sensor shall have the capability to be programmed as a utility monitoring device to monitor for temperature extremes in the range from 32-deg F to 155-deg F.

E. Provide where indicated on drawings, Fixed temperature detectors in mechanical rooms or other hazardous areas. Provide rate-of-rise detectors for storage rooms.

2.5 ADDRESSABLE CIRCUIT INTERFACE MODULES:

A. Addressable Circuit Interface Modules: Arrange to monitor one or more system components that are not otherwise equipped for addressable communication. Modules shall be used for monitoring of non-addressable devices, and for control of evacuation indicating appliances and AHU systems.

B. Addressable Circuit Interface Modules will be capable of mounting in a standard 4”x4”x1-1/2” electric outlet box. Modules will include cover plates to allow surface mounting. Modules will receive their operating power from the signaling line or a separate two wire pair running from an appropriate power supply as required. Cover plates shall be provided by the Contractor and shall include port holes in the cover to visually monitor the LED status.

C. There shall be the following types of modules:

1. Type 1: Monitor Circuit Interface Module:
   a. For conventional 2-wire smoke detector and/or contact device monitoring with Class B or Class A wiring supervision. The supervision of the zone wiring will be Class B. This module will communicate status (normal, alarm, trouble) to the FACP.
   b. For conventional 4-wire smoke detector with Class B wiring supervision. The module will provide detector reset capability and over-current power protection for the 4-wire detector. This module will communicate status (normal, alarm, trouble) to the FACP.
2. Type 2: Line Powered Monitor Circuit Interface Module
   a. This type of module is an individually addressable module that has both its power and its communications supplied by the two wire multiplexing signaling line circuit. It provides location specific addressability to an initiating device by monitoring normally open dry contacts. This module shall have the capability of communicating four zone status conditions (normal, alarm, current limited, trouble) to the FACP.
   b. This module shall provide location specific addressability for up to five initiating devices by monitoring normally closed or normally open dry contact security devices. The module shall communicate four zone status conditions (open, normal, abnormal, and short). The two-wire signaling line circuit shall supply power and communications to the module.
3. Type 3: Single Address Multi-Point Interface Modules
   a. This multipoint module shall provide location specific addressability for four initiating circuits and control two output relays from a single address. Inputs shall provide supervised monitoring of normally open, dry contacts and be capable of communicating four zone status conditions (normal, open, current limited, and short). The input circuits and output relay operation shall be controlled independently and disabled separately.

b. This dual point module shall provide a supervised multi-state input and a relay output, using a single address. The input shall provide supervised monitoring of two normally open, dry contacts with a single point and be capable of communicating four zone status conditions (normal, open, current limited, and short). The two-wire signaling line circuit shall supply power and communications to the module.

c. This dual point module shall monitor an unsupervised normally open, dry contact with one point and control an output relay with the other point, using a single address. The two-wire signaling line circuit shall supply power and communications to the module.

4. Type 4: Line Powered Control Circuit Interface Module

a. This module shall provide control and status tracking of a Form "C" contact. The two-wire signaling line circuit shall supply power and communications to the module.

D. All Circuit Interface Modules shall be supervised and uniquely identified by the control unit. Module identification shall be transmitted to the control unit for processing according to the program instructions. Modules shall have an on-board LED to provide an indication that the module is powered and communicating with the FACP. The LEDs shall provide a troubleshooting aid since the LED blinks on poll whenever the peripheral is powered and communicating.

2.6 ALARM NOTIFICATION APPLIANCES:

A. Notification Appliances: The Contractor shall furnish and install Notification Appliances and accessories to operate on compatible signaling line circuits (SLC).

1. Notification appliance operation shall provide power, supervision and separate control of speakers and strobes. The controlling channel (SLC) digitally communicates with each appliance and receives a response to verify the appliance's presence on the channel. The channel provides a digital command to control appliance operation.
2. Class B (Style 4) notification appliances shall be wired without requiring traditional in/out wiring methods; "T" Tapping shall be permitted. Up to 63 appliances can be supported on a single channel.

B. Visible/Only: Strobe shall be listed to UL 1971. The V/O shall consist of a xenon flash tube and associated lens/reflector system. The V/O enclosure shall mount directly to standard single gang, double gang or 4" square electrical box, without the use of special adapters or trim rings. Appliances shall be wired with UTP conductors, having a minimum of 3 twists per foot. V/O appliances shall be provided with different minimum flash intensities of 75cd and 110cd where indicated. Provide a label inside the strobe lens to indicate the listed candela rating of the specific Visible/Only appliance.

C. Audible/Visible: Combination Audible/Visible (A/V) Notification Appliances shall be listed to UL 1971 and UL 464. The strobe light shall consist of a xenon flash tube and associated lens/reflector system. Provide a label inside the strobe lens to indicate the listed candela rating of the specific strobe. The horn shall have a minimum sound pressure level of 83 or 89 dBA @ 24VDC. The audible/visible enclosure shall mount directly to standard single gang, double gang or 4" square electrical box, without the use of special adapters or trim rings.

1. Audible portion shall be a speaker.

D. Isolator Module: Isolator module provides short circuit isolation for addressable notification appliance SLC wiring. Isolator shall be listed to UL 864. The Isolator shall mount directly to a minimum 2 1/8" deep, standard 4" square electrical box, without the use of special adapter or trim rings. Power and communications shall be supplied by the Addressable Controller channel SLC; dual port design shall accept communications and power from either port and shall automatically isolate one port from the other when a short circuit occurs. The following functionality shall be included in the Isolator module:

1. Report faults to the host FACP.
2. On-board Yellow LED provides module status.
3. After the wiring fault is repaired, the Isolator modules shall test the lines and automatically restore the connection.

E. Accessories: The contractor shall furnish the necessary accessories.

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.

C. The new fire alarm system and all related equipment required is designed and detailed within this specification and will be installed. The Contractor is responsible for any other equipment required which may not be detailed in the drawings or listed within the specification shall be installed for proper installation and operation of the new system. This includes all device backboxes and cover plates where required.

3.2 EQUIPMENT INSTALLATION:

A. Install a complete Fire Alarm System as described herein and as shown on the plans. Include all other necessary material for a complete operating system.

B. Duct Smoke Detectors: Comply with manufacturer's written instructions:

1. Verify that each unit is listed for the complete range of air velocity, temperature, and humidity of the existing air handling system.
2. Verify that the fan shutdown relay is rated to interrupt the existing air handling system fan motor control circuit.
3. Install sampling tubes so that they extend the width of the existing duct.

C. Monitor Modules: Mount within electrical boxes near the sprinkler waterflow, pressure, and/or tamper switches. Coordinate location and interconnection with the sprinkler system. Remove existing steel boxes in Garage areas and provide and install NEMA 12 boxes with a gasket for the monitor module cover.

D. Control Relays: Mount within existing electrical boxes as recommended by the fire alarm manufacturer.

E. Manual Pull Stations: Surface mount pull stations in back boxes. Mount new pull stations so that top of pull station is 48" above finished floor, as per ADA standards

F. Fire Alarm Control Panels: Install so that the top of the cabinet is not more than 72 inches above the finished floor.

G. Isolation Modules: Where called for on plans install in same location as existing device to be removed.

H. Remote Annunciators: Install per manufacturer's recommendations. Mount at height so that LCD is viewable.

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 Fire Alarm 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 Fire Alarm 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. Color-code notification appliance circuits differently from alarm-initiating circuits. Paint fire alarm system junction boxes and covers red. Provide and install wire numbers and number terminal strips.

3.4 FIELD QUALITY CONTROL:

A. 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.

B. Service personnel shall be qualified and experienced in the inspection, testing, and maintenance of fire alarm systems. Examples of qualified personnel shall be permitted to include, but shall not be limited to, individuals with the following qualifications:

1. Factory trained and certified.
2. National Institute for Certification in Engineering Technologies (NICET) fire alarm certified.
3. International Municipal Signal Association (IMSA) fire alarm certified.
4. Certified by a state or local authority.
5. Trained and qualified personnel employed by an organization listed by a national testing laboratory for the servicing of fire alarm systems.

C. Pre-testing: Determine, through pre-testing, the conformance of the system to the requirements of the Drawings and Specifications. Correct deficiencies observed in pretesting. 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. Minimum System Tests: Test the system according to the procedures outlined in NFPA 72.

F. 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.

G. Report of Tests and Inspections: Provide a written record of inspections, tests, and detailed test results in the form of a test log.

H. Final Test, Certificate of Completion, Certificate of Occupancy, and first annual inspections:

1. Test the system as required by the Authority Having Jurisdiction in order to obtain a certificate of occupancy.
2. Provide the first annual fire alarm inspection as required by NFPA 72.

3.5 FINAL ADJUSTING:

A. Occupancy Adjustments: When requested within the one year of date of final acceptance, provide on-site assistance in adjusting sound levels and adjusting controls and sensitivities to suit actual occupied conditions. Provide up to (3) three visits to the site for this purpose.

3.6 TRAINING:

A. 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. Provide a minimum of 4 training sessions each two hours long in duration.
2. Schedule training with the Owner at least seven days in advance.

3.7 WARRANTY:

A. Warrant that the Products be free from defects in material and workmanship under normal use for a period of one year from the date of final project acceptance of all or any part of the system. 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.

END OF SECTION 283101

SECTION 323113 - CHAIN LINK FENCES AND GATES

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 chain-link fences and swing gates.

1.3 PERFORMANCE REQUIREMENTS

A. Engineering design of chain-link fence by Contractor.

1. Wind Loads: 110 MPH.
2. Exposure Category: C.

B. Lightning Protection System: Maximum grounding-resistance value of 25 ohms.

1.4 QUALITY ASSURANCE

A. Electrical Components: NFPA 70.

B. Mockups.

1.5 WARRANTY

A. Materials and Workmanship: Five (5) years.

1.6 CHAIN-LINK FENCES AND GATES

A. Fence Fabric: Aluminum wire mesh sized 2-1/8 inches.

B. Posts and Rails: Heavy industrial strength; round shape.

C. Horizontal Support: Rails.

D. Steel Finish: Aluminum coated.

1.7 INSTALLATION

A. Chain-Link Fencing: ASTM F 567.

B. Post Setting:
   1. Terminal Posts: In concrete.
   2. Line Posts: Mechanically driven into soil.

C. Grounding and Bonding: NFPA 780.

1.8 FIELD QUALITY CONTROL

A. Grounding-Resistance Testing: By Contractor-engaged agency.

END OF SECTION 323113

SECTION 323119 - DECORATIVE METAL FENCES AND GATES

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.

C. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Decorative steel fences.

B. Related Sections:

1. Section 055000 "Metal Fabrications".
2. Section 06100 "Rough Carpentry".
3. Section 061533 "Wood Decking".

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

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.

C. Shop Drawings: For gates. Include plans, elevations, sections, details, and attachments to other work.

1. Include diagrams for power, signal, and control wiring.

D. Samples: For each fence material and for each color specified.

1. Provide Samples 12 inches in length for linear materials.

1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

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. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.

1. Include 10-foot length of fence complying with requirements.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 WARRANTY

A. Refer to Form 816, Article 1.20-1.06.08, and the NOTICE TO CONTRACTOR – CLOSEOUT DOCUMENTS for additional information.

B. All structural fence components (i.e. rails, pickets, and posts) shall be warranted by the manufacturer for a period of twenty-five (25) years against defects in material finish, including cracking, peeling, chipping, blistering or corroding

C. Repair or replace any panel that fails during the manufacturer's extended warranty period at no additional cost to CTDOT, including labor to remove failed section and install replacement section.

D. Reimbursement for labor necessary to restore or replace components that have been found to be defective under the terms of manufacturer’s warranty shall be guaranteed for five (5) years from date of original purchase.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Lightning-Protection System: Maximum grounding-resistance value of 25 ohms under normal dry conditions.

B. Structural Performance of Decorative Metal Fencing: Fencing shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.

1. Top Rails of Fencing:

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 Fencing:

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.

2.2 DECORATIVE STEEL FENCES

A. Decorative Steel Fences: Fences made from steel tubing bars and shapes, hot-dip galvanized.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Ameristar Fence Products, Inc. (888)333-3422; Montage II Welded Ornamental Steel Fence - 3-Rail -Genesis style, or comparable product by one of the following:

a. Ametco Manufacturing Corporation.
b. Metalco Fence & Railing Systems; Atlantis Products, Inc.
c. Approved equal.

B. Posts: Square steel tubing.

1. Line Posts: 2-1/2 by 2-1/2 inches with 12 gauge thickness.
2. End and Corner Posts: 2-1/2 by 2-1/2 inches with 12 gauge thickness.

C. Post Caps: Formed from steel sheet and hot-dip galvanized after forming.

D. Rails:
1. Steel Channel Rails: Steel channels 1.75 inches by 1.75 inches x .105 inches with picket holes spaced 4.715 inches on-center.

E. Pickets: 3/4-inch Decorative steel bars of pattern and size indicated.

1. Extend pickets beyond top rail as indicated and cap with metal spear point finial.
2. Picket Spacing: 4.675 inches on-center. 4” clear space maximum between.
3. Square Tubes: 1 inch square x 14 gauge steel tubing.

F. Fabrication: Assemble fences into sections by welding pickets to rails.

1. Fabricate sections with clips welded to rails for field fastening to posts.
2. Drill posts and clips for fasteners before finishing to maximum extent possible.

G. Finish exposed welds to comply with NOMMA Guideline 1, Finish #4 - good-quality, uniform undressed weld with minimal splatter.

H. Galvanizing: For items other than hardware that are indicated to be galvanized, hot-dip galvanize to comply with ASTM A 123/A 123M. For hardware items, hot-dip galvanize to comply with ASTM A 153/A 153M.

1. Hot-dip galvanize posts and rails.
2. Hot-dip galvanize rail and picket assemblies after fabrication.
3. Hot-dip galvanize custom-design rail and infill assemblies after fabrication.

I. Finish for Steel Items High-performance coating.

2.3 STEEL AND IRON

A. Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Bars (Pickets): Hot-rolled, carbon steel complying with ASTM A 29/A 29M, Grade 1010.

C. Tubing: ASTM A 500/A 500M, cold-formed steel tubing.

1. Bars: Hot-rolled steel strip, ASTM A 1011/A 1011M, Commercial Steel, Type B.
2. Wire Rods: ASTM A 510.

D. Galvanized-Steel Sheet: ASTM A 653/A 653M, structural quality, Grade 50, with G60 coating.

E. Castings: Either gray or malleable iron unless otherwise indicated.

1. Gray Iron: ASTM A 48/A 48M, Class 30.
2. Malleable Iron: ASTM A 47/A 47M.

2.4 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

2.5 GROUNDING MATERIALS

A. Grounding Conductors: Bare, solid wire for No. 6 AWG and smaller; stranded wire for No. 4 AWG and larger.

1. Material above Finished Grade: Copper.

2.6 STEEL FINISHES

A. Surface Preparation: Clean surfaces according to SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning."

1. After cleaning, apply a conversion coating compatible with the organic coating to be applied over it.

B. Powder Coating: Immediately after cleaning, apply two-coat finish consisting of epoxy primer and TGIC polyester topcoat, with a minimum total dry film thickness of not less than 8 mils. Comply with coating manufacturer's written instructions.

1. Color and Gloss: Black, eggshell.

C. Primer Application: Apply zinc-rich epoxy primer immediately after cleaning, to provide a minimum dry film thickness of 2 mils per applied coat, to surfaces that are exposed after assembly and installation, and to concealed surfaces.

D. High-Performance Coating: Apply intermediate and polyurethane topcoats to prime-coated surfaces. Comply with coating manufacturer's written instructions and with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting. Apply at spreading rates recommended by coating manufacturer.

1. Match approved Samples for color, texture, and coverage. Remove and refinish, or recoat work that does not comply with specified requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for site clearing, earthwork, pavement work, construction layout, and other conditions affecting performance of the Work.

B. Do not begin installation before final grading is completed unless otherwise permitted by Architect.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 DECORATIVE FENCE INSTALLATION

A. Install fences according to manufacturer's written instructions.

B. Install fences by setting posts as indicated and fastening rails to posts.

C. Post Setting: Set posts with mechanical anchors at indicated spacing to wood frame platform substrate and vertical edge of concrete platform.

1. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with mechanical devices.
2. Space posts as indicated on drawings.
3. Fence panels shall be attached to posts with brackets supplied by the manufacturer.
4. Posts setting by plated posts must be shown by engineering analysis to be sufficient in strength for the intended application.

END OF SECTION 323119

State of Connecticut

Department of Transportation

SUPPLEMENTAL SPECIFICATIONS

TO

THE STANDARD SPECIFICATIONS

FOR

ROADS, BRIDGES AND INCIDENTAL CONSTRUCTION

FORM 816

2004

JANUARY 2014

January 2014

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STANDARD SPECIFICATIONS
FOR
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ERRATA

PG.	ARTICLE OR SUBARTICLE	LINE NO.	CORRECTION	REV. DATE
i	Table of Contents	20	Insert "1.11 Claims"	July10
iv	Table of Contents	11	Change "Guild" to "Guide"	Jan05
12	1.01.03	31	Insert "AOEC – Area of Environmental Concern"	Jan05
12	1.01.03	31	Insert "AWG – American Wire Gauge"	Jan05
13	1.01.03	16	Insert "HASP – Health and Safety Plan"	Jan05
13	1.01.03	29	Insert "PCC – Portland Cement Concrete"	Jan05
14	1.01.03	25	Insert "VOC – Volatile Organic Compound"	Jan05
14	1.01.03	26	Insert "WSA – Temporary Waste Stockpile Area"	Jan05
32	1.05.01	38	Change "Connecticut General Statutes" to "CGS"	Jan05
97	1.10.03-2	32	Change "D.E.P." to "DEEP"	Jan14
97	1.10.03-2	39	Change "D.E.P," to "DEEP,"	Jan14
98	1.10.03-2.1	13	Change "D.E.P." to "DEEP"	Jan14
99	1.10.03-2.6	23	Change "D.E.P." to "DEEP"	Jan14
100	1.10.03-2.9	32	Change "D.E.P." to "DEEP"	Jan14
101	1.10.03-2.12	22	Change "D.E.P." to "DEEP"	Jan14
102	1.10.04	26	Change "D.E.P." to "DEEP"	Jan14
105	1.20	29	Change "Workmen and Equipment" to "Personnel and Equipment"	Jan05
105	1.20	31	Delete "Completion of Construction Work and"	Jan05
108	1.20-1.04.01	26	Change "othewise" to "otherwise"	July07
110	1.20-1.05.02-2	17	Change "DEP" to "DEEP"	Jan14
122	1.20-1.06.08	3	Change "Certificate of Compliance" to "C.O.C."	July07
131	1.20-1.08.05	34	Change "Workmen and Equipment" to "Personnel and Equipment"	Jan05
132	1.20-1.08.11	12	Change "Certificate of Compliance" to "C.O.C."	July07
133	1.20-1.08.13	7	Delete "Completion of Construction Work and"	Jan05
133	1.20-1.08.13	9	Change "Certificate of Compliance" to "C.O.C."	July07
133	1.20-1.08.13	15	Change "Certificate of Compliance" to "C.O.C."	July07
133	1.20-1.08.13	20	Change "Certificate of Compliance" to "C.O.C."	July07
164	2.04.03-1	2	Change "6.01.03-10" to "6.01.03-6"	Jan14
196	3.03.02	33	Change "Article M.03.01" to "Section M.03"	Jan14
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 ( ).**"	Jan05
256	5.01.02	22	Change "DEP" to "DEEP"	Jan14
259	5.03.03	24	Change "Such requirements of Article 5.02.03 ... 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."	July10

PG.	ARTICLE OR SUBARTICLE	LINE NO.	CORRECTION	REV. DATE
262	5.06.02	26	Change "Article M.03.01" to "Section M.03"	Jan14
262	5.06.02	27	Change "Article M.03.01" to "Section M.03"	Jan14
265	5.07.02	19	Change "Subarticle M.03.01-11" to "Article M.03.09"	Jan14
265	5.07.02	24	Change "M.08.01-26" to "M.08.01-19 Geotextiles"	July13
270	5.08.02	4	Change "M.06.02-12" to "M.06.02-4 Welded Stud Shear Connectors"	July10
271	5.09.02	39	Change "M.06.02-12" to "M.06.02-4 Welded Stud Shear Connectors"	July10
272	5.13.02	22	Change "M.08.01-27" to "M.08.01-20 PVC Pipe or M.08.01-21 PVC Gravity Pipe"	July13
378	6.52.02	2	Change "M.08.01-22" to "M.08.01-11 Reinforced Concrete Culvert End"	July13
378	6.52.02	3	Change "M.08.01-23" to "M.08.01-6 Metal Culvert End"	July13
404	7.05.02	11	Change "Article M.03.01" to "Section M.03"	Jan14
416	7.51.02-(4)	7	Change "M.08.01-26" to "M.08.01-19 Geotextiles"	July13
418	7.55.02	26	Change "M.08.01-26" to "M.08.01-19 Geotextiles"	July13
420	8.11.02	37	Change "Article M.03.01" to "Section M.03"	Jan14
420	8.11.02	38	Change "Article M.03.01" to "Subarticle M.03.08-2"	Jan14
421	8.11.02	1	Change "Article M.03.01" to "Section M.03"	Jan14
426	8.16.02	28	Change "Subarticle M.03.01-8" to "Article M.03.08"	Jan14
428	8.18.02	10	Change "Subarticle M.03.01-11" to "Article M.03.09"	Jan14
429	8.21.02-6	30	Change "M.03.01-11" to "Article M.03.09"	Jan14
430	8.21.03-6	37	Change "M.03.01-11" to "Article M.03.09"	Jan14
434	9.04.02	14	Change "Subarticle M.06.02-1" to "Article 6.03.02"	July10
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."	July10
445	9.11.02	14	Change "Subarticle M.03.01-12" to "Article M.03.05"	Jan14
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."	July10
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)	

PG.	ARTICLE OR SUBARTICLE	LINE NO.	CORRECTION	REV. DATE
			to determine that the required quality is obtained in the castings in the finished condition."	July10
454	9.16.02	20	Change "Article M.03.01" to "Section M.03"	Jan14
459	9.21.02	9	Change "Article M.03.01" to "Section M.03"	Jan14
459	9.21.02	17	Change "Article M.03.01" to "Section M.03"	Jan14
464	9.24.02-1	19	Change "Article M.03.01" to "Section M.03"	Jan14
475	9.47.02-5	34	Change "Article M.03.01" to "Section M.03"	Jan14
496	9.70.01	37	Change "CDOT" to "ConnDOT"	Jan05
533	10.02.02	6	Change "Article M.03.01" to "Section M.03"	Jan14
544	10.11.02	5	Change "M.08.01-25 or M.08.01-27" to "M.08.01-20 or M.08.01-21"	July13
548	10.17.03	14	Change "6.01.03-21" to "6.01.03-10"	Jan14
552	11.03.03-1	18	Change "M.03.01-12" to "M.03.05"	Jan14
569	11.14.05	19	Change "Span Wire" to "Span Wire (Type)"	July12
576	12.01.02	40	Change "Subarticle M.03.01-12" to "Article M.03.05"	Jan14
577	12.01.03	7	Change "6.03.03-19" to "6.03.03-4 (f) High Strength Bolted Connections"	July10
577	12.01.03	23	Change "Article 6.03.03-15" to "Subarticle 6.03.03-4(c) Bearings"	July10
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"	July10
578	12.02.02	23	Change "M.03.01-12" to "M.03.05"	Jan14
580	12.02.03	16	Change "6.01.03-21" to "6.01.03-10"	Jan14
604	18.00.02	7	Change "National Cooperative Highway Research Program (NCHRP)" to "NCHRP"	Jan05
638	M.04.02	37	Change "Asphalt Institute's" to "AI's"	Jan05
708	M.09.02-5	5	Change "Article M.03.01" to "Section M.03"	Jan14
711	M.10.02-1	17	Change "Subarticle M.06.02-1(b)" to "Article M.06.02"	July10
713	M.10.02-7	8	Change "Article M.03.01" to "Section M.03"	Jan14
720	M.10.08-3	2	Change "Subarticle M.06.02-1(b)" to "Article M.06.02"	July10
720	M.10.08-4	10	Change "Article M.03.01" to "Section M.03"	Jan14
726	M.12.03	18	After "M.03.01" add "and M.03.02"	Jan14
749	M.14.01-8	32	Change "Article M.03.01-12" to "Article M.03.05"	Jan14
759	M.15.15-5	24	Change "Article M.03.01" to "Section M.03"	Jan14
759	M.15.15-6	27	Change "Article M.03.01" to "Section M.03"	Jan14
760	M.15.15-16	21	Change "non-fusible" to "fused"	Jan05
829	Pay Items	4	Add "7.02, Dynamic Pile Driving Analysis (PDA) Test, ea. (ea.)"	July13
829	Pay Items	5	Add "7.02, Pre-Augering of Piles, l.f. (m)"	July13
837	Pay Items	24	Change "Span Wire" to "Span Wire (Type)"	July12
845	Index	6	Add page 133 to "Acceptance of Project"	Jan05
846	Index	13	Add page 107 to "Bids: Consideration of"	Jan05
847	Index	28	Add page 132 to "Cleaning Up, Final"	Jan05
849	Index	25	Add page 107 to "Consideration of Bids"	Jan05
849	Index	39	Add page 108 to "Contract: Intent of"	Jan05
850	Index	3	Add page 133 to "Contractor's: Responsibility, Termination of the"	Jan05

PG.	ARTICLE OR SUBARTICLE	LINE NO.	CORRECTION	REV. DATE
850	Index	13	Add page 114 to "Cooperation by Contractor"	Jan05
850	Index	15	Add page 114 to "Coordination of Special Provisions, Plans, Supplemental Specifications and Standard Specifications and Other Contract Requirements"	Jan05
850	Index	40	Add page 128 to "Cutting and Patching:"	Jan05
852	Index	16	Add page 106 to "Examination of Plans, Specifications, Special Provisions and Site of Work"	Jan05
852	Index	38	Insert "Facilities, Temporary…126"	Jan05
853	Index	7	Add page 132 to "Final: Cleaning Up"	Jan05
854	Index	35	Add page 115 to "Inspection"	Jan05
855	Index	11	Add page 108 to "Intent of Contract"	Jan05
855	Index	22	Add page 106 to "Knowledge of Applicable Laws"	Jan05
855	Index	25	Add page 106 to "Laws: Knowledge of Applicable"	Jan05
856	Index	27	Add page 120 to "Materials: Source of Supply and Quality"	Jan05
856	Index	28	Add page 121 to "Materials: Storage of"	Jan05
857	Index	33	Add page 133 to "Operation and Maintenance Manuals:"	Jan05
857	Index	34	Change page 133 to 136 for "Equipment and Systems Maintenance Manual"	Jan05
859	Index	2	Add page 131 to "Personnel and Equipment"	Jan05
860	Index	6	Add page 114 to "Plans: Coordination of Special Provisions, Supplemental Specifications and Standard Specifications and Other Contract Requirements"	Jan05
860	Index	7	Add page 106 to "Plans: Examination of"	Jan05
860	Index	30	Change page 108 to 112 for "Product Data"	Jan05
860	Index	31	Change page 108 to 112 for "Product Samples"	Jan05
860	Index	32	Add page 124 to "Product Selection:"	Jan05
861	Index	12	Add page 126 to "Prosecution of Work"	Jan05
861	Index	38	Change page 115 to 135 for "Record Drawings"	Jan05
863	Index	3	Add page 125 to "Sanitary Provisions"	Jan05
863	Index	18	Insert "Services, Temporary…126"	Jan05
863	Index	23	Add page 111 to "Shop Drawings"	Jan05
864	Index	4	Add page 106 to "Site of Work, Examination of"	Jan05
864	Index	12	Add page 120 to "Source of Supply and Quality"	Jan05
864	Index	19	Add page 114 to "Special Provisions: Coordination of Plans, Supplemental Specifications and Standard Specifications and Other Contract Requirements"	Jan05
864	Index	20	Add page 106 to "Special Provisions: Examination of"	Jan05
864	Index	26	Add page 114 to "Specifications: Coordination of Plans, Special Provisions and Other Contract Requirements"	Jan05
864	Index	27	Add page 106 to "Specifications: Examination of"	Jan05
864	Index	43	Add page 121 to "Storage"	Jan05
865	Index	27	Delete page 108 from "Submittals: Shop Drawings"	Jan05
865	Index	45	Insert "Temporary Utilities, Services, and Facilities…126"	Jan05
866	Index	2	Add page 133 to "Termination of Contractor's Responsibility"	Jan05
866	Index	23	Insert "Training…137"	Jan05
866	Index	45	Add page 133 to "Utility Services"	Jan05
867	Index	8	Insert "Warranties…121"	Jan05
867	Index	24	Add page 126 to "Work: Prosecution of"	Jan05

CONNECTICUT
SUPPLEMENTAL SPECIFICATION
SECTION 1.01
DEFINITIONS OF TERMS AND PERMISSIBLE ABBREVIATIONS

1.01.01 — Definitions:

After the end of the definition for "Plans" *insert the following Subarticle:*

" 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."

After the definition for "Subcontractor" *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 entire Article and replace with the following:

" **1.01.02—Abbreviations, Publications and Standards:** Whenever one of the following abbreviations is used in the Contract, its meaning shall be interpreted as follows:
AA—Aluminum Association, Inc. (The)
AABC—Associated Air Balance Council
AAMA—American Architectural Manufacturers Association
AAPA—American Association of Port Authorities
AASHTO—American Association of State Highway and Transportation Officials: Wherever reference is made to an AASHTO Standard Method of Test or Standard Specification, it refers by letter and number to the method or specification published by AASHTO in the "Standard Specifications for Transportation Materials and Methods of Sampling and Testing". The edition governing the work shall be in effect on the date the Contract was advertised for solicitation of bids shall govern.

ABMA—American Bearing Manufacturers Association
ACGIH—American Council of Government Industrial Hygienists
ACI—ACI International (American Concrete Institute)
ADAAG—Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities
AF&PA—American Forest & Paper Association
AGA—American Gas Association
AGC—Associated General Contractors of America (The)
AHA—American Hardboard Association
AHAM—Association of Home Appliance Manufacturers
AI—Asphalt Institute
AIA—The American Institute of Architects (The)
AISC—American Institute of Steel Construction
AISI—American Iron and Steel Institute
AITC—American Institute of Timber Construction
A.L.I.—Automotive Lift Institute
ALSC—American Lumber Standard Committee, Incorporated
AMCA—Air Movement and Control Association International, Inc.
ANLA—American Nursery and Landscape Association
ANSI—American National Standards Institute
AOAC—AOAC International
AOSA—Association of Official Seed Analysts
APA—APA-The Engineered Wood Association
API—American Petroleum Institute
AREMA—American Railway Engineering and Maintenance-of-Way Association
ARI—Air-Conditioning & Refrigeration Institute
ARTBA—American Road and Transportation Builders Association
ASA—Acoustical Society of America
ASC—Adhesive and Sealant Council
ASCE—American Society of Civil Engineers
ASHRAE—American Society of Heating, Refrigerating and Air-Conditioning Engineers
ASME—ASME International (The American Society of Mechanical Engineers International)
ASSE—American Society of Sanitary Engineering
ASTM—American Society of Testing and Materials (ASTM International): Wherever reference is made to an ASTM specification, test method, or practice, it refers by letter, number, or both to standards published by ASTM International in the "ASTM Standards Source™ Database". The edition governing the work shall be in effect on the date the Contract was advertised for solicitation of bids shall govern.
ATSSA—American Traffic Safety Services Association
AWI—Architectural Woodwork Institute
AWPA—American Wood-Preservers' Association
AWPI—American Wood Preservers Institute
AWS—American Welding Society: Wherever reference is made to an AWS materials specification, inspection methods, or welding procedures, it refers by section number to standards of the American Welding Society published in the applicable steel, or aluminum welding code. The edition governing the work shall be in effect on the date the Contract was advertised for solicitation of bids shall govern.
AWWA—American Water Works Association

BHMA—Builders Hardware Manufacturers Association
BIA—Brick Industry Association (The)
BOCA—BOCA International, Inc.
CBM—Certified Ballast Manufacturers Association
CCRL—Cement and Concrete Reference Laboratory
CDA—Copper Development Association (The)
CGA—Compressed Gas Association
CISCA—Ceilings and Interior Systems Construction Association
CLFMI—Chain Link Fence Manufacturers Institute
ConnDOT—Connecticut Department of Transportation
CFR—Code of Federal Regulations
CGS—Connecticut General Statutes
CISPI—Cast Iron Soil Pipe Institute
CRI—Carpet and Rug Institute (The)
CRSI—Concrete Reinforcing Steel Institute
CSI—Construction Specifications Institute (The)
CSSB—Cedar Shake & Shingle Bureau
CTI—Cooling Technology Institute
DASMA—Door and Access Systems Manufacturers Association, International
DEEP—Connecticut Department of Energy and Environmental Protection
DHI—Door and Hardware Institute
DOD—Department of Defense Military Specifications and Standards
~~DPUC—Department of Public Utility Control~~ *see PURA*
EIA—Electronic Industries Alliance
EPA—Environmental Protection Agency
FAA—Federal Aviation Administration
FCC—Federal Communications Commission
FCICA—Floor Covering Installation Contractors Association
FHWA—Federal Highway Administration
FMG—FM Global
FRA—Federal Railway Administration
FS—Wherever reference is made to FS in the contract, it refers by number, letter, or both, to the latest standard or tentative standard of the Federal Specification Unit, General Services Administration, Federal Supply Service, as to materials, specifications, or methods of testing, whichever the case may be.
FTA—Federal Transit Administration
HPVA—Hardwood Plywood & Veneer Association
GA—Gypsum Association
GANA—Glass Association of North America
GSA—General Services Administration
HI—Hydraulics Institute
HPVA—Hardwood Plywood & Veneer Association
ICC—International Code Council
ICC-ES—ICC Evaluation Service, Inc.
ICEA—Insulated Cable Engineers Association, Inc.
IEC—International Electrotechnical Commission
IEEE—Institute of Electrical and Electronics Engineers, Inc. (The)
IES—Illuminating Engineers Society
IESNA—Illuminating Engineering Society of North America

IGCC—Insulating Glass Certification Council
IGMA—Insulating Glass Manufacturers Alliance
IMSA—International Municipal Signal Association
IRI—HSB Industrial Risk Insurers
ISO—International Organization for Standardization
ITE—Institute of Traffic Engineers
KCMA—Kitchen Cabinet Manufacturers Association
LMA—Laminating Materials Association
LPI—Lightning Protection Institute
MBMA—Metal Building Manufacturers Association
MILSPEC—Military Specification and Standards
MMA—Monorail Manufacturers Association
MSHA—Mine Safety and Health Administration
MSS—Manufacturers Standardization Society of The Valve and Fittings the Valve Industry, Inc.
MUTCD—Manual on Uniform Traffic Control Devices
NAAMM—National Association of Architectural Metal Manufacturers
NADCA—National Air Duct Cleaners Association
NAIMA—North American Insulation Manufacturers Association (The)
NBFU—National Board of Fire Underwriters
NCHRP—National Cooperative Highway Research Program
NCMA—National Concrete Masonry Association
NCPI—National Clay Pipe Institute
NEBB—Natural Environmental Balancing Bureau
NEC—National Electrical Code
NECA—National Electrical Contractors Association
NEMA—National Electrical Manufacturers Association
NEPCOAT—North East Protective Coatings Committee
NESC—National Electrical Safety Code
NETA—InterNational Testing Association
NFPA—National Fire Protection Association
NFRC—National Fenestration Rating Council
NHLA—National Hardwood Lumber Association
NICET—National Institute for Certification in Engineering Technologies
NIOSH—National Institute of Occupational Safety and Health
NIST—National Institute of Standards and Technology
NLGA—National Lumber Grades Authority
NOAA—National Oceanic and Atmospheric Administration
NRCA—National Roofing Contractors Association
NSF—NSF International
NTMA—National Terrazzo and Mosaic Association, Inc.
OEO—Office of Equal Opportunity
OSHA—Occupational Safety and Health Administration
PCA—Portland Cement Association
PCI—Precast/Prestressed Concrete Institute
PDI—Plumbing & Drainage Institute
PTI—Post-Tensioning Institute
PURA—Public Utilities Regulatory Authority
RMA—Rubber Manufacturers Association

SAE—SAE International
SDI—Steel Deck Institute *or*
.....—Steel Door Institute
SFPA—Southern Forest Products Association
SJI—Steel Joist Institute
SMACNA—Sheet Metal and Air Conditioning Contractors National Association
SPIB—Southern Pine Inspection Bureau (The)
SPRI—Single Ply Roofing Institute
SSPC—Where reference is made to SSPC in the Contract, it refers by number, letter, or both, to the latest standard or tentative standard specification of The Society for Protective Coatings, Formerly the Steel Structures Painting Council, as to materials specifications, methods of testing, systems, procedures, inspection or other specification pertaining to any or all phases of cleaning or painting, whichever may apply.
SWRI—Sealant, Waterproofing, & Restoration Institute
TCA—Tile Council of America, Inc.
TIA—Telecommunications Industry Association
TIA/EIA—Telecommunications Industry Association/Electronics Industries Alliance
TPI—Truss Plate Institute, Inc.
TRB—Transportation Research Board
UFAS—Uniform Federal Accessibility Standards
UL—Underwriters Laboratories Inc.
USDA—United States Department of Agriculture
USGBC—U.S. Green Building Council
WCLIB—West Coast Lumber Inspection Bureau
WCSC—Window Covering Safety Council
WDMA—Window & Door Manufacturers Association
WWPA—Western Wood Products Association"

1.01.03 — Abbreviations and Terms:

Add the following abbreviations:

"**cu.dm** - Cubic Decimeter
cu.m - Cubic Meters
dm^3 - Cubic Decimeter
m^2 - Square Meter
m^3 - Cubic Meters
sq.m - Square Meter
Vert. M - Vertical Meter
vert.m - Vertical Meter"

CONNECTICUT
SUPPLEMENTAL SPECIFICATION
SECTION 1.03
AWARD AND EXECUTION OF THE CONTRACT

Replace Article 1.03.07 in its entirety with the following:

"1.03.07—Insurance:

Coverage shall be on a primary basis.

The Contractor shall carry and maintain at all times during the term of the Contract the insurance coverages required by this Article and any additional coverages(s) or higher minimum insurance coverage amount(s) required by the Special Provisions of the Contract.

If the Project includes work on or adjacent to railroad property additional insurance may be required as specified by the railroad. Please refer to the Special Provisions for any additional insurance requirements by the railroad.

1. **Worker's Compensation Insurance:** With respect to all operations the Contractor performs and all those performed for it by subcontractors, the Contractor shall carry, and require each subcontractor to carry, Workers' Compensation insurance as required by the laws of the State of Connecticut.

Employer's Liability insurance shall be provided in amounts not less than $100,000 per accident for bodily injury by accident; $100,000 policy limit by disease and $100,000 per employee for bodily injury by disease. Each 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 navigable water.

2. **Commercial General Liability Insurance:** With respect to the operations the Contractor performs and also those performed for it by subcontractors, the Contractor shall carry, and require each subcontractor to carry, Commercial General Liability insurance, including Contractual Liability, Products and Completed Operations, Broad Form Property Damage and Independent Contractors.

Products and completed operations insurance for ongoing and completed operations shall be maintained for a period of one (1) year after the acceptance of the project by the Department in accordance with Article 1.08.14. See chart below for applicable minimum coverage amounts.

Contract Amount ($)	Minimum Single Occurrence Amount ($)	Minimum Annual Aggregate Amount ($)
0-2,000,000	1,000,000	2,000,000
>2,000,001-10,000,000	2,000,000	4,000,000
>10,000,000	4,000,000	8,000,000

In Facilities construction projects, if underground work is to be undertaken, each policy shall have coverage for and exclusions removed for "Explosion, Collapse and Underground" ("XCU").

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 for all damages arising out of: (1) bodily injury to or death of all persons and/or (2) injury to or destruction of property; in any one accident or occurrence. This policy shall not be subject to an annual aggregate limitation. See chart above for applicable minimum coverage amounts.

4. **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 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. See chart below for applicable minimum coverage amounts.

Contract Amount ($)	Minimum Single Occurrence Amount ($)	Minimum Annual Aggregate Amount ($)
0 - 20 Million	1,000,000	1,000,000
20 Million - 50 Million	2,000,000	2,000,000
> 50 Million	4,000,000	4,000,000

5. **Railroad Protective Liability Insurance:** When the Contract involves work within fifty (50) feet of the railroad right-of-way or State-owned rail property, with respect to Project operations and also those of its subcontractors, the Contractor shall carry, and require each subcontractor to carry, Railroad Protective Liability Insurance 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, and subject to that limit per accident or occurrence, an aggregate coverage of at least $6,000,000 for all damages during the policy period, and with all entities falling within any of the following listed categories named as insured parties: (i) the owner of the railroad right-of-way, (ii) the owner of any railcar licensed or permitted to travel within that affected portion of railroad right-of-way, and (iii) the operator of any railcar licensed or permitted to travel within that affected portion of the railroad right-of-way, and with the State, if not falling within any of the above-listed categories, also named as an insured party.

6. **Blasting:** When explosives are to be used in the Project, the Commercial General Liability insurance policy shall include XCU coverage, in the same limits as the per occurrence policy limits.

7. **Protection and Indemnity Insurance for Marine Construction Operations in Navigable Waters:**

If a vessel of any kind will be involved in Project work, the Contractor shall obtain the following additional insurance coverage:

A. Protection and Indemnity Coverage of at least $300,000 per vessel or equal to at least the value of hull and machinery, whichever is greater.

B. If there is any limitation or exclusion with regard to crew and employees under the protection and indemnity form, the Contractor must obtain and keep in effect throughout the Project a workers' compensation policy, including coverage for operations under admiralty jurisdiction, with a limit of liability of at least $300,000 per accident or a limit equal to at least the value of the hull and machinery, whichever is greater, or for any amount otherwise required by statute.

8. **Builder's Risk Insurance:** For Facilities construction projects, the Contractor 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 within 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.

9. **Architects and Engineer's Professional Liability Insurance for Structural Engineer:** If required, limits will be specified in Article 1.03.07 of the Special Provisions of the Contract or Article 1.05.02.

10. **Umbrella Liability Insurance:** The Contractor may satisfy the minimum limits required for Commercial General Liability and Automobile Liability Insurance using Umbrella Liability Insurance. In the event that the Contractor obtains Umbrella Liability Insurance to meet the minimum coverage requirements for Commercial General Liability or Automobile Liability Insurance coverage, the Umbrella Liability Insurance policy shall have an annual aggregate at a limit not less than twice the single occurrence and must specifically endorse the State of Connecticut as an additional insured. Specifically for Bridge Projects with a low bid equal to or higher than $80,000,000, the Umbrella Liability Insurance policy must have a minimum limit of at least $25,000,000.

11. **Certificate of Insurance:** Before the Contract is executed, the Contractor must provide to the Department a certificate of insurance acceptable to the Commissioner and executed by an insurance company or companies satisfactory to the State of Connecticut for the insurance coverage(s) required by this Article and the Special

Provisions of the Contract. The Contractor shall maintain the required insurance coverage during the entire term of the Contract. The certificate of insurance must clearly include the name of the insured and identify the project for which it is being issued.

12. **Copies of Policies:** The Contractor shall provide, within five (5) business days, a copy or copies of all applicable insurance policies when requested by the State. In providing said policies, the Municipality may redact provisions of the policy that are proprietary. This provision shall survive the expiration or termination of the Contract.

13. **Sovereign Immunity:** The Contractor 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 that the Contractor do so or consents to its doing.

14. **Contractor Assumes Costs:** 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.

15. **State Named as Additional Insured:** The State must be named as an additional insured party for the Commercial General Liability and Automobile Liability insurance policies required by this Article and the Special Provisions to the Contract, and any Umbrella Liability Insurance, as applicable, obtained in accordance with this Article. Each policy shall waive right of recovery (waiver of subrogation) against the State of Connecticut.

16. **Termination or Change of Insurance:**

A. The Contractor shall notify the Department of any cancelation of insurance carrier or change to the required insurance coverage by submitting a new insurance certificate to the Department immediately following said cancelation or change in required coverage.

B. It is the responsibility of the Contractor to maintain evidence of a current insurance coverage with the Department for the duration of contract. It is the responsibility of the Contractor to file with the Department all renewals and new certificates of insurance issued due to changes in policy terms or changes in insurance carriers prior to the expiration dates on the forms already on file with the Department.

17. **Duration of Coverage**. 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 defined by Article 1.08.14.

18. **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."

CONNECTICUT
SUPPLEMENTAL SPECIFICATION
SECTION 1.05
CONTROL OF THE WORK

Article 1.05.08–Vacant:

Replace 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."

Article 1.05.12–Payrolls:

Replace the first paragraph with the following:

"For each week of the Project from the first week during which an employee of the Contractor does Project work to which prevailing wage requirements apply, until the last week on which such an employee does such work, the Contractor shall furnish to the Engineer certified copies of payrolls showing (a) the names of the employees who worked on the Project and whose work is subject to prevailing wage requirements, (b) the specific days and hours and numbers of hours that each such employee worked on the Project, and (c) the amount of money paid to each such employee for Project work. Each such payroll shall include the statement(s) of compliance with prevailing wage laws required by the State of Connecticut and, if applicable, by the Federal government. Said payrolls must contain all information required by Connecticut General Statutes Section 31-53 (as it may be revised). For contracts subject to Federal prevailing wage requirements, each payroll shall also contain the information required by the Davis Bacon and Related Acts (DBR). All of the payroll requirements in this Article shall also apply to the work of any subcontractor or other party that performs work on the Project site, and the Contractor shall be responsible for ensuring that each such party meets said requirements."

Article 1.05.15–Markings for Underground Facilities:

Replace the beginning of the first sentence with the following:

"In conformance with Sections 16-345 through 16-359 of the Regulations of the PURA state statutes, the Contractor is responsible for notifying 'Call Before You Dig' ..."

After **Article 1.05.16–Dimensions and Measurements**, *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 1.07
LEGAL RELATIONS AND RESPONSIBILITIES

Article 1.07.05 – Load Restrictions

Delete the entire article and replace with the following:

"**Article 1.07.05 – Load Restrictions**

(a) Vehicle Weights: This subarticle will apply to travel both on existing pavements and pavements under construction. The Contractor shall comply with all legal load restrictions as to vehicle size, the gross weight of vehicles, and the axle weight of vehicles while hauling materials. Throughout the duration of the contract, the Contractor shall take precautions to ensure existing and newly installed roadway structures and appurtenances are not damaged by construction vehicles or operations.

Unless otherwise noted in contract specifications or plans, on and off road equipment of the Contractor, either loaded or unloaded, will not be allowed to travel across any bridge or on any highway when such a vehicle exceeds the statutory limit or posted limit of such bridge or highway. Should such movement of equipment become necessary the Contractor shall apply for a permit from the Department for such travel, as provided in the Connecticut General Statutes (CGS). The movement of any such vehicles within the project limits or detour routes shall be submitted to the Engineer for project record. Such permit or submittal will not excuse the Contractor from liability for damage to the highway caused by its equipment.

The Contractor is subject to fines, assessments and other penalties that may be levied as a result of violations by its employees or agents of the legal restrictions as to vehicle size and weight.

(b) Storage of Construction Materials/Equipment on Structures: Storage is determined to be non-operating equipment or material. The Contractor shall not exceed the statutory limit or posted limit for either an existing or new structure when storing materials and/or construction equipment. When a structure is not posted, then the maximum weight of equipment or materials stored in each 12 foot wide travel lane of any given span shall be limited to 750 pounds per linear foot combined with a 20,000 pound concentrated load located anywhere within the subject lane. If anticipated storage of equipment or material exceeds the above provision, then the Contractor shall submit his proposal of storage supported by calculations stamped by a Professional Engineer registered in the State of Connecticut, the the Engineer for approval 14 days prior to the storage operation. Operations related to structural steel demolition or erection shall follow the guidelines under Section 6.03. All other submittals shall include a detailed description of the material/equipment to be stored, the quantity of storage if it is stockpiled materials, the storage location, gross weight with supporting calculations if applicable, anticipated duration of storage and any environmental safety, or traffic protection that may be required. Storage location on the structure shall be clearly defined in the field. If structures are in a state of staged construction or demolition, additional structural analysis may be required prior to authorization of storage."

Article 1.07.18 – Use of State Property

After Subarticle **(h)** *add the following sentence:*

"Gore areas are not available for disposal of surplus material."

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 paragraphs:

" 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.

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. Withholding retainage by the Contractor, subcontractor or lower tier subcontractors is not allowed.

Payment for work that has been performed by a subcontractor does not eliminate the Contractor's responsibilities for all the work as defined in Article 1.07.12, "Contractor's Responsibility for Work."

Payment for work that has been performed by a subcontractor also 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 or defective work responsibilities may result in administrative action on future Department contracts.

For any dispute regarding prompt payment, 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 nonresponsible as a bidder for a Department contract."

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."

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

Replace the only paragraph with the following:

" 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 completed."

CONNECTICUT
SUPPLEMENTAL SPECIFICATION
SECTION 1.09
MEASUREMENT AND PAYMENT

Article 1.09.04 – Extra and Cost-Plus Work

Delete existing subarticle (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 letter designation (g) *for subarticle* **Miscellaneous** *back to original* "**(f)**".

Delete entire subarticle "**(f) Bonding Costs:**" *that was added in the July 2008 Supplemental Specifications.*

Article 1.09.06 – Partial Payments:

In the first paragraph under **A. Monthly and Semi-monthly Estimates:**, *delete the second, third and fourth sentences and replace the remainder of subarticle (1) with the following:*

"Retainage will not be held.

Exceptions may be made as follows:

(a) When not in conflict with the interests of the State, the Contractor may request, and the Engineer may make, semi-monthly estimates for payment.
(b) If, in the judgment of the Assistant District Engineer, the Project is not proceeding in accordance with the Contract the Engineer may decline to make a payment estimate.
(c) If the total value of the Project work complete since the last estimate amounts to less than $2,500 the Engineer also may decline to make a payment estimate."

Replace the first paragraph of subarticle **B. Payment for Stored Materials:** *with the following:*

"**B. Payment for Stored Materials:** Non-perishable materials that are required for Project construction and that the Contractor has produced or purchased specifically for incorporation into the Project, but which have not yet been so incorporated, may be

included in a payment estimate if

(i) the materials meet all applicable Contract specifications,

(ii) the materials have been delivered to the Project site or to another location approved by the Engineer, and

(iii) the Contractor has submitted to the Engineer, as evidence of the Contractor's purchase of the materials, either a copy of a receipted bill for same or a Certificate of Title to the materials, in the form approved by the Department, duly-executed by the Contractor and Vendor.

The Engineer will decide at what fair and appropriate fraction of the applicable Contract price such materials may be included in a payment estimate."

Article 1.09.07 – Final Payment:

Replace the entire article with the following:

"**1.09.07 – Final Payment:** When the Commissioner has accepted the Project in accordance with Article 1.08.14, the Engineer will prepare a final payment estimate."

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:

SECTION 1.11
CLAIMS

1.11.01 – General
1.11.02 – Notice of Claim
1.11.03 – Record Keeping
1.11.04 – Claim Compensation
1.11.05 – Required Claim Documentation
1.11.06 – Auditing of Claims

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 2009 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

2.02.01 – Description:

In the first sentence, insert ", swales" *between* "channels" *and* "and other miscellaneous construction to the ..."

2.02.04 – Method of Measurement:

In the 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

2.05.01--Description:

In 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.

In 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

In 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 2.12
SUBBASE

2.12.02 – Materials:

Delete the second sentence:

"Grading 'B' shall be used."

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:

Change the beginning of the first sentence as follows:

"The composition of the concrete shall be in accordance with the requirements of Section M.03 - Portland Cement Concrete, as well as the applicable ..."

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."

Article 4.01.03-E. Hauling Units:
1. Truck mixers and truck agitators:

Change the end of the only sentence as follows:

"... the requirements of Subarticle 6.01.03-3, 'Transportation and Delivery of Concrete.'"

Article 4.01.03-F. Placing Concrete:

6. Joints:
(e) Load Transfer Devices:

Change the only sentence as follows:

"Load transfer devices shall conform to the requirements of Article M.03.08."

7. Curing:

(a) Liquid Membrane-Forming Cure:

Change the first sentence as follows:

"The liquid curing compound shall conform to Subarticle M.03.04-3."

(b) Moist Curing:

Change the end of the first sentence as follows:

"... moist mats of the size and quality specified in Subarticle M.03.04-2."

(c) Cover Sheet Curing:

Change the end of the first sentence as follows:

"... paper or polyethylene cover sheets conforming to Subarticle M.03.04-4."

CONNECTICUT
SUPPLEMENTAL SPECIFICATION
SECTION 5.14
PRESTRESSED CONCRETE MEMBERS

Article 5.14.03 – Construction Methods:

2. Prestressing:

Change the outline level of "**Final Stressing of Straight Strands:**" *and* "**Final Stressing of Draped Strands:**" *and their subsections as follows:*

" **A. Final Stressing of Straight Strands:**
- **(1) Single-strand tensioning:**
- **(2) Multiple-strand tensioning:**

B. Final Stressing of Draped Strands:
- **(1) Partial stressing and subsequent strains:**
- **(2) Final stressing in draped position:**"

5. Finishing: Deck Units:

Change the first sentence as follows:

"Deck units in structures that will have a bituminous concrete wearing surface shall be given a float finish on the top surface as specified in Subarticle 6.01.03-10."

9. Joining Deck Units:

Change the end of the last sentence of the first paragraph as follows:

"... shall be filled with non-shrink grout conforming to the requirements of Article M.03.05."

12. Inspection:

Change the beginning of the first sentence as follows:

"The provisions of Subarticle 6.03.03-3 (Shop Fabrication), (a) Notification shall apply to the steel items, ..."

16: Methods and Equipment:

Change the last sentence as follows:

"The results of this investigation, including computations, shall be submitted to the Engineer."

CONNECTICUT
SUPPLEMENTAL SPECIFICATION
SECTION 6.01
CONCRETE FOR STRUCTURES

Delete the entire Section and replace it with the following:

SECTION 6.01
CONCRETE FOR STRUCTURES

6.01.01—Description
6.01.02—Materials
6.01.03—Construction Methods
6.01.04—Method of Measurement
6.01.05—Basis of Payment

6.01.01—Description: This item shall include concrete for use in bridges and culverts, walls, catch basins, drop inlets and other incidental construction as required. The concrete shall be composed of Portland cement, pozzolans, fine and coarse aggregate, admixtures and water, prepared and constructed in accordance with these specifications, at the locations and of the form dimensions and class shown on the plans, or as directed by the Engineer.

The use of concrete from dry batch or central mixed plants is permitted for all concrete mixtures.

6.01.02—Materials: The materials for this work shall conform to the requirements of Section M.03.

6.01.03—Construction Methods:

1. Falsework and Forms: Falsework is considered to be any temporary structure which supports structural elements of concrete, steel, masonry or other material during the construction or erection. Forms are considered to be the enclosures or panels which contain the fluid concrete and withstand the forces due to its placement and consolidation. Forms may in turn be supported on falsework.

This work shall consist of the construction and removal of falsework and forms that are designed by the Contractor in the execution of the work, and whose failure to perform properly could adversely affect the character of the Contract work or endanger the safety of adjacent facilities, property, or the public. Falsework and forms shall be mortar tight and of sufficient rigidity and strength to safely support all loads imposed and to produce in the finished structure the lines and grades indicated in the Contract documents. Forms shall also impart the required surface texture and rustication and shall not detract from the uniformity of color of the formed surfaces. Forms shall be of wood, steel or other material approved by the Engineer.

(a) **Design:** The design of falsework and formwork shall conform to the *AASHTO Guide Design Specifications for Bridge Temporary Works,* or to other established and generally accepted design codes such as ACI Standard *ACI 347 Recommended Practice for Concrete Formwork* or specific form or falsework manufacturer specifications. When other than new or undamaged materials are used, appropriate reductions in allowable stresses, and decreases in resistance factors or imposed loads shall be used for design.

(b) **Loads:** The design of the falsework and forms shall be based on load factors specified in the *AASHTO LRFD Bridge Design Specifications* and all applicable load combinations shall be investigated. The design load for falsework shall consist of the sum of appropriate dead and live vertical loads and any horizontal loads.

As a minimum, dead loads shall include the weight (mass) of the falsework and all construction material to be supported. The combined unit weight (density) of concrete, reinforcing and pre-stressing steel and forms that is supported shall be assumed to be not less than:

1. Normal-weight (normal-density) concrete: 0.16 kip/ft3 (2560 kg/m3)
2. Lightweight (low-density) concrete: 0.13 kip/ft3 (2080 kg/m3)

Live loads shall consist of the actual weight (mass) of any equipment to be supported, applied as concentrated loads at the points of contact and a uniform load of not less than 0.02 kip/ft^2 (0.001 MPa) applied over the area supported, plus 0.075 kip/ft (1.10 N/mm) applied at the outside edge of deck overhangs.

The horizontal load used for the design of the falsework bracing system shall be the sum of the horizontal loads due to equipment; construction sequence including unbalanced hydrostatic forces from fluid concrete and traffic control devices; stream flow, when applicable; and an allowance for wind. However, in no case shall the horizontal load to be resisted in any direction be less than two percent (2%) of the total dead load.

For post-tensioned structures, the falsework shall also be designed to support any increase in or redistribution of loads caused by tensioning of the structure. Loads imposed by falsework onto existing, new, or partially completed structures shall not exceed those permitted in 6.01.03-12, "Application of Loads."

(c) **Working Drawings:** The working drawings for falsework and formwork shall be prepared in accordance with Article 1.05.02 whenever the falsework or formwork exceeds 14.0 feet (4300 mm) in height or whenever vehicular, marine, or pedestrian traffic may travel under or adjacent to the falsework or formwork. Working drawings shall include the sequence, method and rate of placement of the concrete.

Manufacturer catalog cuts or written installation procedures shall be provided for any clips, braces, hangers or other manufactured parts used with the formwork or falsework.

(d) **Construction:** Forms and falsework shall be built true to lines and grades, shall be strong, stable, firm, mortar-tight and adequately braced or tied, or both. They shall be designed and constructed to withstand all loads and pressures including those imposed by plastic concrete, taking full account of the stresses due to the rate of placement, effect of vibration and conditions brought about by construction methods. Forms and falsework shall be constructed to compensate for variations in camber of supporting members and allow for deflections.

Falsework and formwork shall be chamfered at all sharp corners, unless otherwise ordered or permitted, and shall be given a slight bevel or draft in the case of projections to ensure satisfactory removal. Materials for falsework and formwork and their supports, ties and bracing, shall be of the type, quality and strength to achieve the structural requirements. Form material in contact with concrete shall provide the finished concrete surface smoothness as specified in 6.01.03-10, "Finishing Concrete Surfaces," and have a uniform appearance.

Falsework and formwork shall be treated with form oil or other release agent approved by the Engineer before the reinforcing steel is placed, or self-releasing forms approved by the Engineer may be used. Release agents which will adhere to or discolor the concrete shall not be used.

Falsework and formwork for concrete surfaces exposed to view shall produce a smooth surface of uniform texture, free of voids, indentations, protrusions and bulges. Panels lining falsework and formwork shall be arranged so that the joint lines form a symmetrical pattern conforming to the general lines of the structure. The same type of form-lining material shall be used throughout each element of a structure. Falsework and formwork shall be sufficiently rigid so that the undulation of the concrete surface shall not exceed 1/4 inch (6 mm) when checked with a 4 foot (1200 mm) straightedge or template.

For non-exposed surfaces the falsework and formwork shall be sufficiently rigid so that the undulation of the concrete surface shall not exceed 1/2 inch (13 mm) when checked with a 4 foot (1200 mm) straightedge or template.

Metal ties and anchors to hold the falsework and formwork in alignment and location shall be so constructed that the metal work can be removed to a depth of at least 2 inches (50 mm) from the concrete surface without damage to the concrete. All cavities resulting from the removal of metal ties shall be filled after removal of forms with cement mortar of the same proportions used in the body of the work or other materials approved by the Engineer, and the surface finished smooth and even, and if exposed in the finished work, shall conform to the texture and color of adjacent surfaces. With permission of the Engineer, the Contractor need not remove from the underneath side of bridge decks portions of metal devices used to support reinforcing steel providing such devices are of material, or are adequately coated with material, that will not rust or corrode. When coated reinforcing steel is required, all metal ties, anchorages, or spreaders that remain in the concrete shall be of corrosion-resistant material or coated with a dielectric material.

Forms shall be clean and clear of all debris. For narrow walls and columns where the bottom of the form is inaccessible, an access opening will be allowed in the form and falsework for cleaning out extraneous material.

(e) **Date of Completion:** The year in which the superstructure is completed in its entirety shall be cast in at least two (2) places as shown on the plans unless otherwise ordered by the Engineer. The date shall be placed in diagonally opposite ends of the bridge parapets or as designated by the Engineer. The reverse molds for the date shall be furnished by the Contractor.

(f) **Bridge Decks:** After erection of beams and prior to placing falsework and forms, the Contractor shall take elevations along the top of the beam at the points shown on the plans or as directed by the Engineer. The Contractor shall calculate the haunch depths and provide them to the Engineer a minimum of seven (7) days prior to installing the falsework and forms. The Contractor shall also provide calculations for the setting of the overhang brackets based on the final beam deflection. These calculations shall be based on the final proposed deck grade and parapet elevations.

Falsework or formwork for deck forms on girder bridges shall be supported directly on the girders so that there will be no appreciable differential settlement during placing of the concrete. Girders shall be either braced and tied to resist any forces that would cause rotation or torsion in the girders caused by the placing of concrete for diaphragms or decks, or shown to be adequate for those effects. Unless specifically permitted, welding of falsework support brackets or braces to structural steel members or reinforcing steel shall not be allowed.

(g) **Stay-In-Place Metal Forms for Bridge Decks:** These forms may be used if shown in the Contract or approved by the Engineer. Prior to the use of such forms and before fabricating any material, the Contractor shall submit working drawings to the Engineer for review in accordance with Article 1.05.02, Working Drawings. These drawings shall include the proposed method of form construction, erection plans including placement plans, attachment details, weld procedure(s), material lists, material designation, gage of all materials, and the details of corrugation. Also, copies of the form design computations shall be submitted with the working drawings. Any changes necessary to accommodate stay-in-place forms, if approved, shall be at no cost to the Department.

The metal forms shall be designed on the basis of the dead load of the form, reinforcement and the plastic concrete, including the additional weight (mass) of concrete [considered to be equivalent to the weight (mass) imposed by an additional concrete thickness equal to three percent (3%) of the proposed deck thickness, but not to exceed 0.3 inches (8 mm)] 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 megapascals). The span for design and deflection shall be the clear distance between edges of the beams or girders less 2 inches (50 mm) and shall be measured parallel to the form flutes. The maximum deflection under the weight (mass) of plastic concrete, reinforcement, and forms shall not exceed 1/180 of the form span or 0.5 inches (13 mm), whichever is less. In no case shall the loading

used to estimate this deflection be less than 120 pounds per square foot (586 kilograms per square meter). The permissible form camber shall be based on the actual dead load condition. Camber shall not be used to compensate for deflection in excess of the foregoing limits. The form support angles shall be designed as a cantilever with horizontal leg not more than 3 inches (75 mm).

No stay-in-place metal forms shall be placed over or be directly supported by the top flanges of beams or girders. The form supporting steel angles may be supported by or attached to the top flanges.

Stay-in-place metal forms shall not be used in bays where longitudinal slab construction joints are located, under cantilevered slabs such as the overhang outside of fascia members, and bridges over a salt-laden body of water with a clearance of less than 15 feet (4.5 m) above mean high water level.

Welding to the top flanges of steel beams and girders is not permitted in the areas where the top flanges are in tension, or as indicated on the plans. Alternate installation procedures shall be submitted addressing this condition.

Drilling of holes in pre-stressed concrete beams or the use of power-actuated tools on the pre-stressed concrete beams for fastening of the form supports to the pre-stressed concrete beams will not be permitted. Welding of the reinforcing steel to the pre-stressed units is not permitted.

All edges of openings cut for drains, pipes, and similar appurtenances shall be independently supported around the entire periphery of the opening.

All fabricated stay-in-place metal forms shall be unloaded, stored at the Project site at least 4 inches (100 mm) above the ground on platforms, skids or other suitable supports and shall be protected against corrosion and damage and handled in such a manner as to preclude damage to the forms. Damaged material shall be replaced at no additional cost to the State.

Any exposed form or form support metal where the galvanized coating has been damaged, shall be thoroughly cleaned, wire brushed, then coated with two (2) coats of Zinc Dust – Zinc Oxide primer, FS No. TT-P-641d, Type II or another product acceptable to the Engineer.

The forms shall be installed from the topside in accordance with the manufacturer's recommended installation procedures. The form supports shall ensure that the forms retain their correct dimensions and positions during use at all times. Form supports shall provide vertical adjustment to maintain design slab thickness at the crest of corrugation, to compensate for variations in camber of beams and girders and to allow for deflections. Stay-in-place metal forms shall have a minimum depth of the form valley equal to 2 inches (50 mm). The forms shall have closed tapered ends. Lightweight filler material shall be used in the form valleys.

All field cutting shall be done with a steel cutting saw or shears including the cutting of supports, closures and cutouts Flame cutting of forms is not permitted.

All welding shall be performed by Department certified welders in accordance with the "Welding" Subarticle in Section 6.03. Welding of forms to supports is not permitted.

The steel form supports shall be placed in direct contact with the flange of stringer or floor beam flanges and attached by bolts, clips, welding where permitted, or other approved means. Form sheets shall not be permitted to rest directly on the top of the stringer or floor beam flanges. The forms shall be securely fastened to form supports with self-drilling fasteners and shall have a minimum bearing length of 1 inch (25 mm) at each end. In the areas where the form sheets lap, the form sheets shall be securely fastened to one another by fasteners at a maximum spacing of 18 inches (450 mm). The ends of the form sheets shall be securely attached to the support angles with fasteners at a maximum spacing of 18 inches (450 mm), or two (2) corrugation widths, whichever is less.

The depth of the concrete slab shall be as shown on the plans and the corrugated forms shall be placed so that the top of the corrugation will coincide with the bottom of the deck slab. No part of the forms or their supports shall protrude into the slab. All reinforcement in the bottom reinforcement mat shall have a minimum concrete cover of 1 inch (25 mm) unless noted otherwise on the plans.

The completed stay-in-place metal form system shall be sufficiently tight to prevent leakage of mortar. Where forms or their installation are unsatisfactory in the opinion of the Engineer, either before or during placement of the concrete, the Contractor shall correct the defects before proceeding with the work.

(h) **Construction Joints:** Construction joints other than those shown on the plans will not be permitted without prior approval of the Engineer. In joining fresh concrete to concrete that has already set, the work already in place shall have all loose and foreign material removed, and the surface roughened and thoroughly drenched with water.

All reinforcing steel shall extend continuously through joints. Where unplanned construction joints may be needed, they shall be constructed as directed by the Engineer.

(i) **Expansion and Contraction Joints:** Expansion and contraction joints shall be constructed at the locations and in accordance with the details specified in the Contract documents. The forming of joint openings shall be dimensioned in accordance with the joint manufacturer's design requirements. Joints include open joints, filled joints, joints sealed with sealants, joints reinforced with steel armor plates or shapes, paraffin coated joints, and joints with combinations of these features.

For mechanical joint systems, the concrete shall be placed in such a manner that does not interfere with the movement of the joint.

Open joints shall be placed at locations designated on the plans and shall be formed by the insertion and subsequent removal of templates of wood, metal or other suitable material. The templates shall be so constructed that their removal may be readily accomplished without damage to the work.

Filled joints shall be made with joint filler, the materials for which shall conform to the requirements of the plans and of these specifications.

(j) **Pipes, Conduits and Utility Installations:** The Contractor shall coordinate the installation of pipes, conduits and utilities as shown on the plans and in conformance with the Contract documents or as directed by the Engineer. The openings accommodating such pipe, conduit and utility installations shall be incorporated into the formwork by the Contractor.

(k) **Anchorages:** Anchor bolts and systems shall be set to the requirements of the plans and Contract documents. Anchor bolts and systems shall be clean and free of dirt, moisture or other foreign materials at the time of installation. The anchor bolts and systems shall be installed prior to placing concrete.

With the Engineer's approval, the Contractor may install anchorages after placement and setting of the concrete or in formed holes. The anchorages shall be installed into drilled or formed holes having a diameter and a depth suitable to receive the bolts in accordance with the grout manufacturer's requirements. Such holes shall be located to avoid damage to the existing reinforcement. All holes shall be perpendicular to the plane surface. The Contractor shall take every precaution necessary to prevent damage to the concrete due to freezing of water or grout in anchor bolt holes.

(l) **Ornament or Reverse Moulds:** Ornamental work, when so noted on the plans, shall be formed by the use of reverse moulds. These moulds shall be produced by a qualified manufacturer approved by the Engineer. They shall be built in accordance with the general dimensions and appearance shown on the plans. The Contractor shall submit all detailed drawings, models, or carvings for review by the Engineer before the moulds are made.

The Contractor shall be responsible for their condition at all times, and shall be required to remove and replace any damaged or defective moulds at no additional cost to the State.

The surfaces of the moulds shall be given a coating of form release agent to prevent the adherence of concrete. Any material which will adhere to or discolor the concrete shall not be used.

Form Liners, if required, shall be installed per the Contract Special Provisions.

(m) **Removal of Falsework and Forms:** The Contractor shall consider the location and character of the structure, the weather, the materials used in the mix, and other conditions influencing the early strength of the concrete when removing forms and falsework. Methods of removal likely to cause damage to the concrete surface shall not be used.

Supports shall be removed in such a manner as to permit the structure to uniformly and gradually take the stresses due to its own weight. For structures of two (2) or more spans, the sequence of falsework release shall be as specified in the Contract documents or as approved by the Engineer.

Removal shall be controlled by field-cured cylinder tests. The removal shall not begin until the concrete has achieved seventy-five percent (75%) of the design compressive strength. To facilitate finishing, side forms carrying no load may be removed after twenty-four (24) hours with the permission of the Engineer, but the curing process must be continued for seven (7) days.

When the results of field-cured cylinder tests are unavailable, the following periods, exclusive of days when the temperature drops below 40°F (5°C), may govern the removal of forms:

Form Removal Requirements	
Structure Element	Minimum Time Period
Arch Centers, centering under beams, pier caps, and unsupported elements	14 days
Slabs on grade, Abutments and Walls	24 hours
Columns	2 days
Bridge Decks	28 days

The Contractor may submit alternate methods to determine the in-place strength of the concrete for removal of forms and falsework, for review and approval by the Engineer.

2. Protection from Environmental Conditions: The concrete shall be protected from damage due to weather or other environmental conditions during placing and curing periods. In-place concrete that has been damaged by weather conditions shall be either repaired to an acceptable condition or removed and replaced as determined by the Engineer.

(a) Rain Protection: The placement of concrete shall not commence or continue unless adequate protection satisfactory to the Engineer is provided by the Contractor.

(b) Hot Weather Protection: When the ambient air temperature is above 90°F (32°C), the forms, which will come in contact with the mix shall be cooled to below 90°F (32°C) for a minimum of one (1) hour prior to and one (1) hour after completion of the concrete placement by means of a water spray or other methods satisfactory to the Engineer.

(c) Cold Weather Protection: When there is a probability of ambient air temperature below 40°F (5°C) during placement and curing, a Cold-Weather Concreting Plan shall be submitted to the Engineer for review and comment. The Plan shall detail the methods and equipment, including temperature measuring devices, that will be used to ensure that the required concrete and air temperatures are maintained.

1. Placement: The forms, reinforcing steel, steel beam flanges, and other surfaces which will come in contact with the mix shall be heated to a minimum of 40°F (5°C), by methods satisfactory to the Engineer, for a minimum of one (1) hour prior to, and maintained throughout, concrete placement.

2. Curing: For the first six (6) days, considered the initial cure period, the concrete shall be maintained at a temperature of not less than 45°F (7°C) and the air temperature surrounding the structure shall be maintained at a temperature of not less than 60°F (16°C). When the concrete mix includes pozzolans or slag, the initial cure period shall be increased to ten (10) days. After the initial cure period, the air surrounding the structure shall be maintained above 40° F (5°C) for an additional eight (8) days. If external heating is employed, the heat shall be applied and withdrawn gradually and uniformly so that no part of the concrete surface is heated to more than 90°F (32°C) or caused to change temperature by more than 20°F (11°C) in eight (8) hours. The Engineer may reduce or increase the amount of time that the structure must be protected or heated based on an indication of in-place concrete strength acceptable to the Engineer.

(d) **Additional Requirements for Bridge Decks:** Prior to the application of curing materials, all the concrete placed on bridge decks shall be protected from damage due to rapid evaporation by methods acceptable to the Engineer. During periods of low humidity (less than 60% relative humidity), sustained winds of 25 mph (40 kph) or more, or ambient air temperatures greater than 80°F (25°C) the Contractor shall provide written details of additional measures to be taken during placement and curing.

Protection may include increasing the humidity of the surrounding air with fog sprayers and employing wind-breaks or sun-shades. Additional actions may include reduction of the temperature of the concrete prior to placement, scheduling placement during cooler times of days or nights, or a combination of these actions.

(e) **Concrete Exposed to Salt Water:** No Construction joints shall be formed between the levels of extreme low water and extreme high water or the upper limit of wave action as determined by the Engineer.

3. Transportation and Delivery of Concrete: All material delivered to the Project shall be supplied by a producer qualified in accordance with Section M.03. The producer shall have sufficient plant capacity and trucks to ensure continuous delivery at the rate required to prevent the formation of cold joints.

(a) **Material Documentation:** All vendors producing concrete must have their weigh scales and mixing plant automated to provide a detailed ticket. Delivery tickets must include the following information:

1. State of Connecticut printed on ticket
2. Name of producer, identification of plant
3. Date and time of day
4. Type of material
5. Cubic yards (cubic meters) of material loaded into truck
6. Project number, purchase order number, name of Contractor (if Contractor other than producer)
7. Truck number for specific identification of truck
8. Individual aggregate, cement, water weights (masses) and any admixtures shall be printed on plant tickets
9. Water/cement ratio, and
10. Additional water allowance in gallons (liters) based on water/cement ratio for mix

A State inspector may be present to monitor batching and weighing operations.

The Contractor shall notify the Engineer immediately if, during the production day, there is a malfunction of the recording system in the automated plant or weigh scales.

Manually written tickets containing all required information may be allowed for up to one (1) hour after malfunction provided they are signed by an authorized representative of the producer.

(b) **Transportation of Mixture:** Trucks delivering concrete shall be qualified in accordance with Section M.03.

If the concrete mix arrives at the Project with a slump lower than allowed by specification, water may be considered as a means to temper concrete to bring the slump back to within specification. This tempering may only be done prior to discharge with the permission of the Engineer. The quantity of water in gallons (liters) added to the concrete cannot exceed the allowance shown on the delivery ticket.

The concrete shall be completely discharged into the forms within one and one-half (1-1/2) hours from the batch time stamped on the delivery ticket. This time may be extended if the measured temperature of the concrete is below 90°F (32°C). This time may also be reduced if the temperature of the concrete is over 90°F (32°C).

Rejected concrete shall be disposed of by the Contractor at no cost to the State.

The addition of chemical admixtures or air entrainment admixtures at the Project site, to increase the workability or to alter the time of set, will only be permitted if prior approval has been granted by the Engineer. The addition of air entrainment admixtures at the Project site will only be permitted by the producer's quality control staff. The Contractor is responsible for follow-up quality control testing to verify compliance with the Specifications.

4. Acceptance Testing and Test Specimens: The Contractor shall furnish the facilities and concrete required for sampling, transport to the testing location in the field, performing field testing and for casting sample cylinders for compressive-strength determinations. The Department will furnish personnel for sampling and casting Acceptance specimens and the number of specimens required will be determined by the Engineer. The equipment for the Department's testing is provided for elsewhere in the Contract.

(a) **Temperature, Air Content and Slump**: Field testing in accordance with AASHTO T-23, "Making and Curing Concrete Test Specimens in the Field" will be performed at the point of placement and at a frequency determined by the Engineer.

English Units

Standard Mix Class	Air Content	Slump	Concrete Temperature
A (3300 psi)	6.0 +/- 1.5%	4" +/- 1"	60°-90°F
C (3300 psi)			
F (4400 psi)			
Modified Standards[1]	6.0 +/- 1.5% [2]	4" +/- 1" [2]	
Special Provision Mix[3]	As specified	As specified	

[1] Modifications to Standard Mixes, including mixes placed by pumping, shall be reviewed by the Engineer prior to use. These include but are not limited to the use of chemical admixtures such as high range water reducing (HRWR) admixtures and the use of coarse aggregate sizes for that class not specified in M.03.

[2] If the only modification is the addition of HRWR, the maximum allowable slump shall be 7 inches.

[3] All concrete mixes with a mix design strength not shown in the table must be approved by the Engineer on a case-by-case basis. Limits on the plastic properties and strength requirements of these mixes are listed in the Specifications.

Metric Units

Standard Mix Class	Air Content	Slump	Concrete Temperature
A (23MPa)	6.0 +/- 1.5%	100 mm +/- 25mm	15.5°-32°C
C (23 MPa)			
F (30 MPa)			
Modified Standards[1]	6.0 +/- 1.5% [2]	100mm +/- 25mm [2]	
Special Provision Mix[3]	As specified	As specified	

[1] Modifications to Standard Mixes, including mixes placed by pumping, shall be reviewed by the Engineer prior to use. These include but are not limited to the use of chemical admixtures such as high range water reducing (HRWR) admixtures and the use of coarse aggregate sizes for that class not specified in M.03.

[2] If the only modification is the addition of HRWR, the maximum allowable slump shall be 175 mm.

[3] All concrete mixes with a mix design strength not shown in the table must be approved by the Engineer on a case-by-case basis. Limits on the plastic properties and strength requirements of these mixes are listed in the Specifications.

(b) **Acceptance Testing and Compressive Strength Specimens:** Concrete samples are to be taken at the point of placement into the forms or molds. Representatives of the Engineer will sample the mix.

The Contractor shall provide and maintain facilities on the Project site, acceptable to the Engineer, for sampling, transporting the initial sample, casting, safe storage and initial curing of the concrete test specimens as required by AASHTO T-23. This shall include but not be limited to a sampling receptacle, a means of transport of the initial concrete sample from the location of the concrete placement to the testing location, a level and

protected area of adequate size to perform testing, and a specimen storage container capable of maintaining the temperature and moisture requirements for initial curing of Acceptance specimens. The distance from the location of concrete placement to the location of testing and initial curing shall be 100 feet (30 m) or less, unless otherwise approved by the Engineer.

The specimen storage container described in this section is in addition to the concrete cylinder curing box provided for elsewhere in the Contract documents.

After initial curing, the test specimens will be transported by Department personnel and stored in the concrete cylinder curing box until they can be transported to the Division of Materials Testing for strength evaluation.

(c) **Sampling Procedure for Pumping**: It is the responsibility of the Contractor to provide concrete that meets required specifications at the point of placement.

Samples of concrete shall be taken at the discharge end of the pump at the point of placement with the exception of underwater concrete. The Contractor may submit an alternate location to provide a sample from the discharge end of the pump with verification showing that the characteristics of the mix will not be altered from that which would have been attained at the point of placement. The Engineer will review the documentation and other extenuating circumstances when evaluating the request.

In the case of underwater concrete the Contractor shall submit the proposed sampling location with the submittals required in 6.01.03-6(f).

(d) **Additional field testing:** Additional field testing such as density and yield measurements may be required at the time of placement as determined by the Engineer.

5. Progression Cylinders and Compressive Strength Specimens: Progression Cylinders outlined in this section are field cured compressive strength specimens taken for information related to when a structure or segment of a structure can be loaded or put into service, adequacy of curing and protection of concrete in the structure, or when formwork or shoring may be removed from the structure. The information produced from strength results of Progression Cylinders will not be considered for acceptance of the concrete.

The personnel, equipment, and molds for sampling, casting, curing and testing of Progression Cylinders shall be furnished by the Contractor at no expense to the Department.

Sampling, casting, and field curing of the specimens shall be performed in accordance with AASHTO T23 by an ACI Concrete Field Testing Technician Grade 1 or higher and will be witnessed by a representative of the Department.

The sample shall be taken at the point of placement into the forms or molds from one (1) or more of the same truck loads that an Acceptance sample is taken from.

A minimum of two (2) cylinder results will be used to determine in-place strength.

Compression testing shall be performed in accordance with AASHTO T-22 by personnel approved by the Engineer.

A Certified Test Report in accordance with Article 1.06.07 shall be provided to the Engineer reporting the Progression Cylinder test results. A copy of the results of the compressive strength testing shall be provided to the Engineer at least twenty-four (24) hours prior to any Project activity that the results may control.

6. Handling and Placing Concrete: Concrete shall be handled, placed, and consolidated by methods acceptable to the Engineer that will not segregate the mix and shall result in a dense homogeneous concrete. The methods used shall not cause displacement of reinforcing steel or other materials to be embedded in the concrete. Concrete shall not be placed until the forms and all materials have been inspected by the Engineer. All mortar from previous placements, debris, and foreign material shall be removed from the forms and steel prior to commencing placement. The forms and subgrade shall be thoroughly moistened with water immediately before concrete is placed. All water that has ponded within the forms shall also be removed. Temporary form spreader devices shall not be left in place.

All laitance or unsound material shall be removed before placing substructure concrete onto the surface of any concrete placed underwater.

Placement of concrete for each section of the structure shall be performed continuously between construction or expansion joints as shown on the plans. The delivery rate, placing sequence and methods shall be such that fresh concrete is always placed and consolidated against previously placed concrete before initial set has occurred. The temperature of the concrete mixture during placement shall be maintained between 60°F (16°C) and 90°F (32°C). During and after placement of concrete, care shall be taken not to damage the concrete or break the bond with reinforcing steel. Platforms for workers and equipment shall not be supported directly on any reinforcing steel. Forces that may damage the concrete shall not be applied to the forms or reinforcing steel.

(a) Sequence of Placement: The sequence of placement shall be in accordance with the Contract documents or as permitted by the Engineer.

Concrete for integral horizontal members, such as caps, slabs, or footings shall not be placed until the concrete for the columns, substructure, culvert walls and similar vertical members has achieved sufficient strength as stated in 6.01.03-1(m).

The concrete in arches shall be placed in such a manner as to load the formwork uniformly and symmetrically.

The base slab or footings of cast-in-place box culverts shall reach sufficient strength before the remainder of the culvert is constructed.

(b) Placement Methods: The Contractor shall notify the Engineer at least twenty-four (24) hours in advance of intention to place concrete.

Vibrators shall not be used to shift the fresh concrete horizontally. Vibrators shall be adequate to consolidate the concrete and integrate it with the previous lift.

The rate of concrete placement must not produce loadings that exceed those considered in the design of the forms.

The use of chutes and pipes for conveying concrete into the forms must be reviewed by the Engineer. Chutes shall be clean, lined with smooth watertight material and, when steep slopes are involved, shall be equipped with baffles or reverses. When the discharge must be intermittent, a hopper or other device for regulating the discharge shall be provided.

Aluminum shall not be permanently incorporated into the concrete unless otherwise specified.

When placing operations involve dropping the concrete more than 5 feet (1500 mm), the Contractor shall take action to prevent segregation of the mix and spattering of mortar on steel and forms above the elevation of the lift being placed. This restriction shall not apply to cast-in-place pilings.

When using stay-in-place forms, concrete shall not be dropped more than 3 feet (1000 mm) above the top of the forms, and the concrete shall be discharged directly over the beams or girders.

(c) **Pumping:** The Contractor shall use equipment specifically manufactured to pump concrete mixes and that meets the needs of the specific concrete placement.

(d) **Consolidation:** Unless otherwise specified, all concrete, except concrete placed under water, shall be sufficiently consolidated by mechanical vibration immediately after placement.

The Contractor shall provide a sufficient number of commercially available mechanical immersion type vibrators to properly consolidate the concrete immediately after it is placed in the forms unless external form vibrators are used. The Contractor shall have an adequate number of operable vibrators available in case of breakdown.

External form vibrators may be used if submitted prior to concrete placement and reviewed by the Engineer.

Vibration shall not be applied directly to the reinforcement or hardened concrete. Special care shall be taken in placing and consolidating concrete around ornamental moulds, form liners and other embedded items. The vibrator shall not touch these items at any time.

(e) **Additional Requirements for Bridge Decks:** At least fifteen (15) days before the erection of the screed rails, the Contractor shall submit screed erection plans, grades and sequence of concrete placement and proposed rate of placing concrete for review by the Engineer. These plans shall include details of equipment to be

used in the placement and finishing of the concrete, including the number and type of personnel who will be engaged in placing the concrete. The screed equipment shall be a commercially available vibratory system. The use of wooden screeds is prohibited.

When setting screed rails for mechanical finishing, the Contractor shall take into consideration and make proper allowances for the deflection of the bridge superstructure due to all operations.

Screed and runway supports shall not be located on any stay-in-place metal form sheets, form supports or reinforcing steel. The Contractor shall operate the mechanical screed at least twenty-four (24) hours prior to actual placement of the concrete to verify deck survey and equipment operations to the satisfaction of the Engineer.

Concrete shall be deposited in a uniform manner across the entire width being placed, and only two (2) passes of the transverse screed will be permitted over a given deck area, unless otherwise allowed by the Engineer.

If the Contractor proposes to place concrete outside of daylight hours, an adequate lighting system must be provided.

Concrete shall be deposited in accordance with the placement sequence as noted on the plans. If no sequence is indicated, the Contractor shall provide a placement sequence to the Engineer for review. The placement sequence shall proceed in such a manner that the total deflection or settlement of supporting members, and final finishing of the surface will occur before initial set of the concrete takes place.

At construction joints, concrete shall not be placed against the previously placed concrete for at least twelve (12) hours unless otherwise allowed by the Engineer.

(f) Underwater Placement: Concrete may only be placed under water within a cofferdam unless otherwise specified in the documents or otherwise allowed by the Engineer. Placement shall begin following inspection and acceptance of the depth and character of the foundation material by the Engineer.

Underwater concrete mixes are considered non-standard designs and shall be submitted to the Engineer for approval. Typically a minimum of ten percent (10%) additional cement than comparable non-underwater mixes will be required.

Underwater concrete shall be placed continuously with the surface of the concrete kept as horizontal as practical. To ensure thorough bonding, each succeeding layer shall be placed before the preceding layer has taken initial set. For large concrete placements, more than one (1) tremie or pump shall be used to ensure compliance with this requirement.

Mass concrete placement requirements, outlined in 6.01.03-6(g), do not apply to underwater concrete.

To prevent segregation, underwater concrete shall be placed in a compact mass, in its final position, by means of a tremie, concrete pump, or other approved method and shall not be disturbed. Still water shall be maintained at the point of deposit. Cofferdams shall be vented during the placement and curing of the concrete to equalize the hydrostatic pressure and thus prevent flow of water through the concrete.

If a tremie is used, the method of depositing the concrete shall be detailed in a working drawing submitted to the Engineer for review. The tube shall have watertight couplings and shall permit the free movement of the discharge end over the area of the work.

(g) **Mass concrete placement:** Mass concrete placement shall be defined as any placement, excluding underwater concrete placement, in which the concrete being cast has dimensions of 5 feet (1500 mm) or greater in each of three (3) different directions. For placements with a circular cross-section, a mass concrete placement shall be defined as any placement that has a diameter of 6 feet (1800 mm) or greater and a height of 5 feet (1500 mm) or greater. For all mass concrete placements, the mix temperature shall not exceed 85°F (30°C) as measured at point of discharge into the forms.

Any special concrete mix design proposed by the Contractor to meet the above temperature requirements shall be submitted to the Engineer for review.

7. Finishing Plastic Concrete: Unless otherwise specified in the Contract documents, after concrete has been consolidated and prior to final curing, all surfaces of concrete that are not placed against forms shall be struck-off to the planned elevation or slope. The surface shall be finished by floating with an acceptable tool. While the concrete is still in a workable state, all construction and expansion joints shall be tooled with an edger. Joint filler shall be left exposed. For requirements on float finish, refer to 6.01.03-10, "Finishing Concrete Surfaces."

After completion of the placing and finishing operation and for at least twelve (12) hours after the concrete has set, the Contractor shall not operate any equipment in the immediate vicinity of the freshly placed concrete if, in the opinion of the Engineer, it could cause excessive vibration, movement or deflection of the forms.

The addition of water to the surface of the concrete to assist in finishing operations will not be permitted.

(a) **Bridge Decks:** After the concrete has been consolidated and brought to the proper elevation by the screed machine, it shall be finished by use of a suitable float. The Contractor shall not disturb the fresh concrete after it has been finished. All finishing work, including the application of the fog spray and placement of the curing mats, shall be performed from work bridges supported above the deck surface. A work bridge shall be made available to the Engineer for inspection of the concrete work.

Surfaces that are to be covered with a waterproofing membrane shall be finished to a smooth surface, free of mortar ridges and other projections and in accordance with the membrane manufacturer's recommendations.

Unless otherwise noted in the Contract, the concrete wearing surfaces shall be given a skid-resistant texture by dragging, brooming, tining, or by a combination of these methods These methods shall be done after floating and at such time and in such manner that the desired texture will be achieved while minimizing displacement of the larger aggregate particles.

1. Dragging: The surface shall be finished by dragging a seamless strip of damp burlap over the surface. The burlap to be dragged shall consist of sufficient layers and have sufficient length in contact with the concrete to slightly groove the surface. The burlap shall be drawn longitudinally along the surface in a slow manner so as to leave an even texture. The burlap shall be kept damp, clean, and free of particles of hardened concrete. The Contractor may propose an alternate material for the Engineer's consideration.

2. Tining: Tining shall be in a transverse direction using a wire broom, comb, or float having a single row of tines or fins. The tining grooves shall be between 1/16 inch (1.5 mm) and 3/16 inch (5 mm) wide and between 1/8 inch (3 mm) and 3/16 inch (5 mm) deep, spaced 1/2 inch (12.5 mm) to 3/4 inch (20 mm) on centers. Tining shall be discontinued 12 inches (300 mm) from the curb line on bridge decks. The area adjacent to the curbs shall be given a light broom finish longitudinally. As an alternative, tining may be achieved using a machine designed specifically for tining or grooving concrete pavements.

The transverse grooving shall be performed when the grooves can be formed to a maximum depth of 3/16 inch (5 mm) with relative ease and without the walls of the grooves closing in on each other. The tining shall be aligned so as to prevent overlapping of grooves in any two (2) successive transverse passes. The Contractor shall measure the depth of the grooves in the presence of the Engineer with an appropriate device to ensure compliance.

(b) Surface Testing and Correction: The completed surface shall be constructed in accordance with grades and cross slopes shown on the plans. The entire surface shall be checked by the Contractor in the presence of the Engineer, with an acceptable 10 foot (3 meter) straightedge.

1. The surface shall not vary more than +/- 1/8 inch (3 mm) in 10 feet (3 m) for decks which will not be covered with an overlay.

2. The surface shall not vary more than +/- 1/4 inch (6 mm) in 10 feet (3 m) for decks which will be covered with an overlay.

Variances greater than these, which, in the opinion of the Engineer, may adversely affect the riding qualities of the surface shall be corrected, and this shall be done at the expense of the Contractor. The Contractor shall submit a corrective procedure to the Engineer for review and approval. The procedure shall correct such irregularities by methods such as, but not limited to, concrete planing or grooving.

8. Bearing Surfaces: Concrete surfaces under metallic masonry plates and elastomeric bearings shall have a float finish. After the concrete has set, the area which will be in contact with the masonry plate shall be ground as necessary to provide full and even bearing. The finished surface shall not vary from a straightedge laid on the surface in any direction within the limits of the masonry plate by more than 0.0625 inches (1.5 mm). Surfaces which fail to conform shall be ground or filled until acceptable to the Engineer.

9. Curing Concrete: All newly placed concrete shall be cured so as to prevent loss of water by use of the methods specified. The Engineer may request that the Contractor furnish a curing plan.

The duration of the initial and final curing period in total shall continue uninterrupted for a minimum of seven (7) days.

(a) Curing Methods:

1. Forms-In-Place Method: Formed surfaces of concrete may be cured by retaining the forms in place without loosening. During periods of hot weather, water shall be applied to the forms until the Engineer determines that it is no longer required.

2. Water Method: Exposed concrete surfaces shall be kept continuously wet by ponding, spraying, or covering with materials that are kept continuously and thoroughly wet. Such materials may consist of cotton mats, multiple layers of burlap, or other approved materials that do not discolor or otherwise damage the concrete.

3. Waterproof Cover Method: This method shall consist of covering exposed surfaces with a waterproof sheet material to prevent moisture loss from the concrete. The concrete shall be wet at the time the cover is installed. The sheets shall be of the widest practicable width and adjacent sheets shall overlap a minimum of 6.0 inches (150 mm) to form a waterproof cover of the entire concrete surface and shall be adequately secured. Broken or damaged sheets shall be immediately repaired and the concrete shall be remoistened.

(b) Additional Requirements for Bridge Decks:

1. Curing Plan: The Contractor shall submit to the Engineer, at least fourteen (14) days prior to the placement of concrete for the bridge deck, a detailed curing plan that describes the following:

   A. the initial and final curing durations,
   B. equipment and materials to be used for curing concrete and monitoring concrete temperature, and
   C. proposed primary and secondary water and heat sources

2. Initial Curing Period: A water fog spray shall be used by the Contractor from the time of initial placement until the final curing period begins. The amount of fog spray shall be strictly controlled so that accumulations of standing or flowing water on the surface of the concrete shall not occur.

   Should atmospheric conditions render the use of fog spray impractical, the Contractor shall request approval from the Engineer to use a curing compound that meets the requirements of Section M.03 in lieu of a fog spray. The application shall be in accordance with the manufacturer's recommendation and be compatible with the membrane waterproofing.

3. Final Curing: After completion of finishing and as soon as any bleed water has dissipated and the concrete reaches sufficient strength to avoid marring, the Final curing period shall begin and the entire concrete surface shall be covered with water-retaining materials such as cotton mats, multiple layers of burlap, or other materials approved by the Engineer. Materials used shall be kept saturated by means of an acceptable sprinkler or wetting system.

   The Contractor may cover the wet water-retaining material with a suitable polyethylene film to minimize evaporation during the curing period. The use of the polyethylene film does not relieve the Contractor from maintaining saturation of the curing materials.

4. Temperature Monitoring: The internal temperature of the concrete shall be monitored with a calibrated continuous recording thermometer for a minimum of seven (7) days. The air temperature at the concrete surface or the air temperature between the concrete surface and its protective covering shall be monitored with a minimum of one (1) recording thermometer.

   The number and placement of the thermometers will be determined by the Engineer. A minimum of two (2) thermometers per concrete placement shall be provided by the Contractor.

   The following types of thermometers shall be used to monitor curing temperatures:

   A. Continuously Recording Thermometer: The thermometer shall be capable of continuously recording temperatures within a range of -4 °F to 122 °F (-20°C to 50°C) for a minimum of twenty-four (24) hours.

   B. Maximum–Minimum Recording Thermometer: For all placements, the thermometer shall be capable of recording maximum and minimum temperatures in a range of -4 °F to 122 °F (-20°C to 50°C).

10. Finishing Concrete Surfaces: Any minor repairs due to fins, bulges, offsets and irregular projections shall be performed immediately following the removal of forms. For areas of newly placed concrete that are honeycombed or segregated the Contractor shall provide a written corrective procedure for review by the Engineer prior to the work being performed. Construction and expansion joints in the completed work shall be left

carefully tooled and free of mortar and concrete. The joint filler shall be left exposed for its full length with clean and true edges.

The cavities produced by form ties and all other holes, broken corners or edges, and other defects shall be cleaned, saturated with water, pointed and trued with a mortar conforming to M.11.04. Cement similar in color to the exposed surface being repaired shall be added to the mortar. Mortar used in pointing shall be used within one (1) hour of mixing. The concrete shall be finished as defined below if required and the cure continued as previously specified in "Curing Concrete."

Finishing work shall not interrupt the curing period unless permitted by the Engineer. The curing period may be extended to provide the minimum total number of days required.

Concrete surface finishes shall be classified as follows:

(a) **Float Finish:** This finish shall be achieved by placing an excess of material in the form and removing or striking off of such excess forcing the coarse aggregate below the mortar surface. Concave surfaces in which water will be retained will not be allowed. After the concrete has been struck off, the surface shall be thoroughly worked and floated. Before this last finish has set, the surface shall be lightly stripped with a fine brush to remove the surface cement film, leaving a fine-grained, smooth, but sanded texture. Curing, as specified elsewhere, shall follow. Any surfaces that will support appurtenances such as light standards, railing, or fences shall be finished in accordance with 6.01.03-8, "Bearing Surfaces."

(b) **Rubbed Finish:** The initial rubbing shall only be allowed within three (3) days after placement. The entire surface shall be thoroughly wet with a brush and rubbed with a No. 16 Carborundum Stone or an abrasive of equal quality, bringing the surface to a paste. The rubbing shall be continued sufficiently to remove all form marks and projections, producing a smooth, dense surface without pits or irregularities. The paste formed by the rubbing may be finished by stripping with a clean brush, or it may be spread uniformly over the surface and allowed to re-set. If all or portions of the rubbed surface are unacceptable to the Engineer or a rubbed finish is not provided within three (3) days after removal of forms, the Contractor will be directed to provide a grout clean down finish.

(c) **Grout Clean-Down Finish:** As soon as all cavities have been filled as required elsewhere and the cement mortar has set sufficiently, grout clean-down shall be performed. All burrs, unevenness, laitance, including that in air holes, and any other material which will adversely affect the bond of the grout to the concrete, shall be removed by acceptable methods. This cleaning shall be done from the top or uppermost part of the surface to be finished to the bottom.

    A mixture of a fine aggregate and Portland cement shall be thoroughly blended while dry. The proportions shall be such that when mixed with the proper amount of water, the color will match that of the concrete to be finished. Water shall be added to this mixture in an amount which will bring the grout to a workable thick paint-like consistency.

The surface to be treated shall be thoroughly wetted with a sufficient amount of water to prevent the absorption of water from the grout. Grout shall then be applied to the wetted surface before setting of the grout occurs. Grout which has set shall not be re-tempered and shall be disposed of by the Contractor at no cost to the State.

The grout shall be uniformly applied over the entire surface, completely filling all air bubbles and holes. Immediately after applying the grout, the surface shall be floated with a suitable float, scouring the surface vigorously. While the grout is still plastic, all excess grout shall be removed.

After the final rubbing is completed and the surface has dried, it shall be rubbed to remove loose powder and shall be left free from all unsound patches, paste, powder, and objectionable marks. Wetting, application and removal of excess grout shall be completed in one (1) work shift.

All finished surfaces shall be cured for a minimum of twenty-four (24) hours. Horizontal surfaces shall have a float finish and vertical exposed surfaces shall have a rubbed finish. A grout clean down finish may be substituted for a rubbed finish as noted in this section or as directed by the Engineer

11. Mortar, Grout, Epoxy and Joint Seal

(a) Mortar and Grout: This work consists of the making and placing of mortar and grout. At least forty-eight (48) hours prior to the planned use, a copy of the installation instructions and MSDS sheet(s) shall be provided to the Engineer for review and concurrence of their applicability and for verification of proper hole sizes in concrete structures. Such uses include mortar for filling under masonry plates, mortar used to fill voids and repair surface defects, grout used to fill sleeves for anchor bolts, and mortar and grout for other such uses where required or approved.

Concrete areas to be in contact with the mortar or grout shall be cleaned of all loose or foreign material that would in any way prevent bond, and the concrete surfaces shall be flushed with water and allowed to dry until no free-standing water is present.

The mortar or grout shall completely fill and shall be tightly packed into recesses and holes, on surfaces, under structural members, and at other locations specified. After placing, all surfaces of mortar or grout shall be cured as previously specified in 6.01.03-9(a)-2 "Curing Concrete – Water Method," for a period of not less than three (3) days.

(b) Epoxy: The epoxy shall be prepared and placed in accordance with the manufacturer's directions and with the equipment prescribed by the manufacturer. Instructions furnished by the supplier for the safe storage, mixing, handling and

application of the epoxy shall be followed. Contents of damaged or previously opened containers shall not be used.

(c) Joint Seal: This work consists of sealing joints where shown on the plans or as otherwise directed by the Engineer.

Before placement of the sealing material, the joints shall be thoroughly cleaned of all scale, loose concrete, dirt, dust or other foreign matter. Projections of concrete into the joint space shall be removed. The joint shall be clean and dry before the sealing compound is applied.

The joint sealant shall be prepared and placed in accordance with the manufacturer's directions and with the equipment prescribed by the manufacturer. The sealing compound shall be flush with, or not more than 1/8 inch (3 mm) above the adjacent surface of concrete, cutting off all excess compounds after the application. The joints shall be sealed in a neat and workmanlike manner and when the work is completed, the joints shall effectively seal against infiltration of moisture and water.

The Contractor shall arrange for, and have present at the commencement of the joint-sealing operation, a technically competent manufacturer's representative knowledgeable in the methods of installation of the sealant. The Contractor shall also arrange to have the representative present at such other times as the Engineer may request.

(d) **Closed Cell Elastomer:** The closed cell elastomer shall be of the thickness, size and type specified and installed as shown on the plans and shall be in accordance with Section M.03.

12. Application of Loads: Loads shall not be applied to concrete structures until the concrete has attained sufficient strength and, when applicable, sufficient pre-stressing and post tensioning has been completed, so that damage will not occur. The means to determine when the concrete has attained sufficient strength shall be the use of Progression cylinders as defined elsewhere in this specification, or other means approved in advance by the Engineer.

(a) **Earth Loads:** The placement of backfill shall not begin until the concrete is cured and has reached at least eighty percent (80%) of its specified strength unless otherwise permitted by the Engineer. The sequence of placing backfill around structures shall minimize overturning or sliding forces and flexural stresses in the concrete.

(b) **Construction Loads:** Light materials and equipment may be hand carried onto bridge decks only after the concrete has been in place at least twenty-four (24) hours providing curing is not interfered with and the surface texture is not damaged.

Prior to the concrete achieving its specified compressive strength, any other live or dead loads imposed on existing, new, or partially completed portions of structures, shall not exceed the reduced load carrying capacity of the structure, or portion of structure. The Contractor may be required to submit calculations to the Engineer

that verify these requirements are being met. The compressive strength of concrete ($f'c$) to be used in computing the load-carrying capacity shall be the smaller of the actual field compressive strength at the time of loading or the specified design strength of the concrete. The means to determine the actual field compressive strength shall be approved by the Engineer.

For post-tensioned structures, no live or dead loads shall be allowed on any span until the steel for that span has been tensioned.

(c) **Loading of Completed Elements:** Precast concrete or steel girders shall not be placed on substructure elements until the substructure concrete has attained eighty-five percent (85%) of its specified strength.

No load shall be allowed on mortar or grout that has been in place less than seventy-two (72) hours.

(d) **Traffic Loads:** The concrete deck will not be opened to traffic until at least fourteen (14) days after the last placement of deck concrete and until such concrete has attained its specified strength.

13. Dispute Resolution: The basis of any dispute resolution is side-by-side and quality control testing by the Contractor or the Contractor's representative. The Contractor and Engineer should perform independent testing on the material to reasonably establish the true characteristics of the material at the time of delivery. Absent of Contractor QC testing, the Engineer's test results will apply to the quantity of concrete represented by the sample, not to exceed 75 cubic yards (60 cubic meters).

(a) **Air Content:** Contractor QC Testing must be performed by personnel qualified by The American Concrete Institute as an ACI Concrete Field Testing Technician Grade 1 or higher and performed in accordance with AASHTO T-23. If the Contractor's test results vary from those of the Engineer, the Contractor shall immediately notify the Engineer of the difference and work cooperatively to determine the reasonable cause and recognize the valid test. Should there be agreement, the result of the valid test will be used for acceptance and adjustment purposes for that lot of material. Should there not be an agreement as to the valid test, an additional set of tests should be performed. Results of all valid tests on the same lot may be averaged and used for acceptance and adjustment purposes. Should the Contractor wish to perform additional QC testing on subsequent material, the lot sizes may be adjusted to the amount of material included in that specific delivery. Any such QC testing must be witnessed and agreed to by the Engineer.

(b) **Compressive Strength:** Contractor QC testing for compressive strength must be performed in accordance with AASHTO T-22 by personnel approved by the Engineer. Samples used to dispute the Engineer's test results must be made simultaneously and from the same batch of concrete. Should the Contractor wish to pursue a dispute resolution with regard to compressive strength, the Contractor shall submit in writing to the Engineer all test results, control charts, or other documentation that may be useful in determining if the specific lot(s) of material met the Contract specifications. The Engineer will consider the submittal and may average specific test results on the disputed lot(s) for acceptance and adjustment purposes. Destructive testing of any kind on the placed concrete structure will not be allowed.

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

1. Concrete: The quantity of concrete will be the actual volume in cubic yards (cubic meters) of the specified class or classes, with the exception of underwater concrete, completed and accepted within the neat lines as shown on the plans or as ordered by the Engineer.

When concrete is placed against bedrock, a maximum of 6 additional inches (150 additional millimeters) beyond the neat lines can be measured for payment.

No deduction will be made for panels, form liners, reinforcing bars, structural steel shapes or for pile heads. There will be no deduction made for the volume occupied by culvert and drainage pipes, scuppers, weep holes, public utility structures or any other opening, unless the surface area of any such single opening is 9 square feet (1 square meter) or more.

In the case of culverts or drainage pipes, the computation of the surface area will be based on the nominal diameter of the pipe, disregarding the thickness of the shell.

Miscellaneous materials necessary for completion of the work such as felt, mortar, grout, epoxy, joint seal, paraffin coating and closed cell elastomer will not be measured for payment.

Incidental work such as forming for anchor bolts, utilities, keyways, and sampling and testing will not be measured for payment.

2. Underwater Concrete: When underwater concrete is used, it will be measured by the volume in cubic yards (cubic meters) within the actual horizontal limits of the cofferdam and between the elevations established by the Engineer.

3. Joint Filler: This material will be measured by the area in square feet (square meters) of the joint filler, of the type and thickness specified, actually installed and accepted.

6.01.05—Basis of Payment: Payment for this work will be made as follows:

1. Concrete: Progress payments may be allowed for completed major labor elements of work such as forming, placing and curing. Prior to placement, the Contractor shall submit a proposed schedule of values for review and approval by the Engineer.

Payment for any lot of concrete allowed to remain in place will be adjusted when the field and laboratory testing of the material is completed. The quantity of concrete in each lot will be a maximum of 75 cubic yards (60 cubic meters). Payment for each lot of concrete will be adjusted based on the results of the Acceptance testing performed by the Engineer.

The following pay factors apply for Standard and Modified Standard Mix classes with regard to entrained air content:

Air Pay Factors

Measured air (%)		Pay factor (%)
4.5 to 7.5		1.00 (100)
4.3 and 4.4	7.6 and 7.7	0.98 (98)
4.1 and 4.2	7.8 and 7.9	0.96 (96)
3.9 and 4.0	8.0 and 8.1	0.94 (94)
3.7 and 3.8	8.2 and 8.3	0.92 (92)
3.5 and 3.6	8.4 and 8.5	0.90 (90)
Concrete lots with less than 3.5% or greater than 8.5% entrained air will be rejected.		

The following pay factors apply for Standard and Modified Standard Mix classes with regard to compressive strength:

Strength Pay Factors

Compressive Strength (%)	Pay factor (%)
95 or greater	1.00 (100)
90 to 94.9	0.95 (95)
85 to 89.9	0.90 (90)
Concrete lots with less than 85% specified strength will be rejected.	

The payment adjustment value for entrained air and 28-day strength for any lot of concrete that is allowed to remain in-place is determined using the formulas below. An index price of $400.00 per c.y. (cu.m) shall be used to calculate each adjustment. The total adjustment value will be the sum of each individual adjustment value and will be deducted from the payment for the appropriate item.

English Units:	Metric Units:
Adjustment (air) = (1 - air pay factor) x $400/c.y. x lot size (c.y.)	Adjustment (air) = (1 - air pay factor) x $400/cu.m x lot size (cu.m)
Adjustment (strength) = (1 - strength pay factor) x $400/c.y. x lot size (c.y.)	Adjustment (strength) = (1 - strength pay factor) x $400/cu.m x lot size (cu.m)
Total Adjustment = Adjustment (air) + Adjustment (strength)	

The Contractor shall request permission from the Engineer to remove and replace a lot(s) of concrete to avoid a negatively adjusted payment. Any replacement material will be sampled, tested and evaluated in accordance with this specification.

No direct payment will be made for any labor, equipment or materials used during the sampling and testing of the concrete for Progression or Acceptance. The cost shall be considered as included in the general cost of the work or as stated elsewhere in the Contract. The work of transporting the concrete test specimens, after initial curing, for Acceptance testing will be performed by the Department without expense to the Contractor.

This material will be paid for at the Contract unit price per cubic yard (cubic meter) less any adjustments, for the specified class or classes, complete in place, which price shall include all materials, equipment, tools, labor and work incidental thereto, including heating, all admixtures, joint sealer, roofing felt and closed cell elastomer, and any miscellaneous materials such as metal flashing and metal used in expansion joints and bearings.

2. Underwater Concrete: When this class of concrete is used, it will be paid for at the Contract unit price per cubic yard (cubic meter) for "Underwater Concrete," complete in place, which price shall include all materials, equipment, tools, labor and work incidental thereto.

3. Joint Filler: Expansion joint filler will be paid for at the Contract unit price per square foot (square meter) for "Joint Filler for Bridges" of the type and thickness specified, complete in place, which price shall include all materials, equipment, tools, labor and work incidental thereto.

Pay Item	Pay Unit
Concrete (Class A, C, F)	c.y. (cu.m)
Underwater Concrete	c.y. (cu.m)
Joint Filler for Bridges (Thickness and Type)	s.f. (s.m.)

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 80° F, +/- 2 °F (15.5 to 26.7 °C, +/- 1 °C) within an outside ambient air temperature range of -10 to 120 ° F (-23.3 to 49 °C). 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:

Delete the 2nd paragraph, "Pipes of the type indicated ... of Article M.02.01." and insert the following paragraph:

"Pipes of the type indicated on the plans and joint sealant shall conform to the requirements of Article M.08.01. Bedding material shall conform to the requirements of Article M.08.03. Granular fill shall conform to the requirements of Article M.02.01."

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

Delete the entire section and replace it with the following:

SECTION 7.02
PILES

7.02.01—Description
7.02.02—Materials
7.02.03—Construction Methods
7.02.04—Method of Measurement
7.02.05—Basis of Payment

7.02.01—Description: This item shall consist of furnishing and driving foundation piles of the type and dimensions designated. Piles shall conform to and be installed in accordance with these specifications, and at the location, and to the elevation, penetration and/or capacity shown on the plans, or as directed by the Engineer. If specified in the plans or directed by the Engineer, piles shall be tipped, shaped, reinforced or otherwise pointed and strengthened
Test piles shall be piles of the type specified, driven in advance of placing orders for the piles, for the purpose of determining length or bearing capacity of piles. The Contractor shall furnish the piles in accordance with an itemized order list which will be furnished by the Engineer, showing the number and length of all piles. When test piles are specified, the pile lengths shown on the plans are for estimating purposes only. The actual lengths to be furnished for production piles will be determined by the Engineer after the test piles have been driven.

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

7.02.03—Construction Methods

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

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

(c) Cast-In-Place Concrete Piles: Cast-in-place concrete piles shall be constructed by driving steel shells and filling them with concrete. Shells shall be continuously or incrementally tapered, or cylindrical, or a combination of continuously or incrementally

tapered lower sections, which are extended with cylindrical upper sections, unless otherwise provided in the plans or special provisions. The tapered portion of piles shall have a minimum tip diameter of 8 inches (200 millimeters) and shall change in diameter not less than 1 inch in every 12 feet (7 millimeters/meter). Cylindrical piles and the cylindrical extension portions of tapered piles shall have a minimum diameter of 12 inches (300 millimeters). Shells for cast-in-place concrete piles shall be formed by joining sections of the same manufacture, unless otherwise permitted by the Engineer. Composite shell piles, which are piles composed of different thicknesses or of different manufacture, shall not be used unless shown on the plans or approved by the Engineer. Prefabricated driving points or other type tip enclosures shall be subject to the approval of the Engineer.

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

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

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

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

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

No concrete shall be placed in a pile until all driving within a radius of 15 feet (4.5 meters) from the pile has been completed, or until all the shells for any one bent have been completely driven. If this is not practical, all driving within the above limits shall be discontinued until the concrete in the last pile cast has set at least 7 days.

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

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

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

(1) Forms: The forms for the piles shall be of substantial construction and shall produce a uniformly smooth surface on all formed sides. A minimum concrete cover of 2 inches (50 millimeters) shall be maintained for prestressing elements by the use of spreaders or by bundling in areas adjacent to openings or inserts. Ties shall also have a minimum cover of 2 inches (50 millimeters) at these locations. Side forms carrying no load may be removed after 24 hours with the permission of the Engineer or after the concrete has reached the minimum transfer strength as required by Subarticle M.09.02-6.

(2) Finishing: The topside surface of the piles shall be given a uniformly smooth steel trowel finish to match the surface of the formed sides. The prestressing elements shall be cut flush or recessed 1/8 inch (3 millimeters) to the top of the pile. Projecting fins and surface imperfections shall be removed in a workmanlike manner. Exposed jet pipe connections, inserts or other devices shall be removed or recessed to a depth as directed, and the hole or opening patched with non-shrink grout in a workmanlike manner. The patching material shall have a degree of finish comparable to the adjacent surfaces. Additional finishing of piles, if required, shall be as shown on the plans or as otherwise directed.

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

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

2. Pile Driving Equipment:

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

The size of hammer shall be adapted to the type and size of piles and the driving conditions. Unless otherwise specified, the minimum rated striking energy per blow for

hammers used shall be 7,000-foot pounds (9,500 joules) for driving timber piles; 15,000-foot pounds (20,000 joules) for driving steel piles and for driving shells for cast-in-place concrete piles; and 19,000-foot pounds (25,000 joules) for driving precast concrete piles and for driving prestressed concrete piles. The hammer model used for the driving of test piles shall be used for the driving of service or production piles, unless a change is authorized by the Engineer in writing. Hammers delivering an energy which the Engineer considers detrimental to the piles shall not be used.

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

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

The criteria that the Engineer will use to evaluate the driving equipment consists of both the required number of hammer blows per foot (per 0.25 meters) as well as the pile stresses at the required ultimate pile capacity. The required number of hammer blows indicated by the wave equation at the ultimate pile capacity shall be between 36 and 180 blows per foot (29 and 147 blows per 0.25 meters) for the driving equipment to be acceptable. In addition, for the driving equipment to be acceptable the pile stresses which are indicated by the wave equation to be generated by the driving equipment shall not exceed the maximum driving stresses allowed by the governing design code stated in the contract documents.

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

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

(c) Drive System Components and Accessories:

(1) Hammer Cushion: Impact pile driving equipment designed to be used with a hammer cushion shall be equipped with a suitable thickness of hammer cushion material to prevent damage to the hammer or pile and to insure uniform driving behavior. Hammer cushions shall be made of durable manufactured materials, provided in accordance with the hammer manufacturer's guidelines. Wood, wire rope, and asbestos hammer cushions are specifically disallowed and shall not be

used. A striker plate as recommended by the hammer manufacturer shall be placed on the hammer cushion to insure uniform compression of the cushion material. The hammer cushion shall be removed from the helmet and inspected prior to beginning pile driving at each structure or after each 100 hours of pile driving, whichever is less. The Contractor shall replace any hammer cushion whose thickness is less than 75% of the original thickness.

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

(3) Pile Cushion: The heads of concrete piles shall be protected by a pile cushion. Pile cushions shall be made of plywood, hardwood, or composite plywood and hardwood materials. The minimum pile cushion thickness placed on the pile head prior to driving shall be at least 4 inches (100 millimeters). A new pile cushion shall be provided for each pile. In addition the pile cushion shall be replaced if, during the driving of any pile, the cushion is compressed more than one-half the original thickness or it begins to burn. The pile cushion dimensions shall match the cross sectional area of the pile top. The use of manufactured pile cushion materials in lieu of a wood pile cushion shall be evaluated on a case by case basis.

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

(5) Followers: Followers shall only be used when approved in writing by the Engineer, or when specifically stated in the contract documents. In cases where a follower is permitted, the first pile in each bent and every tenth pile driven thereafter shall be driven full length without a follower, to determine that adequate pile penetration is being attained to develop the ultimate pile capacity. The follower and pile shall be held and maintained in equal and proper alignment during driving. The follower shall be of such material and dimensions to permit the piles to be driven to the penetration depth

determined necessary from the driving of the full length piles. The final position and alignment of the first two piles installed with followers in each substructure unit shall be verified to be within the required location tolerances before additional piles are installed.

(6) Jets: Jetting shall only be permitted if approved in writing by the Engineer or when specifically stated in the contract documents. When jetting is not required in the contract documents, but approved after the Contractor's request, the Contractor shall determine the number of jets and the volume and pressure of water at the jet nozzles necessary to freely erode the material adjacent to the pile without affecting the lateral stability of the in place pile. When jetting is specifically required in the contract documents, the plant shall have sufficient capacity to deliver at all times at least 100 psi (700 kilopascals) pressure at two 3/4-inch (19 millimeter) jet nozzles. In either case, unless otherwise indicated by the Engineer, jet pipes shall be removed when the pile toe is a minimum of 5 feet (1.5 meters) above prescribed toe elevation and the pile shall be driven to the required ultimate pile capacity with an impact hammer. Also, the Contractor shall control, treat if necessary, and dispose of all jet water in a manner satisfactory to the Engineer and in accordance with the provisions of Article 1.10.

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

3. Pile Capacity

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

Jetting or other methods shall not be used to facilitate pile penetration unless specifically permitted in the contract documents or in writing by the Engineer. The ultimate pile capacity of jetted piles shall be based on driving resistances recorded during impact driving after the jet pipes have been removed. Jetted piles not attaining the ultimate pile capacity at the ordered length shall be spliced, as

required, at the Contractor's cost, and driven with an impact hammer until the ultimate pile capacity is achieved.

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

(b) Wave Equation: The ultimate pile capacity shall be determined by the Engineer. Piles shall be driven with the approved driving equipment to the ordered length or other lengths necessary to obtain the required ultimate pile capacity. Jetting or other methods to facilitate pile penetration shall not be used unless specifically permitted either in the contract documents or approved by the Engineer after a revised driving resistance is established from the wave equation analysis. Adequate pile penetration shall be considered to be obtained when the specified wave equation resistance criteria is achieved within 5 feet (1.5 meters) of the pile toe elevation, based on ordered length. Piles not achieving the specified resistance within these limits shall be driven to penetrations established by the Engineer.

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

The top elevation of the test pile shall be determined immediately after driving and again just before load testing to check for heave. Any pile which heaves more than 1/4 inch (6 millimeters) shall be redriven or jacked to the original elevation prior to testing. Unless otherwise specified in the contract, a minimum 3-day waiting period shall be observed between the driving of any anchor piles or the load test pile and the commencement of the load test.

On completion of the load testing, any test or anchor piling not a part of the finished structure shall be removed or cut off at least 1 foot (300 millimeters) below either the bottom of footing or the finished ground elevation, if not located within the footing area.

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

dynamic pile driving tests, to perform the testing and report preparation for all Dynamic Pile Driving Analysis (PDA) Tests to be performed.

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

All equipment necessary for the dynamic monitoring of the piles such as gages, cables, etc., shall be furnished by the Contractor's Consultant. The equipment shall conform to the requirements of ASTM D-4945, Standard Test Method for High Strain Dynamic Testing of Piles, and be capable of testing the pile to one and one-half times the ultimate pile capacity. An experienced engineer, who has successfully completed no less than ten dynamic pile driving tests, shall operate the Pile Driving Analyzer in the field. The Contractor shall furnish a shelter within 100 feet (30 meters) of test location(s) to protect the dynamic test equipment from the elements. The shelter shall be a minimum floor size of 400 square feet (40 square meters), with a minimum ceiling height of 7 feet (2 meters), and an inside temperature maintained between 50° and 85°F (10° and 29°C).

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

Prior to lifting the pile to be dynamically tested, the Contractor shall provide as a minimum 3 feet (1 meter) of clear access to 180 degree opposite faces of the pile for pile preparation. The Contractor or its Consultant shall then drill and prepare holes in the pile for gage attachment.

The Contractor or its Consultant shall attach the gages to the pile before driving the piles. Pile driving shall be performed using routine pile installation procedures. When the level of the gages is within 1 foot (300 millimeters) of the ground surface, or obstruction, driving shall be halted to remove the gages from the pile. If additional driving is required, the pile shall be spliced and gages shall be reattached to the head of the next pile segment.

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

shall reduce the driving energy transmitted to the pile by using additional cushions or reducing the energy output of the hammer in order to maintain driving stresses below the maximum values. If non-axial driving is indicated by dynamic test equipment measurements, the Contractor shall immediately realign the driving system.

After the initial drive of the pile, the Contractor shall wait 24 hours, or the time specified in the contract documents, and restrike the dynamic monitoring test pile with the dynamic testing instruments attached. A cold hammer shall not be used for the restrike. The hammer shall be warmed up before restrike begins by applying at least 20 blows to another pile. The maximum amount of penetration required during restrike shall be 6 inches (150 millimeters), or 50 hammer blows, whichever occurs first.

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

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

Test piles that do not attain the specified driving resistance at a depth of 6 inches (150 millimeters) above the estimated pile tip elevation, or are specified as a dynamic monitoring pile, shall be redriven after being allowed to set up. The minimum time period before restrike shall be 24 hours, or as specified in the contract documents. A cold hammer shall not be used for the restrike. The hammer used shall be warmed up by applying at least 20 blows to another pile.

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

When no test piles are specified for a substructure, the estimated pile lengths in the contract documents are taken as the pile order length.

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

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

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

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

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

(a) Location and Alignment Tolerance: Piles shall be driven with a variation of not more than 1/4 inch per foot (20 millimeters/meter) from the vertical or from the batter line indicated, except that piles for trestle bents shall be so driven that the cap may be placed in its proper location without inducing excessive stresses in the piles. Upon completion of driving and released from leads, exposed piles such as in bents shall not have a variation of more than 2 inches (50 millimeters) at the cut-off elevation from the position shown on the plans. Unless otherwise permitted in writing by the Engineer, failure to meet this tolerance shall be cause for rejection. Other foundation piles shall not be out of the position shown on the plans more than 6 inches (150 millimeters) after driving. The Engineer may require that driving be stopped in order to check the pile alignment. Pulling laterally on piles to correct misalignment, or splicing a properly aligned section on a misaligned section shall not be permitted.

If the location and/or alignment tolerances specified are exceeded, the extent of overloading shall be evaluated by the Engineer. If in the judgment of the Engineer, corrective measures are necessary, suitable measures shall be designed and constructed by the Contractor.

(b) Heaved Piles: Level readings to measure pile heave after driving shall be made by the Contractor at the start of pile driving operations and shall continue until the Engineer determines that such checking is no longer required. Level readings shall be taken immediately after the pile has been driven and again after piles within a radius of 15 feet (4.5 meters) have been driven. If pile heave is observed, the Contractor shall take accurate level readings referenced to a fixed datum on all piles immediately after installation and periodically thereafter as adjacent piles are driven to determine the pile heave range. All piles that have been heaved more than ¼ inch (6 millimeters) shall be redriven at the Contractor's cost, to the required resistance or penetration. Concrete shall not be placed in pile casings until pile driving has progressed beyond a radius of 15 feet (4.5 meters) from the pile to be concreted. If pile heave is detected for pipe or shell piles which have been filled with concrete, the piles shall be redriven to original position after the concrete has obtained sufficient strength and a proper hammer-pile cushion system, satisfactory to the Engineer, is used.

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

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

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

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

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

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

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

10. Painting Steel Piles and Steel Pile Shells: When steel piles or steel pile shells extend above the ground surface or water surface, they shall be painted as specified elsewhere in the contract documents or as ordered by the Engineer. This protection shall extend from an elevation 2 feet (600 millimeters) below the ground or water surface to the top of the exposed steel.

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

7.02.04—Method of Measurement

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

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

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

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

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

Cut-off materials from shells shall remain the property of the Contractor. They will be paid for in accordance with the unit cost applying in the Contractor's bill or bills for such shells, except that no payment will be made of material cut off from shells furnished by the Contractor in excess of the ordered length. The unit of measurement will be the unit applying in the Contractor's bill or bills for such shells. Material cut off from shells furnished by the Contractor in lengths in excess of those ordered by the Engineer will not be measured for payment hereunder. The work, materials, tools, equipment and labor incidental to the disposal of cutoffs will not be measured for payment.
Reinforcement, if required in cast-in-place concrete piles, will not be measured for payment.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

2. Timber Piles: Payment for furnishing timber piles or treated timber piles, up to a length 10 feet (3 meters) greater than that specified on the plans or in the proposal form, will be at the Contract unit price per foot (meter) for "Furnishing Timber Piles (' Length)" and "Furnishing Treated Timber Piles (' Length)," respectively, which price shall include furnishing, delivery, peeling, storage and handling, and all materials, equipment, tools and labor incidental thereto.

In case the length of any piles finally ordered is more than 10 feet (3 meters), but less than 20 feet (6 meters), greater than the length specified on the plans or proposal form, payment for furnishing such piles shall be at a price per linear foot (meter) equal to the original contract price, plus 20 percent thereof.

In case the length of any piles finally ordered is 20 feet (6 meters) or more greater than the length specified on the plans or proposal form, payment for furnishing such piles shall be at a price per linear foot (meter) equal to the original contract price plus 40 percent thereof.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Pay Item	Pay Unit
Furnishing (Type) Piles (Lengths)	lb. (kg)
Driving (Type) Piles	l.f. (m)
Test Pile (Type-Length)	ea. (ea.)
Splicing (Type) Piles	ea. (ea.)
Point Reinforcement for (Type) Piles	ea. (ea.)
Pile Loading Test	ea. (ea.)
Dynamic Pile Driving Analysis (PDA) Test	ea. (ea.)
Pre-Augering of 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 9.10.02 – Materials:

Change the only sentence in Subarticle 1 as follows:

"Chemical anchoring material shall meet the requirements of Article M.03.07."

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 10.10.02 – Materials:

Replace "M.03.01" *with* "M.03" *for both Class A and Class C Concrete.*

Article 10.10.05 – Basis of Payment

In the first sentence, 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.03
PORTLAND CEMENT CONCRETE

Delete the entire Section and replace it with the following:

SECTION M.03
PORTLAND CEMENT CONCRETE

M.03.01 - Component Materials
M.03.02 - Mix Design Requirements
M.03.03 - Producer Equipment and Production Requirements
M.03.04 - Curing Materials
M.03.05 - Non Shrink, Non Staining Grout
M.03.06 - Expansive Cement for Anchoring
M.03.07 - Chemical Anchors
M.03.08 - Joint Materials
M.03.09 - Protective Compound/Sealers
M.03.10 - Formwork

M.03.01 – Component Materials

1. Coarse Aggregate: Coarse aggregate shall be broken stone, gravel, or reclaimed concrete aggregate defined as mortar-coated rock, consisting of clean durable fragments of uniform quality throughout. It shall be free from soft, disintegrated pieces, mud, dirt, organic or other injurious material and shall not contain more than 1 percent of dust by mass, as determined by AASHTO T-11. Coarse aggregate of a size retained on a 1-inch (25 mm) square opening sieve shall not contain more than 8% of flat or elongated pieces, whose longest dimension exceeds 5 times their maximum thickness. Heating or cooling of coarse aggregates may be required to meet concrete mix temperature requirements at time of placement.

(a) **Soundness:** When tested with magnesium sulfate solution for soundness, using AASHTO Method T 104, coarse aggregate shall not have a loss of more than 10% at the end of 5 cycles.

(b) **Loss on Abrasion:** When tested by means of the Los Angeles Machine, using AASHTO Method T 96, coarse aggregate shall not have a loss of more than 40%.

(c) **Gradation:** Grading and stone sizes of the coarse aggregate shall conform to Article M.01.01 as determined by AASHTO T-27. All coarse aggregate proportions shall be approved in advance by the Transportation Division Chief (TDC) as part of the Mix Design requirements.

(d) **Storage:** Aggregate stockpiles shall be located on smooth, hard, sloped/well-drained areas. Each source and gradation shall have an individual stockpile or bin. Aggregates shall be handled from stockpiles or other sources to the batching plant in such manner as to minimize segregation of the material. Aggregates that have become segregated, or mixed with earth or foreign material, shall not be used.

(e) **Reclaimed Concrete Aggregate:** In addition to the above requirements (a-d), when reclaimed concrete aggregate is proposed, it shall be tested for chloride in AASHTO T-260 "Sampling and Testing for Chloride Ion in Concrete and Concrete Raw Materials." Aggregate shall not be used if the chloride content as determined from this test exceeds 0.5 pound/cubic yard (297 g/cubic meter). Regardless of chloride content, reclaimed concrete aggregate shall not be used in concrete mixes used for pre-stressed concrete construction.

2. Fine Aggregate: Fine aggregate shall be natural or manufactured sand consisting of clean, hard, durable, uncoated particles of quartz or other rock, free from lumps of clay, soft or flaky material, mica, loam, organic or other injurious material. In no case shall fine aggregate containing lumps of frozen material be used. Heating or cooling of fine aggregates may be required to meet concrete mix temperature requirements at time of placement.

For continued shipments of fine aggregate from a given source, the fineness modulus of any sample shall not vary more than 0.20 from the base fineness modulus. The base fineness modulus for a source shall be established by the Engineer and may be revised based on current testing results.

(a) **Fine Material:** Fine aggregate shall contain not more than 3% of material finer than a #200 sieve (75µm), as determined by AASHTO T 11.

(b) **Organic Impurities:** Fine aggregate subjected to the colorimetric test shall not produce a color darker than Gardner Color Standard No. 11, using AASHTO T 21. If the fine aggregate fails to meet this requirement, the provisions of AASHTO M 6, Section 7.2.3, may apply.

(c) **Gradation:** Fine aggregate gradation shall be within the ranges listed in Table M.03.01-1 for any source. All fine aggregate proportions shall be approved in advance by the TDC as part of the Mix Design requirements.

(d) **Soundness:** When tested with magnesium sulfate solution for soundness, using AASHTO T 104, fine aggregate shall not have a loss of more than 10% at the end of 5 cycles. Fine aggregate that fails to meet this requirement, but meets all other requirements, may be allowed for use on a restricted basis with the approval of the Engineer on a case-by-case basis. Typically concrete forming any surface subject to polishing or erosion from running water will not be allowed to contain such material.

(e) **Storage:** Aggregate stockpiles shall be located on smooth, hard, sloped/well-drained areas. Each source and gradation shall have an individual stockpile or bin. Aggregates shall be handled from stockpiles or other sources to the batching plant in such manner as to minimize segregation of the material. Aggregates that have become segregated, or mixed with earth or foreign material, shall not be used.

Table M.03.01-1 TOTAL % PASSING BY WEIGHT

Sieve Size	3/8" (9.5mm)	No. 4 (4.75mm)	No. 8 (2.36mm)	No. 16 (1.18mm)	No. 30 (600µm)	No. 50 (300µm)	No. 100 (150µm)
Percent Passing	100	95-100	80-100	50-85	25-60	10-30	2-10

3. Cement:

(a) **Portland:** Types I, II, and III Portland cement shall conform to the requirements of AASHTO M 85. Type I and Type III Portland cement shall be used only when required or expressly permitted by the Project specification or the Engineer. The use of Type I or III will require that these mixtures be submitted as Non-standard Mix Designs. All cement shall be provided by a mill participating in the Departments' Cement Certification program. The requirements of the Certification Program are detailed in the Department's Quality Assurance Program for Materials.

(b) **Pre-Blended Cements**: Binary or Ternary cements consisting of Portland Cement and supplemental cementitious materials may be used provided that all the requirements of Subarticles M.03.01- 3(a) and -3(c) are met.

(c) **Replacement Materials:** Unless already approved as a Standard Mix Design, any Contractor proposed Mix Designs with partial replacement of Portland Cement (PC) with fly ash or ground granulated blast furnace slag (GGBFS), shall be submitted in writing to the Engineer for approval prior to the start of work, on a project-by-project basis. The type of material, source, and the percentage of the PC replaced shall be clearly indicated. Upon request, a Certified Test Report for the cement replacement material shall be provided to the Engineer for use during the Mix Design review.

1. Fly Ash: Fly ash to be used as a partial replacement for Portland cement shall meet the requirements of AASHTO M 295, either Class C or Class F, including the uniformity requirements of Table 2A. Loss on Ignition for either class of fly ash shall not exceed 4.0%. Fly ash may be used to replace up to a maximum of 20% of the required Portland cement. The fly ash shall be substituted on a weight (mass) basis, with a minimum of 1 pound (45 kg) of fly ash for 1 pound (45 kg) of Portland cement. Different classes of fly ash or the same class from different sources shall not be permitted on any single project without the written approval of the Engineer.
2. Ground Granulated Blast Furnace Slag (GGBFS): GGBFS used as a partial replacement for Portland cement shall conform to the requirements of AASHTO M 302/ASTM C989, Grade 100 or 120. As determined by the Engineer, GGBFS may be used to replace a maximum of 30% of the required Portland cement. The Engineer may restrict or prohibit the use of GGBFS if ambient temperatures anticipated during the placement and initial curing of the concrete are low. The GGBFS shall be substituted on a weight (mass) basis, with a minimum of 1 pound (45 kg) of slag for 1 pound (45 kg) of Portland cement. Different sources of GGBFS shall not be permitted on any single project without the written approval of the Engineer.

4. Water: All water used in the mixing of concrete shall be clear in appearance and free from oil, salt, acids, alkalis, sugar, and organic matter. Surface water may be used if not taken from shallow or muddy sources; classified as Class C or Class D on the Department of Energy and Environmental Protection (DEEP) Water Quality Classification mapping; and accommodations have been made to prevent contaminants from entering the supply to the satisfaction of the Engineer. The Engineer may request that water from any surface or ground source be tested in accordance with AASHTO T26 and AASHTO D512 if the appearance or scent of the water is suspect. To be acceptable, the pH of the water must not be less than 6.0 or greater than 8.0 and Chloride Ion Concentration of the water must not exceed 250ppm (250 mg/L). Potable water taken directly from a municipal or regional water supply may be used for mixing concrete without testing. Heating or cooling of water may be required to meet mix temperature requirements at time of placement.

5. Admixtures: All admixtures shall perform their function without injurious effects upon the concrete. If requested by the TDC, the Contractor shall present a certified statement from a recognized laboratory attesting to this requirement. A "recognized" laboratory is any cement and concrete laboratory approved and inspected regularly by the Cement and Concrete Reference Laboratory (CCRL). The statement shall contain results of compression tests of cylinder specimens made with concrete utilizing the admixture(s) in proportions equal to those proposed by the Contractor. The results of at least 5 standard 6-inch x 12-inch (150 mm x 300 mm) cylinders of each mix design shall be listed with the results of at least 5 like-sized cylinders not utilizing the admixture(s). Specimens must be made and cured in the laboratory in accordance with AASHTO T 126 and will be tested in accordance with AASHTO T 22.

(a) **Air-Entraining Admixtures:** In the event that air entrained concrete is required, an admixture conforming to the requirements of AASHTO M 154 may be used. Tests for 7 and 28-day compressive and flexural strengths and resistance to freezing and thawing are required, but tests for bleeding, bond strength and volume change will not be required.

(b) **Other Chemical Admixtures:** In the event that concrete properties are specified that require the use of additional admixtures, or the Contractor proposes the use of additional admixtures to facilitate placement, the admixtures shall conform to the requirements of AASHTO M194M/M, including the 1 year performance data.

M.03.02 – Mix Design Requirements

1. Standard ConnDOT Mix Designs: Standard Mix Designs shall be designed in accordance with applicable sections of ACI 211 and ACI 318. The mixtures shall consist of Portland cement, fine aggregate, coarse aggregate, admixtures[1], and water proportioned in accordance with Table M.03.02-1. The mixtures shall also be designed to obtain the physical properties of plastic concrete as specified in Article 6.01.03.

Table M.03.02-1

TYPE	28-day Minimum Compressive Strength psi (megapascals)	Water / Cement; or Water / Cement plus other approved Cementitious Material, by weight (mass), Maximum	Minimum Cement[2] Required lbs/cy (kg/cm)	Maximum Aggregate Size Required Section M.01.01
Class "A"	3300 (23)	0.53	615 (365)	No. 4
Class "C"	3300 (23)	0.53	658 (390)	No. 6
Class "F"	4400 (30)	0.44	658 (390)	No. 6
Pavement	3500 (24)	0.49	615 (365)	No. 4
Slope Paving	2200 (15)	0.69	455 (270)	No. 3

[1] Approved admixtures may be used in proportions recommended by the manufacturer.

[2] Portland Cement may be partially replaced within a Standard Mix Design by other approved cementitious material meeting the requirements of Article M.03.01-3(b) if permitted by the Engineer.

Mix designs shall indicate the dosage of admixtures anticipated to provide plastic properties required in the Project specification. Properties of standard classes of concrete in the plastic state are listed in Article 6.01.03

Standard Mix Designs are required to be designed and submitted by the concrete producers, and are approved by the Department on a standing basis. Submittal or re-approval of these Standard Mix Designs on an annual basis is not required. Previously approved producer-designed Standard Mixes that have a record of satisfactory performance may be utilized on Department projects unless there is a change in the gravimetric properties or the sources of any materials. Revisions to the Standard Mix Designs, which include changes in component sources, can be submitted at any time to the TDC, but must be approved prior to use on Department projects.

2. Non-Standard ConnDOT Mix Designs: Any proposed Mix Designs that do not comply with Table M.03.02-1 are required to be submitted 15 days prior to use on a project-by-project basis and be approved by the TDC prior to use. The use of an approved admixture with an otherwise approved Standard Mix Design is not considered non-standard.

All Non-standard Mix Designs used for load-bearing structures shall contain a minimum of 658 lbs/cubic yard (390 kg/cubic meter) of cementitious materials.

Concrete used in applications such as flowable fill or controlled low-strength material may be designed with less than 658 lbs/cubic yard (390 kg/cubic meter) of cementitious materials.

M.03.03 - Producer Equipment and Production Requirements

1. General Requirements: The source of the concrete must be approved by the Engineer prior to use on Department projects. Specifically the location and capacity of the central mix or dry batch plant, and complement of truck mixers/haulers, shall be adequate for continuous placement of concrete on a typical Department project. Approval may be revoked at any time in accordance with Section 1.06.01.

(a) Inspection: The production facility supplying hydraulic cement concrete shall have a current Certification of Ready Mixed Concrete Production Facilities from the National Ready Mixed Concrete Association (NRMCA), or equivalent certification approved by the Engineer.

(b) In addition to the requirements of approved third party certification, the facility shall produce batch tickets that conform to Subarticle 6.01.03-3(a).

(c) Quality Control: The Contractor is responsible for all aspects of Quality Control (QC). As determined by the Engineer, should material delivered to a project not meet specification, the Contractor may be required to submit to the Engineer a corrective procedure for approval within 3 calendar days. The procedure shall address any minor adjustments or corrections made to the equipment or procedures at the facility.

(d) Suspension: As determined by the Engineer, repeated or frequent delivery of deficient material to a Department project may be grounds for suspension of that source of material. A detailed QC plan that describes all QC policies and procedures for that facility may be required to formally address quality issues. This plan must be approved by the Engineer and fully implemented, prior to reinstatement of that facility.

2. Hand Mixed Concrete: Hand mixing shall be permitted only with the permission of the Engineer. Hand mixed batches shall not exceed 1/2 cubic yard (0.5 cubic meter) in volume. Hand mixing will not be permitted for concrete to be placed under water.

M.03.04 - Curing Materials

1. Water: Any water source deemed acceptable by the Engineer for mixing concrete may be used to provide water for curing purposes. Surface water may be used if classified as Class C or Class D on the Department of Energy and Environmental Protection (DEEP) Water Quality Classification mapping and accommodations have been made to prevent contaminants from entering the supply to the satisfaction of the Engineer.

In general, water shall not be taken from shallow or muddy sources. In cases where sources of supply are relatively shallow, the intake pipe shall be enclosed to exclude silt, mud, grass, etc.; and the water in the enclosure shall be maintained at a depth of not less than 2 feet (610 mm) under the intake pipe.

2. Mats: Mats for curing concrete shall be capable of maintaining moisture uniformly on the surface of the concrete. The mats shall not contain any materials such as dyes, sugar, etc., that may be injurious to the concrete.

The length or width of the mats shall be sufficient to cover all concrete surfaces being cured. Should more than one mat be required, sufficient overlap shall be provided by the Contractor as determined by the Engineer.

3. Liquid Membrane-Forming Compound: Liquid membrane-forming compound shall conform to the requirements of AASHTO M 148 Type 2, Class B, or shall be a water-soluble linseed oil-based compound conforming to the requirements of AASHTO M 148, Type 2.

4. White Polyethylene Sheeting (Film): White polyethylene sheeting (film) shall conform to the requirements of AASHTO M 171.

M.03.05 - Non Shrink, Non Staining Grout

1. Bagged (pre-mixed): Bagged (pre-mixed) formulations of non-shrink grout shall meet the requirements of ASTM C 1107. The grout shall be mixed with potable water for use. The grout shall be mixed to a flowable consistency as determined by ASTM C 230. All bagged material shall be clearly marked with the manufacturer's name, date of production, batch number, and written instructions for proper mixing, placement and curing of the product.

2. Bulk: The Contractor may formulate and design a grout mix for use on the Project in lieu of using a pre-bagged product. The Contractor shall obtain prior written approval of the Engineer for any such proposed Mix Design. Any such Mix Design shall include the proportions of hydraulic cement, potable water, fine aggregates, expansive agent, and any other necessary additive or admixture. This material shall meet all of the same chemical and physical requirements as shall the pre-bagged grout, in accordance with ASTM C 1107.

M.03.06 – Expansive Cement for Anchoring

The premixed anchoring cement shall be non-metallic, concrete gray in color and prepackaged. The mix shall consist of hydraulic cement, fine aggregate, expansive admixtures and water conforming to the following requirements:

1. The anchoring cement shall have a minimum 24 hour compressive strength of 2,600 psi (18 megapascals) when tested in accordance with ASTM C 109.
2. The water content of the anchoring cement shall be as recommended by the manufacturer. Water shall conform to the requirements of Subarticle M.03.01-4.

The Contractor shall provide a Certified Test Report and Materials Certificate for the premixed anchoring cement in conformance with Article 1.06.07. The Contractor shall also provide, when requested by the Engineer, samples of the premixed anchoring cement for testing and approval.

M.03.07 – Chemical Anchors

Chemical anchor material must be listed on the Departments' Qualified Products List and approved by the Engineer for the specified use.

The chemical anchor material shall be epoxy or polyester polymer resin. It shall not contain any metals or other products that promote corrosion of steel. The Contractor shall supply the Engineer with a Certified Test Report and Materials Certificate for the chemical anchor material in conformance with Article 1.06.07. When requested by the Engineer, the Contractor shall also provide samples of the chemical anchor material.

M.03.08 – Joint Materials

1. **Transverse Joints for Concrete Pavement:** Transverse joints shall consist of corrosion resistant load transfer devices, poured joint seal and in addition, in the case of expansion joints, expansion joint filler all conforming to the following requirements:
   - **(a)** The corrosion resistant load transfer device shall be coated steel or sleeved steel or be made of corrosion resistant material. The dimensions of any devices used shall be as shown on the plans, exclusive of any coating or sleeving. Core material of coated or sleeved metallic devices shall be steel meeting the requirements of AASHTO M 255M/M 255 Grade 520, or steel having equal or better properties and approved by the Engineer. Nonmetallic devices shall meet the various strength requirements applicable to metallic devices as well as all other requirements stated herein.
   - **(b)** All coated load transfer devices shall conform to the requirements of AASHTO M 254. Uncoated or sleeved load transfer devices shall meet the applicable physical requirements of AASHTO M 254. The use of field applied bond breakers will not be permitted.

(c) The basis of acceptance for corrosion resistant load transfer devices shall be the submission by the Contractor of a minimum of 2 samples accompanied by Certified Test Reports conforming to the requirements of Article 1.06.07 demonstrating that the load transfer device conforms to the requirements of AASHTO M 254 for the type of device supplied. The Engineer reserves the right to reject any load transfer device which he deems unsatisfactory for use.

2. **Joint Filler for Concrete Curbing:** Expansion joint filler shall be either preformed expansion joint filler or wood joint filler as indicated on the plans and shall conform to the following requirements:
   (a) Preformed expansion joint filler shall be the bituminous cellular type and shall conform to the requirements of AASHTO M 213.
   (b) Boards for wood joint filler shall have 2 planed sides and shall be redwood, cypress or white pine. Redwood and cypress boards shall be of sound heartwood. White pine boards shall be of sound sapwood. Occasional small, sound knots and medium surface checks will be permitted provided the board is free of any defects that will impair its usefulness for the purpose intended. The joint filler may be composed of more than one length of board in the length of the joint, but no board of a length less than 6 feet (1.9 meters) shall be used; and the separate boards shall be held securely to form a straight joint. Boards composed of pieces that are jointed and glued shall be considered as one board.
   (c) Dimensions shall be as specified or shown on the plans; and tolerances of plus 1/16-inch (1.6 millimeters) thickness, plus 1/8-inch (3.2 millimeters) depth and plus 1/4-inch (6.4 millimeters) length will be permitted.
   (d) All wood joint filler boards shall be given a preservative treatment by brushing with creosote oil conforming to AASHTO M 133. After treatment, the boards shall be stacked in piles, each layer separated from the next by spacers at least 1/4 inch (6.4 millimeters) thick; and the boards shall not be used until 24 hours after treatment. Prior to concreting, all exposed surfaces of the wood filler shall be given a light brush coating of form oil.
   (e) Testing of board expansion joint filler shall be in accordance with pertinent sections of AASHTO T 42.
3. **Longitudinal Joint Devices:** The metal used in the fabrication of longitudinal joint devices shall conform to ASTM requirements for each type of metal used. The dimensions shall be as shown on the plans.
4. **Expansion Joint Fillers for Bridges and Bridge Bearings:**
   (a) Preformed expansion joint filler for bridges shall conform to the requirements of AASHTO M 153, Type I or Type II.
   (b) Pre-molded expansion joint filler for bridge bearings shall conform to the requirements of AASHTO M 33.
5. **Joint Sealants:**
   (a) **Joint Sealer for Pavement:** The joint sealer for pavement shall be a rubber compound of the hot-poured type and shall conform to the requirements of AASHTO M 324 Type II unless otherwise noted on the plans or in the special provisions.
   (b) **Joint Sealer for Structures:** Structure joint sealers shall be one of the following type sealants:
      1. Where "Joint Seal" is specified on the plans, it shall conform to the Federal Specifications SS-S-200-E (Self-leveling type), TT-S-0227E (COM-NBS) Type II-Class A (Non-sag type), or 1 component polyurethane-base elastomeric sealants conforming to FS TT-S-00230C Type II-Class A or an approved equal.

         A Certified Test Report will be required in accordance with Article 1.06.07, certifying the conformance of the sealant to the requirements set forth in the Federal Specification. Should the consignee noted on a Certified Test Report be other than the Prime Contractor, a Materials Certificate shall be required to identify the shipment.

2. Where "Silicone Joint Sealant" is specified on the plans, it shall be one of the following or an approved equal:
   - Sealant, manufactured by the Dow Corning Corporation, Midland, Michigan Dow Corning 888 Silicone Joint Sealant or
   - Dow Corning 888-SL Self-Leveling Silicone Joint 48686-0994

6. **Closed Cell Elastomer:** The closed cell elastomer shall conform to the requirements of ASTM D1056, Grade RE-41 B2. The elastomer shall have a pressure-sensitive adhesive backing on one side.

   The Contractor shall deliver the closed cell elastomer to the job site a minimum of 30 days prior to installation. Prior to the delivery of the closed cell elastomer, the Contractor shall notify the Engineer of the date of shipment and the expected date of delivery. Upon delivery of the closed cell elastomer to the job site, the Contractor shall immediately notify the Engineer.

   Each separate length, roll or container shall be clearly tagged or marked with the manufacturer's name, trademark and lot number. A lot is defined as that amount of closed cell elastomer manufactured at one time from one batch of elastomer. A batch is defined as that amount of elastomer prepared and compounded at one time. The Contractor shall furnish a Certified Test Report in accordance with Article 1.06.07, confirming the conformance of the closed cell elastomer to the requirements set forth in these specifications. Should the co-signee noted on a Certified Test Report be other than the Prime Contractor, a Materials Certificate shall be required to identify shipment.

   The Contractor shall furnish a 1 foot (305 millimeter) length of closed cell elastomer in each lot for purposes of inspection and testing by the Engineer. The Engineer will cut a 1 foot (305 millimeter) sample from each lot and inspect the sample for conformance to size, and perform physical tests on the sample as deemed necessary.

   The Engineer shall reject any lot or portion of a lot that does not conform to the requirements stated herein. A rejected lot or portion of a lot may be resubmitted provided the Contractor has removed or corrected, in a manner acceptable to the Engineer, all non-conforming material.

M.03.09 – Protective Compound/Sealers

The brand and type of material must be listed on the Department's Qualified Products List and approved by the Engineer for the specified use.

M.03.10 – Formwork

1. **Stay-in-place Forms:** Material for stay-in-place metal forms shall be made of zinc-coated (galvanized) steel sheet conforming to ASTM Specification A653 (Structural Steel (SS) Grade 33 through 80). The minimum thickness shall be 20 gage (810 micrometers). Coating weight shall conform to ASTM A924, Class G235, and shall otherwise meet all requirements relevant to steel stay-in-place metal forms and the placing of concrete as specified herein and as noted in the Contract documents.

   Form supports shall either be fabricated and conform to the same material requirements as the forms, or be fabricated from structural steel conforming to the requirements of ASTM A36 and shall be hot-dip galvanized in accordance with ASTM A123.

   Lightweight filler material for forms shall be as recommended by the form manufacturer.

2. **Temporary Forms and Falsework:** Forms and Falsework shall be of wood, steel or other material approved by the Engineer. This approval does not relieve the Contractor from employing adequately sized materials of sufficient rigidity to prevent objectionable distortion of the formed concrete surfaces caused by pressure of the plastic concrete and other loads incidental to the construction operations.

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.08
DRAINAGE

Delete the entire Section and replace with the following:

SECTION M.08
DRAINAGE

M.08.01 – Pipe
General
Iron/Steel
1. **Cast Iron Pipe**
2. **Coated Corrugated Metal Pipe and Coated Corrugated Metal Pipe Elbows**
3. **Perforated or Plain Coated Metal Pipe for Underdrains or Outlets**
4. **Coated Corrugated Metal Pipe Arches**
5. **Corrugated Structural Plates and Bolts**
6. **Metal Culvert Ends**

Concrete
7. **Reinforced Concrete Pipe**
8. **Reinforced Concrete Elliptical Pipe**
9. **Perforated Reinforced Concrete Pipe for Underdrains and Outlets**
10. **Slotted Drain Pipe**
11. **Reinforced Concrete Culvert Ends**

Aluminum
12. **Corrugated Aluminum Pipe**
13. **Corrugated Aluminum Pipe for Underdrains and Outlets**
14. **Corrugated Aluminum Pipe Arches**

Sealers/Gaskets
15. **Cold-Applied Bituminous Sealer**
16. **Preformed Plastic Gaskets**
17. **Flexible, Watertight, Rubber-Type Gaskets**

Plastic
18. **Corrugated Polyethylene Pipe**
19. **Geotextiles**
20. **Polyvinyl Chloride Plastic Pipe**
21. **Polyvinyl Chloride Gravity Pipe**

M.08.02 – Catch Basins, Manholes, and Drop Inlets
M.08.03 – Aggregates
1. **Bedding Material**
2. **Aggregates for Underdrains**

M.08.01 – Pipe

General

The Contractor shall submit manufacturer's material certifications for all metal and plastic pipes other than PVC, metal pipe-arches, metal fittings and metal coupling bands in accordance with Section 1.06.07.

IRON/STEEL

1. **Cast Iron Pipe:** This material shall conform to the requirements of AASHTO M 64 for Extra-Heavy Cast Iron Culvert Pipe.

2. **Coated Corrugated Metal Pipe and Coated Corrugated Metal Pipe Elbows:** This material shall conform to the following:

Pipe fabricated from zinc-coated steel sheet and aluminum-coated (Type 2) steel sheet must conform to AASHTO M 36, Type 1 or IR.

Pipe fabricated from metallic-coated and polymer-precoated steel sheet must conform to AASHTO M 245, Type 1.

Unless otherwise indicated on the plans, the corrugation size and sheet thickness shall conform to the following:

Nominal Inside Diameter (inches)	Corrugations	Minimum Specified Sheet Thickness (inches)	
6	1 1/2" X 1/4"	.052	
8, 10	1 1/2" X 1/4"	.064	
12, 15, 18 & 21	2 2/3" X 1/2"	.064	
24, 30 , 36	2 2/3" X 1/2"	.079	
42, 48	2 2/3" X 1/2"	.109	
54, 60	3" X 1" or 5" X 1"	.064	
66, 72	3" X 1" or 5" X 1"	.079	
78, 84, 90, & 96	3" X 1" or 5" X 1"	.109	
		Steel	Aluminum
18, 24, 30	Helical Rib ¾" X ¾ " X 7 ½"	.064	.060
36	Helical Rib ¾" X ¾ " X 7 ½"	.064	.075
42, 48 & 54	Helical Rib ¾" X ¾ " X 7 ½"	.079	.105
60, 66, 72, 78, 84	Helical Rib ¾" X ¾ " X 7 ½"	.109	.135

Aluminum pipe sheet thickness may be .004 inch less than specified above for 1 1/2-inch x 1/4-inch, 2 2/3-inch x 1/2-inch and 3-inch x 1-inch or 5-inch x 1-inch corrugations. Helical Rib shall be as specified above.

Zinc coated steel pipe, fittings, and coupling bands shall be coated with bituminous material as specified in AASHTO M 190 Type C. Pipe, fittings and coupling bands fabricated from aluminum coated steel sheet (Type 2) does not require coating of bituminous material or paved invert.

Metallic-coated and polymer-precoated steel pipe, fittings, and coupling bands shall be coated as specified in AASHTO M 246, Type B. The thicker polymeric coating shall be on the inside of the pipe.

Only one type of coating will be allowed for any continuously connected run of pipe.

If elongation of the pipe is required, it shall be done by the manufacturer.

3. Perforated or Plain Coated Metal Pipe for Underdrains or Outlets: This material shall conform to the requirements of AASHTO M 36, Type III or AASHTO M 245, Type III.

(a) Perforations: The minimum diameter of perforations after asphalt coating shall be 1/4 inch.

(b) Coating: All requirements of M.08.01-2 shall apply except that the minimum thickness of the bituminous coating on zinc coated steel pipe, fittings, and coupling bands pipe shall be 0.03 inches instead of 0.05 inches.

4. Coated Corrugated Metal Pipe-Arches: This material shall conform to the requirements of AASHTO M 36, Type II, Type IIR or AASHTO M 245, Type II. All coating requirements of M.08.01-1 shall apply.

Unless otherwise indicated on the plans, the corrugation size and sheet thickness shall conform to the following:

Pipe-Arch Equivalent Diameter (Inches)	Corrugations	Minimum Sheet Thickness (Inches)
15, 18, 21	2 2/3" X 1/2"	.064
24, 30	2 2/3" X 1/2"	.079
36, 42, 48	2 2/3" X 1/2"	.109
54, 60	2 2/3" X 1/2"	.138
60, 66, 72	3" X 1" or 5" X 1"	.079
78, 84, 90, 96	3" X 1" or 5" X 1"	.109
18, 21, 24	Helical Rib ¾" X ¾ " X 7 ½"	.064
30, 36	Helical Rib ¾" X ¾ " X 7 ½"	.079
42, 48, 54, 60	Helical Rib ¾" X ¾ " X 7 ½"	.109

5. Corrugated Structural Plates and Bolts: These plates and bolts are for use in the construction of metal pipe of the large diameter and for metal plate arches or pipe arches to be assembled in the field, and they shall conform to the requirements of AASHTO M 167 for corrugated metal pipe.

The dimensions of plates and details of fabrication shall conform to the requirements of the manufacturer. Where the plans call for a heavier gage for the bottom of the pipe than for the remainder of the pipe circumference, the lower fourth of the circumference shall be the minimum width of the heavier gage material.

The coating shall conform to the requirements of AASHTO M 243.

6. Metal Culvert End: The materials used in this work shall meet the pertinent requirements of Articles M.08.01-2 and M.08.01-4.

Bolts and fittings shall conform to the requirements of ASTM A 307 and shall be galvanized to conform to the requirements of ASTM A 153.

The units shall be coated as specified in Articles M.08.01-2, M.08.01-4 or M.08.01-5.

Fabrication: These units shall be formed from a rectangular sheet of metal by cutting and bending to form the desired shape. Two or more sheets may be fastened together by riveting or bolting so as to form a rectangular sheet of the required width. Skirt extensions and a top plate, as needed to complete the unit, shall be separately formed. Skirt extensions shall be riveted or bolted to the skirt.

All edges, which will be exposed above the surface of the ground, shall be reinforced before forming the unit by either of the following means:

(1) The edge shall be bent to form a semicircular roll with an exterior diameter of 1 inch, as shown in the detail drawing on the plans.

(2) A split tube of 1 inch outside diameter and not lighter than 14 gage, shall be slipped over a row of rivets spaced not more than 6 inches apart, as shown in the detail drawing on the plans.

One corrugation, matching the corrugations of the pipe or pipe-arch to which the unit is to be attached, shall be formed in the unit to insure secure and accurate alignment.

Attachment: The unit may be shop-riveted to a length of the appropriate pipe or pipe-arch, or may be field attached to the pipe or pipe arch by either of the other attachment systems shown on the plans, or by other means acceptable to the Engineer. If the unit is shop-riveted to a length of pipe or pipe-arch, this length shall be sufficient to permit proper use of standard coupling bands.

CONCRETE

7. Reinforced Concrete Pipe: Unless otherwise specified, this material shall conform to the requirements of AASHTO M 170, Class IV, as supplemented and modified by the following:

(a) **Reinforcement:** In circular pipe, only circular reinforcement will be allowed.

(b) **Laps and Welds:** The reinforcement shall be lapped not less than 2 inches and welded with an electric welding machine.

(c) **Quality Assurance Testing:** Circular and elliptical reinforced concrete pipe shall be tested by the three-edge bearing method prescribed in AASHTO T 280, except as follows:

1) Modified or special design pipe shall be tested to the 0.01-inch load and the ultimate load requirements as per AASHTO M 170 and M 207.

2) At the discretion of the Engineer, pipe of standard design, as specified in AASHTO M 170 and M 207, may be tested to the 0.01-inch requirement plus 10% additional load in lieu of ultimate load testing. Test pipe attaining a 0.01-inch crack will not be acceptable for use on Department projects.

3) Cores for absorption and determination of steel reinforcement shall be taken on a random basis as determined by the Engineer. The cores shall be at least 6 inches in diameter.

(d) **Inspection:** The pipe plant, materials, processes of manufacture and the finished pipe shall be subject to inspection and approval by the Department. The pipe manufacturer's records related to component materials, production and shipment of pipe for Department use shall be made available to the Department on request. The equipment and labor necessary for inspection, sampling and testing as required by the Department shall be furnished by the pipe manufacturer. Test equipment shall be calibrated at least once each 12 months, or as directed by the Engineer. The plant cement and aggregate scales shall be inspected and sealed by the approved agency at least once every twelve months.

(e) **Preliminary Tests and Tests for Extended Deliveries:** As directed by the Engineer, the Department shall select for test from the stock of any manufacturer proposing to supply pipe to the Department, 2 of each size pipe up through 30-inch diameter and 1 of each size greater than 30-inch diameter. These sample pipes shall be tested under Department supervision by the three-edge bearing method. For pipe that fails, it shall be necessary for the manufacturer to either physically isolate the rejected pipe at his plant or to provide some means to clearly indicate the unacceptability of the pipe. Either method shall be performed to the satisfaction of the Engineer. When production is resumed on any size, wall thickness or class previously rejected, preliminary tests shall be required. If 95% of all pipe tested at a particular plant from the first of the calendar year to September 30 meet specifications, including both preliminary and extended tests, it will not be necessary to perform the Fall three-edge bearing tests at this plant.

Use of compression tests on representative cylinders or cores to determine the compressive strength of the concrete incorporated into the pipe products will be at the discretion of the Engineer.

(f) **Shipping:** Pipe shall not be shipped until it is at least 7 days old unless earlier shipment is authorized by the Engineer on the basis of tests.

(g) **Certification:** Pipe will be accepted by the Department on the basis of manufacturer's certification. The manufacturer shall certify each shipment of pipe on Department Form MAT-073(PC-1), "Certification of Precast Concrete Products." Two (2) copies of this certification shall be furnished with the shipment to the Engineer at the project site.

8. Reinforced Concrete Elliptical Pipe: This material shall conform to the requirements of AASHTO M 207, Class HE IV and supplemented as follows:

(a) Manufacturing and testing shall conform to Article M.08.01-7.

9. Perforated Reinforced Concrete Pipe for Underdrains and Outlets: This material shall conform to the requirements of Article M.08.01-7 and shall be slotted in accordance with AASHTO M 175, Type 2, or as shown on the plans. Pipe for outlets shall not be perforated.

10. Slotted Drain Pipe: The pipe shall be asphalt coated and conform to Subarticle M.08.01-2. Concrete shall conform to Article M.03.01, Class "A" or pavement type. Concrete shall be cured in conformance with M.03.01. The inlet aperture shall be longitudinal on top of the pipe and may be continuous or intermittent. The opening in the pipe wall may be fabricated in the form of continuous bar risers and spacers or of intermittent cut-out segments with structural members supporting a continuous grating as indicated in the plans. End caps shall be as provided by the manufacturer.

Elastomeric polymer sealer shall meet the physical requirements of ASTM D 3406 and be accepted on manufacturer's certification.

The pipe shall be helically corrugated with a continuous welded or lock seam. Pipe ends shall have 2 rolled annular corrugations on each end for jointing.

Bar Riser and Spacer Type: Riser assemblies shall be fabricated from structural steel, in accordance with the dimensions on the plans. The riser assemblies shall be hot dipped galvanized according to ASTM A123. The assemblies shall be welded to the corrugated pipe on each side of the riser at the location of the solid web spacers. The riser shall terminate 1 inch from the ends of each pipe length to allow clearance for single bolt coupling bands. The ends of the riser shall be closed with a suitable welded plate where solid web spacers do not come to the ends of the riser.

The maximum deviation from straight in both the vertical and horizontal plane of the riser assembly shall not exceed 3/4 inch in a 20-foot length.

Continuous Grating Type: The cut-out pipe segments shall provide a 2-inch wide slot of maximum length between the lock seams. The slot shall be left intact 1 inch on each side of the lock seam and this material shall be utilized to fasten the reinforcing bar in place.

A bent epoxy coated reinforcing bar shall cross the slotted opening on 6-inch centers.

The reinforcing bar shall be an ASTM A 615, No. 13, deformed bar epoxy coated with 7 mils of fusion bonded epoxy powder conforming to AASHTO M 284.

Grating shall be furnished unless noted in the contract documents. Grating and all bearing bars, cross bars, and bent connecting bars shall be welding quality, mild carbon steel conforming to ASTM A 569 and to the dimensions shown on the plans.

Tie down bolts shall be J-Type bolts, plated, ASTM A 307 steel supplied with self-locking nuts.

Concrete forms shall be of cellular foam plastic base, fabricated as an integral part of the pipe and reinforcing bar assembly. The form shall be capped with a thick wood or plastic cap resting on top of the foam plastic and reinforcing bar.

The maximum deviation from straight in both the vertical and horizontal plane of the completed assembly shall not exceed 3/4 inch in a 20-foot length. All grating and hardware shall be galvanized in conformance with Article M.06.03. Expansion joint filler shall conform to M.03.

11. Reinforced Concrete Culvert End: The barrel shall conform to the requirements of AASHTO M 170, Class II, except that the three-edge bearing tests will not be required. The flare shall be of the same thickness and materials as the barrel and shall have steel reinforcement equaling or exceeding the amount shown on the table for the pertinent size.

Tongues and grooves shall be compatible with tongues and grooves of pipe meeting AASHTO M 170, Class IV.

Air entrainment shall be added to these units so as to maintain 5 to 8% entrained air.

ALUMINUM

12. Corrugated Aluminum Pipe: This material shall conform to the requirements of AASHTO M 196 Type I or Type IR. Sheet thickness shall conform to the requirements of M.08.01-2.

13. Corrugated Aluminum Pipe for Underdrains and Outlets: This material shall conform to the requirements of AASHTO M 196, Type III or Type IIIR. Sheet thickness shall conform to the requirements of M.08.01-2. Pipe for outlets shall not be perforated.

14. Corrugated Aluminum Pipe Arches: These pipe arches shall conform to the requirements of AASHTO M 196, Type II or Type IIR. Sheet thickness shall conform to the requirements of M.08.01-4.

SEALERS/GASKETS

15. Cold-Applied Bituminous Sealer: This material, for use in sealing of joints in concrete pipes, shall be free of asbestos and shall meet the following requirements:

It shall be of such consistency that it may be spread on the joints with a trowel when

the temperature of the air is between -20° F and 100° F. The bituminous material shall adhere to the concrete pipe so as to make a watertight seal and shall not flow, crack or become brittle when exposed to the atmosphere.

Unless otherwise specified, sampling shall be done in accordance with AASHTO T 40.

The bituminous sealer shall be delivered to the project in suitable containers for handling and shall be sealed or otherwise protected from contamination. The container shall show the brand name, net mass or volume, and the requirements for application.

16. Preformed Plastic Gaskets: This material for use in sealing of joints in concrete pipe shall conform to the requirements of ASTM C 1478.

17. Flexible, Watertight, Rubber-Type Gaskets: This material for use in sealing concrete pipe joints shall conform to the requirements of ASTM C 443.

PLASTIC

18. Corrugated Polyethylene Pipe: Corrugated Polyethylene Pipe, either corrugated interior surface (Type C) or smooth interior surface (Type S) without perforations or with perforations (Type CP or SP), shall conform to AASHTO M 252 or M 294. Type D pipe shall have a smooth interior surface braced circumferentially or spirally with projections or ribs joined to a smooth outer wall. Both surfaces shall be fused to, or be continuous with, the internal supports. Type D shall conform to AASHTO M 294.

19. Geotextiles: The geotextile shall be non-rotting, acid and alkali resistant, and have sufficient strength and permeability for the purpose intended including handling and backfilling operations. Fibers shall be low water absorbent. The fiber network must be dimensionally stable and resistant to delamination. The geotextile shall be free of any chemical treatment or coating that will reduce its permeability. The geotextile shall also be free of any flaws or defects which will alter its physical properties. Torn or punctured geotextiles shall not be used. For each specific use, only geotextiles that are already on the Connecticut Department of Transportation's Approved Products List for the geotextile type will be used. The Engineer reserves the right to reject any geotextile he deems unsatisfactory for a specific use. The brand name shall be labeled on the geotextile or the geotextile container. Geotextiles that are susceptible to damage from sunlight or heat shall be so identified by suitable warning information on the packaging material.

Geotextiles susceptible to sunlight damage shall not be used in any installations where exposure to light will exceed 30 days, unless specifically authorized in writing by the Engineer.

20. Polyvinyl Chloride Plastic Pipe: The pipe shall conform to the requirements of ASTM D 1785. Couplings and elbows shall conform to the requirements of ASTM D 2466 or D 2467.

21. Polyvinyl Chloride Gravity Pipe: This pipe shall conform to one of the following specifications: ASTM F789, ASTM F 679, or ASTM F 794.

M.08.02—Catch Basins, Manholes, and Drop Inlets: The materials to be used in the construction shall conform to the following:

1. **Brick for Catch Basins, Manholes or Drop Inlets:** Brick for catch basins, manholes or drop inlets shall conform to the requirements of ASTM C 32, except that the depth shall be 2 1/4 inches, the width 3 5/8 inches, and the length 8 inches, and except that the maximum water-absorption by 5-hour boiling shall not exceed the following limits:

Average of 5 bricks	15%
Individual brick	18%

2. **Concrete Building Brick for Catch Basins, Manholes, or Drop Inlets:** Concrete building brick for catch basins, manholes, or drop inlets shall conform to the requirements of ASTM C 55, Grade S II.

3. **Masonry Concrete Units for Catch Basins, Manholes, or Drop Inlets:** Masonry concrete units for catch basins, manholes, or drop inlets shall conform to the requirements of ASTM C 139.

4. **Precast Units for Drainage Structures:** Precast units for drainage structures may be used except where particular conditions require building or casting structures in place.

Fabrication plants shall have a quality control plan approved by the Division Chief of Materials Testing that is demonstrated to the satisfaction of the Engineer. The facility, the quality of materials, the process of fabrication, and the finished precast units shall be subject to inspection by the Engineer.

Precast manholes shall conform to the requirements of AASHTO M 199 (ASTM C 478).

Circular precast catch basins and drop inlets shall conform to AASHTO M 199 (ASTM C 478) as supplemented below. Rectangular precast catch basins and drop inlets shall conform to ASTM C 913 as supplemented below:

All materials used for concrete shall conform to the requirements of Section M.03.

The provisions of Subarticle 4.01.03 (A) shall apply except that the concrete shall contain 5.0%-8.0% entrained air. Water-absorption of individual cores taken from precast units shall be not more than 7%.

Reinforcement shall conform to the requirements of Article M.06.01.

Suitable provision shall be made in casting the units for convenient handling of the completed casting, and additional reinforcement steel shall be provided to allow for such handling in the casting yard and during transportation and placement. Each completed unit shall be identified with the name of manufacturer and date of the concrete pour from which it was cast, either by casting this information into an exposed face of the unit or by suitable stencil. For each day's production of precast units, the

fabricator shall mold, cure, and test standard cylinders, or cylinders compacted in a similar manner to the parent precast units, for the purpose of determining the compressive strength of the concrete incorporated into the precast units. Concrete used in molding the cylinders shall be representative of the concrete incorporated into the precast units during the production period. Cylinders shall be molded in accordance with AASHTO T 23, cured by the same method as the units they represent, and tested as prescribed in AASHTO T 22.

The fabricator shall determine the air content of the concrete used in the day's production of precast units by performing tests as prescribed in AASHTO T 152.

The equipment and personnel necessary to perform the required testing shall be furnished by the fabricator and approved by the Engineer. All testing equipment shall be calibrated at least once each 12 months or as directed by the Engineer. The fabricator shall maintain records relative to the production, testing, and shipment of precast units supplied to the Department. Said records shall be available to a representative of the Department upon his request.

The Department may accept precast concrete units on the basis of fabricator's certification. The fabricator shall certify each shipment of precast concrete units on Department Form MAT 314 (PC-1), "Certification of Precast Concrete Products." Two (2) copies of this certification shall be furnished with the shipment to the Engineer at the Project site.

Precast units that are cracked, show evidence of honeycomb, or have over 10% of their surface area patched may be subject to rejection, even though meeting other requirements.

5. Metal for Drainage Structures: Metal for catch basins, drop inlet and manhole frames, extensions, covers, and gratings shall be cast iron, cast steel, structural steel or malleable iron conforming to the requirements of the plans. Covers and gratings shall bear uniformly on their supports.

Extensions shall be designed so that the existing manhole cover or catch basin grate, when set in place, will have substantially the same bearing, fit, and load carrying capacity as in the existing frame. The extension shall be designed to fit into the original frame, resting specifically on the flange and rim area. The extension shall accept the existing cover or grate so that the cover or grate is seated firmly without movement.

Ladder rungs for manholes shall conform to AASHTO M 199 (ASTM C 478).

Cast iron shall conform to the requirements of AASHTO M 105, Class 25 for the frames and Class 30 for grates.

Cast steel shall conform to the requirements of ASTM A 27, Grade optional, and shall be thoroughly annealed.

Structural Steel shall conform to the requirements of ASTM A 36, or A 283, Grade B or better, as to quality and details of fabrication, except that in the chemical composition of the steel, the 2/10 of 1% of copper may be omitted.

Malleable iron shall conform to the requirements of ASTM A 47, Grade 22010.

The materials and method of manufacture for drop inlets shall conform to the requirements as stated on the plans or as ordered.

M.08.03—Aggregates

1. Bedding Material: Material for pipe bedding shall be sand or sandy soil, all of which passes a 3/8-inch sieve and not more than 10% passes a No. 200 sieve.

When ground water is encountered, the Engineer may allow No. 6 stone conforming to Article M.01.01 to be used instead of sand or sandy soil.

2. Aggregates for Underdrains: Materials for filling the trench shall consist of well-graded, clean, non-plastic sands or well-graded, clean, durable broken stone or screened gravel. Unless otherwise noted, the type of material to be used shall be sand.

Sand: This material shall meet the requirements of Article M.03.01-2

Broken Stone or Screened Gravel: This material shall conform to the gradation requirements for Size No. 8 under Article M.01.01.

CONNECTICUT
SUPPLEMENTAL SPECIFICATION
SECTION M.11
MASONRY FACING
CEMENT AND DRY RUBBLE MASONRY
BRICK
MORTAR

Article M.11.01 – Masonry Facing:

Subarticle 1. : Masonry Facing Stone

Delete the third sentence:

"Preferably, the stone shall be from a quarry the product of which is known to be of satisfactory quality."

Delete **"Subarticle 2. : Vacant:"**

Article M.11.04—Mortar:

Delete the entire article and replace it with the following:

M.11.04—Mortar: Mortar shall be either Pre-blended or Pre-packaged material conforming to:

ASTM C1714 - Standard Specification for Pre-blended Dry Mortar Mix for Unit Masonry;

ASTM C387 - Standard Specification for Packaged, Dry, Combined Materials for Concrete and High Strength Mortar;

or be composed of one part Portland cement and two parts, by volume, of surface dry fine aggregate blended on site.

Hydrated lime, in an amount not to exceed 4 pounds (1.8 kilograms) of lime to each bag of cement, may be added when the material is blended on site at the option of the Engineer. Cement and hydrated lime shall conform to the following requirements:

(a) **Portland cement, Types I, II or IS, and water** shall conform to the requirements of Article M.03.

(b) **Hydrated lime** shall conform to the requirements of ASTM C 6.

When mortar is mixed on the project site, **fine aggregate** shall conform to Grading A or B as indicated in the table below, and to the requirements of Section M.03. For laying stone, precast units, or for shotcrete, fine aggregate shall conform to Grading A. For pointing stone or the precast units and for laying brick or sealing pipe joints, the fine aggregate shall conform to Grading B.

Table of Gradation, Fine Aggregate for Mortar

Square Mesh Sieves	Grading	
	A	B
	Percentage Passing by weight (mass)	
Pass 3/8 inch (9.5 millimeters)	100	
Pass #4 (4.75 millimeters)	95-100	
Pass #8 (2.36 millimeters)	80-100	100
Pass #16 (1.18 millimeters)	50-85	
Pass #30 (600 microns)	25-60	
Pass #50 (300 microns)	10-30	10-40
Pass #100 (150 microns)	2-10	0-10

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."

Article M.13.03 – Fertilizer:

In the last sentence of the first paragraph change "AOAC International." *to* "AOAC."

Article M.13.06 – Compost:

In the third to last sentence, replace "DEP" *with* "DEEP".

CONNECTICUT
SUPPLEMENTAL SPECIFICATION
SECTION M.16
TRAFFIC CONTROL SIGNALS

Article M.16.04 – Poles:

1. Steel Poles:

(i) Wire Entrance Fitting:

In the second sentence, delete "required to accept the cables".

Article M.16.06 – Traffic Signals:

9. Painting:

In the first sentence, replace "MIL" *with* "MILSPEC".

Subsection **Third Coat:**

Replace the first two sentences 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

In the last sentence of the second paragraph, change "Americans With Disabilities Act (ADA)" *to* "ADA".

Subarticle **Painting**
Subsection **Third Coat:**

Delete the entire paragraph and replace it 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."

Article M.16.10 – Flasher Cabinet:
1. Cabinet:

In subsection (f), change "Underwriter's Laboratory" *to* "UL".

M.16.15 – Messenger and Span Wire:

Delete the entire article and replace it with the following:

"M.16.15 – Messenger and Span Wire: The materials for this work shall conform to the following requirements:

1. Messenger wire shall be made of double-galvanized 7-strand utilities-grade steel wire cable, not less than 3/16 inch (4.8 millimeters) in diameter, with at least a 2,400-pound (10.7-killinewton) breaking strength.
2. Span wire:
   (a) "Span wire" shall be made of double-galvanized 7-strand utilities-grade steel wire cable, not less than 3/8 inch (9.5 millimeters) in diameter, with at least an 11,200-pound (50-kilonewton) breaking strength.
   (b) "Span wire (high strength)" shall be made of double-galvanized 7-strand extra-high-strength-grade steel wire cable, not less than 7/16 inch (11.1 millimeters) in diameter, with at least a 20,800-pound (94-kilonewton) breaking strength.
3. All hardware accessories shown on the plans to be used in span wire or messenger mounting shall be made of high-strength, double-galvanized, first-quality materials."

CONNECTICUT
SUPPLEMENTAL SPECIFICATION
SECTION M.17
ELASTOMERIC MATERIALS

M.17.01 – Elastomeric Bearing Pads:

2. Laminae:

In the last sentence of Subsection (a), replace "AAA 6061-T6" *with* "AA 6061-T6".

4. Adhesive for Bonding:

In the 2nd paragraph of Subsection (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
(FTA Funded Contracts)

Index

1. Federal Transit Administration Required Contract Clauses

2. Title VI of the Civil Rights Act of 1964 / Nondiscrimination Requirements

3. Contractor Work Force Utilization (Federal Executive Order 11246) / Specific Equal Employment Opportunity

4. Requirements of Title 49, CFR , Part 26

5. Contract Wage Rates

6. Americans with Disabilities Act of 1990

7. Connecticut Statutory Labor Requirements

    a. Construction, Alteration or Repair of Public Works Projects; Wage Rates
    b. Debarment List - Limitation on Awarding Contracts
    c. Construction Safety and Health Course
    d. Awarding of Contracts to Occupational Safety and Health Law Violators Prohibited
    e. Residents Preference in Work on Other Public Facilities (Not Applicable to Federal Aid Contracts)

8. Tax Liability - Contractor's Exempt Purchase Certificate (CERT – 141)

9. Executive Orders (State of CT)

10. Non Discrimination Requirement (pursuant to section 4a-60 and 4a-60a of the Connecticut General Statutes, as revised)

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12. Connecticut Freedom of Information Act

    a. Disclosure of Records
    b. Confidential Information

13. Service of Process

14. Substitution of Securities for Retainages on State Contracts and Subcontracts

15. Health Insurance Portability and Accountability Act of 1996 (HIPAA)

16. Forum and Choice of Law

17. Summary of State Ethics Laws

18. Audit and Inspection of Plants, Places of Business and Records

19. Campaign Contribution Restriction

20. Tangible Personal Property

21. Bid Rigging and/or Fraud – Notice to Contractor

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Index of Exhibits

EXHIBIT A – Federal Transit Administration Required Contract Clauses (Begins on page 13)
EXHIBIT B – Title VI Contractor Assurances (page 36)
EXHIBIT C – Contractor Work Force Utilization (Federal Executive Order 11246) / Equal Employment Opportunity (page 37)
EXHIBIT D – Health Insurance Portability and Accountability Act of 1996 (HIPAA) (page 44)
EXHIBIT E - Campaign Contribution Restriction (page 52)
EXHIBIT F – Federal Wage Rates (Attached at the end)
EXHIBITG - State Wage Rates (Attached at the end)

1. Federal Transit Administration Required Contract Clauses

If applicable, the Contractor shall comply with the Federal Transit Administration (FTA) required contract clauses, attached at Exhibit A, as revised, of this section, all of which are hereby made part of this contract.

2. Title VI of the Civil Rights Act of 1964 / Nondiscrimination Requirements

The Contractor shall comply with Title VI of the Civil Rights Act of 1964 as amended (42 U.S.C. 2000 et seq.), all requirements imposed by the regulations of the United States Department of Transportation (49 CFR Part 21) issued in implementation thereof, and the Title VI Contractor Assurances attached hereto at Exhibit B, all of which are hereby made a part of this Contract.

3. Contractor Work Force Utilization (Federal Executive Order 11246) / Equal Employment Opportunity

(a) The Contractor shall comply with the Contractor Work Force Utilization (Federal Executive Order 11246) / Equal Employment Opportunity requirements attached at Exhibit C and hereby made part of this Contract, whenever a contractor or subcontractor at any tier performs construction work in excess of $10,000. These goals shall be included in each contract and subcontract. Goal achievement is calculated for each trade using the hours worked under each trade.

(b) Companies with contracts, agreements or purchase orders valued at $10,000 or more will develop and implement an Affirmative Action Plan utilizing the ConnDOT Affirmative Action Plan Guideline. This Plan shall be designed to further the provision of equal employment opportunity to all persons without regard to their race, color, religion, sex or national origin, and to promote the full realization of equal employment opportunity through a positive continuation program. Plans shall be updated as required by ConnDOT.

4. Requirements of Title 49, Code of Federal Regulations (CFR), Part 26

Pursuant to 49 CFR 26.13, the following paragraph is part of this Contract and shall be included in each subcontract the Contractor enters into with a subcontractor:

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

5. Contract Wage Rates

The Contractor shall comply with:

The Federal and State wage rate requirements indicated in Exhibits F and G hereof are hereby made part of this Contract. If a conflict exists between the Federal and State wage rates, the higher rate shall govern.

Prevailing Wages for Work on State Highways; Annual Adjustments. With respect to contracts for work on state highways and bridges on state highways, the Contractor shall comply with the provisions of Section 31-54 and 31-55a of the Connecticut General Statutes, as revised.

As required by section 1.05.12 (Payrolls) of the State of Connecticut, Department of Transportation's Standard Specification for Roads, Bridges and Incidental Construction (FORM 816), as may be revised, every Contractor or subcontractor performing project work on a federal aid project is required to post the relevant prevailing wage rates as determined by the United States Secretary of Labor. The wage rate determinations shall be posted in prominent and easily accessible places at the work site.

6. Americans with Disabilities Act of 1990

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.

7. Connecticut Statutory Labor Requirements

(a) Construction, Alteration or Repair of Public Works Projects; Wage Rates. The Contractor shall comply with Section 31-53 of the Connecticut General Statutes, as revised. The wages paid on an hourly basis to any person performing the work of any mechanic, laborer or worker on the work herein contracted to be done and the amount of payment or contribution paid or payable on behalf of each such person to any employee welfare fund, as defined in subsection (i) of section 31-53 of the Connecticut General Statutes, shall be at a rate equal to the rate customary or prevailing for the same work in the same trade or occupation in the town in which such public works project is being constructed. Any contractor who is not obligated by agreement to make payment or contribution on behalf of such persons to any such employee welfare fund shall pay to each mechanic, laborer or worker as part of such person's wages the amount of payment or contribution for such person's classification on each pay day.

(b) Debarment List. Limitation on Awarding Contracts. The Contractor shall comply with Section 3l-53a of the Connecticut General Statutes, as revised.

(c) Construction Safety and Health Course. The Contractor shall comply with section 31-53b of the Connecticut General Statutes, as revised. The contractor shall furnish proof to the Labor Commissioner with the weekly certified payroll form for the first week each employee begins work on such project that any person performing the work of a mechanic, laborer or worker pursuant to the classifications of labor under section 31-53 of the Connecticut General Statutes, as revised, on such public works project, pursuant to such contract, has completed a course of at least ten hours in duration in construction safety and health approved by the federal Occupational Safety and Health Administration or, has completed a new miner training program approved by the Federal Mine Safety and Health Administration in accordance with 30 CFR 48 or, in the case of telecommunications employees, has completed at least ten hours of training in accordance with 29 CFR 1910.268.

Any employee required to complete a construction safety and health course as required that has not completed the course, shall have a maximum of fourteen (14) days to complete the course. If the employee has not been brought into compliance, they shall be removed from the project until such time as they have completed the required training.

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

(d) Awarding of Contracts to Occupational Safety and Health Law Violators Prohibited. The Contract is subject to Section 31-57b of the Connecticut General Statutes, as revised.

(e) Residents Preference in Work on Other Public Facilities. NOT APPLICABLE TO FEDERAL AID CONTRACTS. Pursuant to Section 31-52a of the Connecticut General Statutes, as revised, in the employment of mechanics, laborers or workmen to perform the work specified herein, preference shall be given to residents of the state who are, and continuously for at least six months prior to the date hereof have been, residents of this state, and if no such person is available, then to residents of other states

8. Tax Liability - Contractor's Exempt Purchase Certificate (CERT – 141)

The Contractor shall comply with Chapter 219 of the Connecticut General Statutes pertaining to tangible personal property or services rendered that is/are subject to sales tax. The Contractor is responsible for determining its tax liability. If the Contractor purchases materials or supplies pursuant to the Connecticut Department of Revenue Services' "Contractor's Exempt Purchase Certificate (CERT-141)," as may be revised, the Contractor acknowledges and agrees that title to such materials and supplies installed or placed in the project will vest in the State simultaneously with passage of title from the retailers or vendors thereof, and the Contractor will have no property rights in the materials and supplies purchased.

Forms and instructions are available anytime by:

Internet: Visit the DRS website at www.ct.gov/DRS to download and print Connecticut tax forms; or Telephone: Call 1-800-382-9463 (Connecticut calls outside the Greater Hartford calling area only) and select Option 2 or call 860-297-4753 (from anywhere).

9. Executive Orders

This Contract is subject to the provisions of Executive Order No. Three of Governor Thomas J. Meskill, promulgated June 16, 1971, concerning labor employment practices, Executive Order No. Seventeen of Governor Thomas J. Meskill, promulgated February 15, 1973, concerning the listing of employment openings and Executive Order No. Sixteen of Governor John G. Rowland promulgated August 4, 1999, concerning violence in the workplace, all of which are incorporated into and are made a part of the Contract as if they had been fully set forth in it. The Contract may also be subject to 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.

10. Non Discrimination Requirement (pursuant to section 4a-60 and 4a-60a of the Connecticut General Statutes, as revised): References to "minority business enterprises" in this Section are not applicable to Federal-aid projects/contracts. Federal-aid projects/contracts are instead subject to the Federal Disadvantaged Business Enterprise Program.

(a) For purposes of this Section, the following terms are defined as follows:

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

11. Whistleblower Provision

The following clause is applicable if the Contract has a value of Five Million Dollars ($5,000,000) or more.

Whistleblowing. This Contract may be subject to the provisions of Section 4-61dd of the Connecticut General Statutes. In accordance with this statute, if an officer, employee or appointing authority of the Contractor takes or threatens to take any personnel action against any employee of the Contractor in retaliation for such employee's disclosure of information to any employee of the contracting state or quasi-public agency or the Auditors of Public Accounts or the Attorney General under the provisions

of subsection (a) of such statute, the Contractor shall be liable for a civil penalty of not more than five thousand dollars for each offense, up to a maximum of twenty per cent of the value of this Contract. Each violation shall be a separate and distinct offense and in the case of a continuing violation, each calendar day's continuance of the violation shall be deemed to be a separate and distinct offense. The State may request that the Attorney General bring a civil action in the Superior Court for the Judicial District of Hartford to seek imposition and recovery of such civil penalty. In accordance with subsection (f) of such statute, each large state contractor, as defined in the statute, shall post a notice of the provisions of the statute relating to large state contractors in a conspicuous place which is readily available for viewing by the employees of the Contractor.

12. Connecticut Freedom of Information Act

(a) Disclosure of Records. This Contract may be subject to the provisions of section 1-218 of the Connecticut General Statutes. In accordance with this statute, each contract in excess of two million five hundred thousand dollars between a public agency and a person for the performance of a governmental function shall (a) provide that the public agency is entitled to receive a copy of records and files related to the performance of the governmental function, and (b) indicate that such records and files are subject to FOIA and may be disclosed by the public agency pursuant to FOIA. No request to inspect or copy such records or files shall be valid unless the request is made to the public agency in accordance with FOIA. Any complaint by a person who is denied the right to inspect or copy such records or files shall be brought to the Freedom of Information Commission in accordance with the provisions of sections 1-205 and 1-206 of the Connecticut General Statutes.

(b) Confidential Information. The State will afford due regard to the Contractor's request for the protection of proprietary or confidential information which the State receives from the Contractor. However, all materials associated with the Contract are subject to the terms of the FOIA and all corresponding rules, regulations and interpretations. In making such a request, the Contractor may not merely state generally that the materials are proprietary or confidential in nature and not, therefore, subject to release to third parties. Those particular sentences, paragraphs, pages or sections that the Contractor believes are exempt from disclosure under the FOIA must be specifically identified as such. Convincing explanation and rationale sufficient to justify each exemption consistent with the FOIA must accompany the request. The rationale and explanation must be stated in terms of the prospective harm to the competitive position of the Contractor that would result if the identified material were to be released and the reasons why the materials are legally exempt from release pursuant to the FOIA. To the extent that any other provision or part of the Contract conflicts or is in any way inconsistent with this section, this section controls and shall apply and the conflicting provision or part shall not be given effect. If the Contractor indicates that certain documentation is submitted in confidence, by specifically and clearly marking the documentation as "CONFIDENTIAL," DOT will first review the Contractor's claim for consistency with the FOIA (that is, review that the documentation is actually a trade secret or commercial or financial information and not required by statute), and if determined to be consistent, will endeavor to keep such information confidential to the extent permitted by law. See, *e.g.*, Conn. Gen. Stat. §1-210(b)(5)(A-B). The State, however, has no obligation to initiate, prosecute or defend any legal proceeding or to seek a protective order or other similar relief to prevent disclosure of any information that is sought pursuant to a FOIA request. Should the State withhold such documentation from a Freedom of Information requester and a complaint be brought to the Freedom of Information Commission, the Contractor shall have the burden of cooperating with DOT in defense of that action and in terms of establishing the availability of any FOIA exemption in any proceeding where it is an issue. In no event shall the State have any liability for the

disclosure of any documents or information in its possession which the State believes are required to be disclosed pursuant to the FOIA or other law.

13. Service of Process

The Contractor, if not a resident of the State of Connecticut, or, in the case of a partnership, the partners, if not residents, hereby appoints the Secretary of State of the State of Connecticut, and his successors in office, as agent for service of process for any action arising out of or as a result of this Contract; such appointment to be in effect throughout the life of this Contract and six (6) years thereafter.

14. Substitution of Securities for Retainages on State Contracts and Subcontracts

This Contract is subject to the provisions of Section 3-ll2a of the General Statutes of the State of Connecticut, as revised.

15. Health Insurance Portability and Accountability Act of 1996 (HIPAA)

The Contractor shall comply, if applicable, with the Health Insurance Portability and Accountability Act of 1996 and, pursuant thereto, the provisions attached at Exhibit D, and hereby made part of this Contract.

16. Forum and Choice of Law

Forum and Choice of Law. The parties deem the Contract to have been made in the City of Hartford, State of Connecticut. Both parties agree that it is fair and reasonable for the validity and construction of the Contract to be, and it shall be, governed by the laws and court decisions of the State of Connecticut, without giving effect to its principles of conflicts of laws. To the extent that any immunities provided by Federal law or the laws of the State of Connecticut do not bar an action against the State, and to the extent that these courts are courts of competent jurisdiction, for the purpose of venue, the complaint shall be made returnable to the Judicial District of Hartford only or shall be brought in the United States District Court for the District of Connecticut only, and shall not be transferred to any other court, provided, however, that nothing here constitutes a waiver or compromise of the sovereign immunity of the State of Connecticut. The Contractor waives any objection which it may now have or will have to the laying of venue of any Claims in any forum and further irrevocably submits to such jurisdiction in any suit, action or proceeding.

17. Summary of State Ethics Laws

Pursuant to the requirements of section 1-101qq of the Connecticut General Statutes, the summary of State ethics laws developed by the State Ethics Commission pursuant to section 1-81b of the Connecticut General Statutes is incorporated by reference into and made a part of the Contract as if the summary had been fully set forth in the Contract.

18. Audit and Inspection of Plants, Places of Business and Records

(a) The State and its agents, including, but not limited to, the Connecticut Auditors of Public Accounts, Attorney General and State's Attorney and their respective agents, may, at reasonable hours, inspect and examine all of the parts of the Contractor's and Contractor Parties' plants and places of business which, in any way, are related to, or involved in, the performance of this Contract. For the purposes of this Section, "Contractor Parties" means the Contractor's members, directors, officers, shareholders, partners, managers, principal officers,

representatives, agents, servants, consultants, employees or any one of them or any other person or entity with whom the Contractor is in privity of oral or written contract and the Contractor intends for such other person or entity to Perform under the Contract in any capacity.

(b) The Contractor shall maintain, and shall require each of the Contractor Parties to maintain, accurate and complete Records. The Contractor shall make all of its and the Contractor Parties' Records available at all reasonable hours for audit and inspection by the State and its agents.

(c) The State shall make all requests for any audit or inspection in writing and shall provide the Contractor with at least twenty-four (24) hours' notice prior to the requested audit and inspection date. If the State suspects fraud or other abuse, or in the event of an emergency, the State is not obligated to provide any prior notice.

(d) The Contractor shall keep and preserve or cause to be kept and preserved all of its and Contractor Parties' Records until three (3) years after the latter of (i) final payment under this Agreement, or (ii) the expiration or earlier termination of this Agreement, as the same may be modified for any reason. The State may request an audit or inspection at any time during this period. If any Claim or audit is started before the expiration of this period, the Contractor shall retain or cause to be retained all Records until all Claims or audit findings have been resolved.

(e) The Contractor shall cooperate fully with the State and its agents in connection with an audit or inspection. Following any audit or inspection, the State may conduct and the Contractor shall cooperate with an exit conference.

(f) The Contractor shall incorporate this entire Section verbatim into any contract or other agreement that it enters into with any Contractor Party.

19.Campaign Contribution Restriction

For all State contracts, defined in Conn. Gen. Stat. §9-612(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 E.

20. Tangible Personal Property

(a) The Contractor on its behalf and on behalf of its Affiliates, as defined below, shall comply with the provisions of Conn. Gen. Stat. §12-411b, as follows:

(1) For the term of the Contract, the Contractor and its Affiliates shall collect and remit to the State of Connecticut, Department of Revenue Services, any Connecticut use tax due under the provisions of Chapter 219 of the Connecticut General Statutes for items of tangible personal property sold by the Contractor or by any of its Affiliates in the same manner as if the Contractor and such Affiliates were engaged in the business of selling tangible personal property for use in Connecticut and had sufficient nexus under the provisions of Chapter 219 to be required to collect Connecticut use tax;

(2) A customer's payment of a use tax to the Contractor or its Affiliates relieves the customer of liability for the use tax;

(3) The Contractor and its Affiliates shall remit all use taxes they collect from customers on or before the due date specified in the Contract, which may not be later than the last day of the month next succeeding the end of a calendar quarter or other tax collection period during which the tax was collected;

(4) The Contractor and its Affiliates are not liable for use tax billed by them but not paid to them by a customer; and

(5) Any Contractor or Affiliate who fails to remit use taxes collected on behalf of its customers by the due date specified in the Contract shall be subject to the interest and penalties provided for persons required to collect sales tax under chapter 219 of the general statutes.

(b) For purposes of this section of the Contract, the word "Affiliate" means any person, as defined in section 12-1 of the general statutes, that controls, is controlled by, or is under common control with another person. A person controls another person if the person owns, directly or indirectly, more than ten per cent of the voting securities of the other person. The word "voting security" means a security that confers upon the holder the right to vote for the election of members of the board of directors or similar governing body of the business, or that is convertible into, or entitles the holder to receive, upon its exercise, a security that confers such a right to vote. "Voting security" includes a general partnership interest.

(c) The Contractor represents and warrants that each of its Affiliates has vested in the Contractor plenary authority to so bind the Affiliates in any agreement with the State of Connecticut. The Contractor on its own behalf and on behalf of its Affiliates shall also provide, no later than 30 days after receiving a request by the State's contracting authority, such information as the State may require to ensure, in the State's sole determination, compliance with the provisions of Chapter 219 of the Connecticut General Statutes, including, but not limited to, §12-411b.

21. Bid Rigging and/or Fraud – Notice to Contractor

The Connecticut Department of Transportation is cooperating with the U.S. Department of Transportation and the Justice Department in their investigation into highway construction contract bid rigging and/or fraud.

A toll-free "HOT LINE" telephone number 800-424-9071 has been established to receive information from contractors, subcontractors, manufacturers, suppliers or anyone with knowledge of bid rigging and/or fraud, either past or current. The "HOT LINE" telephone number will be available during normal working hours (8:00 am – 5:00 pm EST). Information will be treated confidentially and anonymity respected.

22. Consulting Agreement Affidavit

The Contractor shall comply with Connecticut General Statutes Section 4a-81(a) and 4a-81(b), as revised. Pursuant to Public Act 11-229, after the initial submission of the form, if there is a change in the information contained in the form, a contractor shall submit the updated form, as applicable, either (i) not later than thirty (30) days after the effective date of such change or (ii) prior to execution of any new contract, whichever is earlier.

The Affidavit/Form may be submitted in written format or electronic format through the Department of Administrative Services (DAS) website.

EXHIBIT A

FEDERAL TRANSIT ADMINISTRATION

Construction Contracts Required Clauses

1. Notification of Federal Participation
2. Fly America Requirements
3. Buy America Requirements (See Certification - Exhibit A, page 24)
4. Cargo Preference Requirements
5. Seismic Safety Requirements
6. Energy Conservation Requirements
7. Clean Water Requirements
8. Lobbying (See Certification - Exhibit B, page 25)
9. Access to Records and Reports
10. Federal Changes
11. Bonding Requirements
12. Clean Air
13. Recycled Products
14. Davis-Bacon and Copeland Anti-Kickback Acts
15. Contract Work Hours and Safety Standards Act
16. No Government Obligation to Third Parties
17. Program Fraud and False or Fraudulent Statements and Related Acts
18. Termination
19. Government-wide Debarment and Suspension (Nonprocurement)
20. Civil Rights Requirements
21. Breaches and Dispute Resolution
22. Transit Employee Protective Agreements
23. Disadvantaged Business Enterprises (DBE)
24. Incorporation of Federal Transit Administration (FTA) Terms
25. Access for Individuals with Disabilities
26. National Intelligent Transportation Systems Architecture and Standards
27. Assignability Clause

1. NOTIFICATION OF FEDERAL PARTICIPATION

To the extent required by law, the State agrees that any request for proposals, solicitation, award notice, press release, or other publication involving the distribution of FTA assistance for the Program or the Project having an aggregate value of $500,000 or more, shall indicate that FTA is the Federal agency that is providing the Federal assistance, the Catalog of Federal Domestic Assistance Number of the program from which the Federal assistance is authorized, as may be applicable, and the amount of Federal assistance FTA provided.

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2. FLY AMERICA REQUIREMENTS
49 U.S.C. § 40118
41 CFR Part 301-10

Applicability to Contracts

The Fly America requirements apply to the transportation of persons or property, by air, between a place in the U.S. and a place outside the U.S., or between places outside the U.S., when the FTA will participate in the costs of such air transportation. Transportation on a foreign air carrier is permissible when provided by a foreign air carrier under a code share agreement when the ticket identifies the U.S. air carrier's designator code and flight number. Transportation by a foreign air carrier is also permissible if there is a bilateral or multilateral air transportation agreement to which the U.S. Government and a foreign government are parties and which the Federal DOT has determined meets the requirements of the Fly America Act.

Flow Down Requirements

The Fly America requirements flow down from FTA recipients and subrecipients to first tier contractors, who are responsible for ensuring that lower tier contractors and subcontractors are in compliance.

Fly America Requirements

The Contractor agrees to comply with 49 U.S.C. 40118 (the "Fly America" Act) in accordance with the General Services Administration's regulations at 41 CFR Part 301-10, which provide that recipients and subrecipients of Federal funds and their contractors are required to use U.S. Flag air carriers for U.S Government-financed international air travel and transportation of their personal effects or property, to the extent such service is available, unless travel by foreign air carrier is a matter of necessity, as defined by the Fly America Act. The Contractor shall submit, if a foreign air carrier was used, an appropriate certification or memorandum adequately explaining why service by a U.S. flag air carrier was not available or why it was necessary to use a foreign air carrier and shall, in any event, provide a certificate of compliance with the Fly America requirements. The Contractor agrees to include the requirements of this section in all subcontracts that may involve international air transportation.

3. BUY AMERICA REQUIREMENTS
49 U.S.C. 5323(j)
49 CFR Part 661

Applicability to Contracts
The Buy America requirements apply to the following types of contracts: Construction Contracts and Acquisition of Goods or Rolling Stock (valued at more than $100,000).

Flow Down
The Buy America requirements flow down from FTA recipients and subrecipients to first tier contractors, who are responsible for ensuring that lower tier contractors and subcontractors are in compliance. The $100,000 threshold applies only to the grantee contract, subcontracts under that amount are subject to Buy America.

Buy America - The contractor agrees to comply with 49 U.S.C. 5323(j) and 49 C.F.R. Part 661, which provide that Federal funds may not be obligated unless steel, iron, and manufactured products used in FTA-funded projects are produced in the United States, unless a waiver has been granted by FTA or the product is subject to a general waiver. General waivers are listed in 49 C.F.R. 661.7, and include final assembly in the United States for 15 passenger vans and 15 passenger wagons produced by Chrysler Corporation, and microcomputer equipment and software. Separate requirements for rolling stock are set out at 49 U.S.C. 5323(j)(2)(C) and 49 C.F.R. 661.11. Rolling stock must be assembled in the United States and have a 60 percent domestic content.

A bidder or offeror must submit to the FTA recipient the appropriate Buy America certification (See Exhibit A of these FTA required clauses) with all bids or offers on FTA-funded contracts, except those subject to a general waiver. Bids or offers that are not accompanied by a completed Buy America certification must be rejected as nonresponsive. This requirement does not apply to lower tier subcontractors.

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4. CARGO PREFERENCE REQUIREMENTS
46 U.S.C. 1241
46 CFR Part 381

Applicability to Contracts
The Cargo Preference requirements apply to all contracts involving equipment, materials, or commodities which may be transported by ocean vessels.

Flow Down
The Cargo Preference requirements apply to all subcontracts when the subcontract may be involved with the transport of equipment, material, or commodities by ocean vessel.
Cargo Preference - Use of United States-Flag Vessels - The contractor agrees: a. to use privately owned United States-Flag commercial vessels to ship at least 50 percent of the gross tonnage (computed separately for dry bulk carriers, dry cargo liners, and tankers) involved, whenever shipping any equipment, material, or commodities pursuant to the underlying contract to the extent such vessels are available at fair and reasonable rates for United States-Flag commercial vessels; b. to furnish within 20 working days following the date of loading for shipments originating within the United States or within 30 working days following the date of leading for shipments originating outside the United States, a legible copy of a rated, "on-board" commercial ocean bill-of -lading in English for

each shipment of cargo described in the preceding paragraph to the Division of National Cargo, Office of Market Development, Maritime Administration, Washington, DC 20590 and to the FTA recipient (through the contractor in the case of a subcontractor's bill-of-lading.) c. to include these requirements in all subcontracts issued pursuant to this contract when the subcontract may involve the transport of equipment, material, or commodities by ocean vessel.

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5. SEISMIC SAFETY REQUIREMENTS
42 U.S.C. 7701 et seq. 49
CFR Part 41

Applicability to Contracts
The Seismic Safety requirements apply only to contracts for the construction of new buildings or additions to existing buildings.

Flow Down
The Seismic Safety requirements flow down from FTA recipients and subrecipients to first tier contractors to assure compliance, with the applicable building standards for Seismic Safety, including the work performed by all subcontractors.

Seismic Safety - The contractor agrees that any new building or addition to an existing building will be designed and constructed in accordance with the standards for Seismic Safety required in Department of Transportation Seismic Safety Regulations 49 CFR Part 41 and will certify to compliance to the extent required by the regulation. The contractor also agrees to ensure that all work performed under this contract including work performed by a subcontractor is in compliance with the standards required by the Seismic Safety Regulations and the certification of compliance issued on the project.

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6. ENERGY CONSERVATION REQUIREMENTS
42 U.S.C. 6321 et seq.
49 CFR Part 18

Applicability to Contracts
The Energy Conservation requirements are applicable to all contracts.

Flow Down
The Energy Conservation requirements extend to all third party contractors and their contracts at every tier and subrecipients and their subagreements at every tier.

Energy Conservation - The contractor agrees to comply with mandatory standards and policies relating to energy efficiency which are contained in the state energy conservation plan issued in compliance with the Energy Policy and Conservation Act.

7. CLEAN WATER REQUIREMENTS
33 U.S.C. 1251

Applicability to Contracts
The Clean Water requirements apply to each contract and subcontract which exceeds $100,000.

Flow Down
The Clean Water requirements flow down to FTA recipients and subrecipients at every tier.

Clean Water - (1) The Contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Federal Water Pollution Control Act, as amended, 33 U.S.C. 1251 et seq. The Contractor agrees to report each violation to the Purchaser and understands and agrees that the Purchaser will, in turn, report each violation as required to assure notification to FTA and the appropriate EPA Regional Office.

(2) The Contractor also agrees to include these requirements in each subcontract exceeding $100,000 financed in whole or in part with Federal assistance provided by FTA.

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8. LOBBYING
31 U.S.C. 1352
49 CFR Part 19
49 CFR Part 20

Applicability to Contracts
The Lobbying requirements apply to Construction/Architectural and Engineering/Acquisition of Rolling Stock/Professional Service Contract/Operational Service Contract/Turnkey contracts.

Flow Down
The Lobbying requirements mandate the maximum flow down, pursuant to Byrd Anti-Lobbying Amendment, 31 U.S.C. § 1352(b)(5) and 49 C.F.R. Part 19, Appendix A, Section 7.

Byrd Anti-Lobbying Amendment, 31 U.S.C. 1352, as amended by the Lobbying Disclosure Act of 1995, P.L. 104-65 [to be codified at 2 U.S.C. § 1601, et seq.] - Contractors who apply or bid for an award of $100,000 or more **shall file the certification required (See Exhibit B of these FTA required clauses)** by 49 CFR part 20, "New Restrictions on Lobbying." Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, officer or employee of Congress, or an employee of a member of Congress in connection with obtaining any Federal contract, grant or any other award covered by 31 U.S.C. 1352. Each tier shall also disclose the name of any registrant under the Lobbying Disclosure Act of 1995 who has made lobbying contacts on its behalf with non-Federal funds with respect to that Federal contract, grant or award covered by 31 U.S.C. 1352. Such disclosures are forwarded from tier to tier up to the recipient.

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9. ACCESS TO RECORDS AND REPORTS
49 U.S.C. 5325
18 CFR 18.36 (i)
49 CFR 633.17

Applicability to Contracts
Reference Chart "Requirements for Access to Records and Reports by Type of Contracts"

Flow Down
FTA does not require the inclusion of these requirements in subcontracts.

Access to Records - The following access to records requirements apply to this Contract:

1. Where the Purchaser is not a State but a local government and is the FTA Recipient or a subgrantee of the FTA Recipient in accordance with 49 C.F.R. 18.36(i), the Contractor agrees to provide the Purchaser, the FTA Administrator, the Comptroller General of the United States or any of their authorized representatives access to any books, documents, papers and records of the Contractor which are directly pertinent to this contract for the purposes of making audits, examinations, excerpts and transcriptions. Contractor also agrees, pursuant to 49 C.F.R. 633.17 to provide the FTA Administrator or his authorized representatives including any PMO Contractor access to Contractor's records and construction sites pertaining to a major capital project, defined at 49 U.S.C. 5302(a)1, which is receiving federal financial assistance through the programs described at 49 U.S.C. 5307, 5309 or 5311.

2. Where the Purchaser is a State and is the FTA Recipient or a subgrantee of the FTA Recipient in accordance with 49 C.F.R. 633.17, Contractor agrees to provide the Purchaser, the FTA Administrator or his authorized representatives, including any PMO Contractor, access to the Contractor's records and construction sites pertaining to a major capital project, defined at 49 U.S.C. 5302(a)1, which is receiving federal financial assistance through the programs described at 49 U.S.C. 5307, 5309 or 5311. By definition, a major capital project excludes contracts of less than the simplified acquisition threshold currently set at $100,000.

3. Where the Purchaser enters into a negotiated contract for other than a small purchase or under the simplified acquisition threshold and is an institution of higher education, a hospital or other non-profit organization and is the FTA Recipient or a subgrantee of the FTA Recipient in accordance with 49 C.F.R. 19.48, Contractor agrees to provide the Purchaser, FTA Administrator, the Comptroller General of the United States or any of their duly authorized representatives with access to any books, documents, papers and record of the Contractor which are directly pertinent to this contract for the purposes of making audits, examinations, excerpts and transcriptions.

4. Where any Purchaser which is the FTA Recipient or a subgrantee of the FTA Recipient in accordance with 49 U.S.C. 5325(a) enters into a contract for a capital project or improvement (defined at 49 U.S.C. 5302(a)1) through other than competitive bidding, the Contractor shall make available records related to the contract to the Purchaser, the Secretary of Transportation and the Comptroller General or any authorized officer or employee of any of them for the purposes of conducting an audit and inspection.

5. The Contractor agrees to permit any of the foregoing parties to reproduce by any means whatsoever or to copy excerpts and transcriptions as reasonably needed.

6. The Contractor agrees to maintain all books, records, accounts and reports required under this contract for a period of not less than three years after the date of termination or expiration of this contract, except in the event of litigation or settlement of claims arising from the performance of this contract, in which case Contractor agrees to maintain same until the Purchaser, the FTA Administrator, the Comptroller General, or any of their duly authorized representatives, have disposed of all such litigation, appeals, claims or exceptions related thereto. Reference 49 CFR 18.39(i)(11).

7. FTA does not require the inclusion of these requirements in subcontracts.

Requirements for Access to Records and Reports by Types of Contract

Contract Characteristics		Operational Service Contract	Turnkey	Construction	Architectural Engineering	Acquisition of Rolling Stock	Professional Services
I State Grantees a. Contracts below SAT ($100,000) b. Contracts above $100,000/Capital Projects		None None unless[1] non-competitive award	Those imposed on state pass thru to Contractor	None Yes, if non-competitive award or if funded thru[2] 5307/5309/5311	None None unless non-competitive award	None None unless non-competitive award	None None unless non-competitive award
II Non State Grantees a. Contracts below SAT ($100,000) b. Contracts above $100,000/Capital Projects		Yes[3] Yes[3]	Those imposed on non-state Grantee pass thru to Contractor	Yes Yes	Yes Yes	Yes Yes	Yes Yes

Sources of Authority:
[1] 49 USC 5325 (a)
[2] 49 CFR 633.17
[3] 18 CFR 18.36 (i)

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10. FEDERAL CHANGES
49 CFR Part 18

Applicability to Contracts
The Federal Changes requirement applies to all contracts.

Flow Down
The Federal Changes requirement flows down appropriately to each applicable changed requirement.

Federal Changes - Contractor shall at all times comply with all applicable FTA regulations, policies, procedures and directives, including without limitation those listed directly or by reference in the Master Agreement between Purchaser and FTA, as they may be amended or promulgated from time to time during the term of this contract. Contractor's failure to so comply shall constitute a material breach of this contract.

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11. BONDING REQUIREMENTS

Refer to the Standard Specifications for Roads, Bridges and Incidental Construction, FORM 816, Section 1.02.01 – "Contract Bidding and Award" - Bonding requirements are addressed in the Connecticut Department of Transportation's Construction Contract Bidding and Award Manual.

12. CLEAN AIR
42 U.S.C. 7401 et seq
40 CFR 15.61
49 CFR Part 18

Applicability to Contracts
The Clean Air requirements apply to all contracts exceeding $100,000, including indefinite quantities where the amount is expected to exceed $100,000 in any year.

Flow Down
The Clean Air requirements flow down to all subcontracts which exceed $100,000.

Clean Air - (1) The Contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act, as amended, 42 U.S.C. §§ 7401 et seq. The Contractor agrees to report each violation to the Purchaser and understands and agrees that the Purchaser will, in turn, report each violation as required to assure notification to FTA and the appropriate EPA Regional Office.

(2) The Contractor also agrees to include these requirements in each subcontract exceeding $100,000 financed in whole or in part with Federal assistance provided by FTA.

13. RECYCLED PRODUCTS
42 U.S.C. 6962
40 CFR Part 247
Executive Order 12873

Applicability to Contracts
The Recycled Products requirements apply to all contracts for items designated by the EPA, when the purchaser or contractor procures $10,000 or more of one of these items during the fiscal year, or has procured $10,000 or more of such items in the previous fiscal year, using Federal funds. New requirements for "recovered materials" will become effective May 1, 1996. These new regulations apply to all procurement actions involving items designated by the EPA, where the procuring agency purchases $10,000 or more of one of these items in a fiscal year, or when the cost of such items purchased during the previous fiscal year was $10,000.

Flow Down
These requirements flow down to all contractor and subcontractor tiers.

Recovered Materials - The contractor agrees to comply with all the requirements of Section 6002 of the Resource Conservation and Recovery Act (RCRA), as amended (42 U.S.C. 6962), including but not limited to the regulatory provisions of 40 CFR Part 247, and Executive Order 12873, as they apply to the procurement of the items designated in Subpart B of 40 CFR Part 247.

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14. DAVIS-BACON AND COPELAND ANTI-KICKBACK ACTS

Background and Application

The Davis-Bacon and Copeland Acts are codified at 40 USC 3141, *et seq.* and 18 USC 874. The Acts apply to grantee construction contracts and subcontracts that "at least partly are financed by a loan or grant from the Federal Government." 40 USC 3145(a), 29 CFR 5.2(h), 49 CFR 18.36(i)(5). The Acts apply to any construction contract over $2,000. 40 USC 3142(a), 29 CFR 5.5(a). 'Construction,' for purposes of the Acts, includes "actual construction, alteration and/or repair, including painting and decorating." 29 CFR 5.5(a). The requirements of both Acts are incorporated into a single clause (*see* 29 CFR 3.11) enumerated at 29 CFR 5.5(a) and reproduced below.

The clause language is drawn directly from 29 CFR 5.5(a) and any deviation from the model clause below should be coordinated with counsel to ensure the Acts' requirements are satisfied.

Davis-Bacon and Copeland Anti-Kickback Acts

(1) **Minimum wages -** (i) All laborers and mechanics employed or working upon the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR Part 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classifications and wage rates conformed under paragraph (1)(ii) of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

(ii)(A) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(1) Except with respect to helpers as defined as 29 CFR 5.2(n)(4), the work to be performed by the classification requested is not performed by a classification in the wage determination; and

(2) The classification is utilized in the area by the construction industry; and

(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination; and

(4) With respect to helpers as defined in 29 CFR 5.2(n)(4), such a classification prevails in the area in which the work is performed.

(B) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(C) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(1)(ii) (B) or (C) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

(v)(A) The contracting officer shall require that any class of laborers or mechanics which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefor only when the following criteria have been met:

(1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(2) The classification is utilized in the area by the construction industry; and

(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(B) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(C) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination with 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(1)(v) (B) or (C) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(2) **Withholding** - The State shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), all or part of the wages required by the contract, the State may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

(3) **Payrolls and basic records** - (i) Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work (or under the United States Housing Act of 1937, or under the Housing Act of 1949, in the construction or development of the project). Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain

records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(ii)(A) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the State for transmission to the Federal Transit Administration. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under section 5.5(a)(3)(i) of Regulations, 29 CFR part 5. This information may be submitted in any form desired. Optional Form WH-347 is available for this purpose and may be purchased from the Superintendent of Documents (Federal Stock Number 029-005-00014-1), U.S. Government Printing Office, Washington, DC 20402. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors.

(B) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be maintained under section 5.5(a)(3)(i) of Regulations, 29 CFR part 5 and that such information is correct and complete;

(2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;

(3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(C) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (a)(3)(ii)(B) of this section.

(D) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

(iii) The contractor or subcontractor shall make the records required under paragraph (a)(3)(i) of this section available for inspection, copying, or transcription by authorized representatives of the Federal Transit Administration or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the Federal agency may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

(4) **Apprentices and trainees** - (i) Apprentices - Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Bureau of Apprenticeship and Training, or with a State Apprenticeship Agency recognized by the Bureau, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Bureau of Apprenticeship and Training or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator of the Wage and Hour Division of the U.S. Department of Labor determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Bureau of Apprenticeship and Training, or a State Apprenticeship Agency recognized by the Bureau, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) Trainees - Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed.

In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) Equal employment opportunity - The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

(5) **Compliance with Copeland Act requirements** - The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.

(6) **Subcontracts** - The contractor or subcontractor shall insert in any subcontracts the clauses contained in 29 CFR 5.5(a)(1) through (10) and such other clauses as the Federal Transit Administration may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

(7) **Contract termination: debarment** - A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

(8) **Compliance with Davis-Bacon and Related Act requirements** - All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.

(9) **Disputes concerning labor standards** - Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

(10) **Certification of eligibility** - (i) By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

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15. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

Background and Application

The Contract Work Hours and Safety Standards Act is codified at 40 USC 3701, *et seq.* The Act applies to grantee contracts and subcontracts "financed at least in part by loans or grants from … the

[Federal] Government." 40 USC 3701(b)(1)(B)(iii) and (b)(2), 29 CFR 5.2(h), 49 CFR 18.36(i)(6). Although the original Act required its application in any construction contract over $2,000 or non-construction contract to which the Act applied over $2,500 (and language to that effect is still found in 49 CFR 18.36(i)(6)), the Act no longer applies to any "contract in an amount that is not greater than $100,000." 40 USC 3701(b)(3) (A)(iii).

The Act applies to construction contracts and, in very limited circumstances, non-construction projects that employ "laborers or mechanics on a public work." These non-construction applications do not generally apply to transit procurements because transit procurements (to include rail cars and buses) are deemed "commercial items." 40 USC 3707, 41 USC 403 (12). A grantee that contemplates entering into a contract to procure a developmental or unique item should consult counsel to determine if the Act applies to that procurement and that additional language required by 29 CFR 5.5(c) must be added to the basic clause below.

Contract Work Hours and Safety Standards

(1) **Overtime requirements** - No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

(2) **Violation; liability for unpaid wages; liquidated damages** - In the event of any violation of the clause set forth in paragraph (1) of this section the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1) of this section, in the sum of $10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (1) of this section.

(3) **Withholding for unpaid wages and liquidated damages** - The (***write in the name of the grantee***) shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (2) of this section.

(4) **Subcontracts** - The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraphs (1) through (4) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (1) through (4) of this section

16. NO GOVERNMENT OBLIGATION TO THIRD PARTIES

Applicability to Contracts
Applicable to all contracts.

Flow Down
Not required by statute or regulation for either primary contractors or subcontractors, this concept should flow down to all levels to clarify, to all parties to the contract, that the Federal Government does not have contractual liability to third parties, absent specific written consent.

No Obligation by the Federal Government.

(1) The Purchaser and Contractor acknowledge and agree that, notwithstanding any concurrence by the Federal Government in or approval of the solicitation or award of the underlying contract, absent the express written consent by the Federal Government, the Federal Government is not a party to this contract and shall not be subject to any obligations or liabilities to the Purchaser, Contractor, or any other party (whether or not a party to that contract) pertaining to any matter resulting from the underlying contract.

(2) The Contractor agrees to include the above clause in each subcontract financed in whole or in part with Federal assistance provided by FTA. It is further agreed that the clause shall not be modified, except to identify the subcontractor who will be subject to its provisions.

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17. PROGRAM FRAUD AND FALSE OR FRAUDULENT STATEMENTS AND RELATED ACTS

31 U.S.C. 3801 et seq.
49 CFR Part 31 18 U.S.C. 1001
49 U.S.C. 5307

Applicability to Contracts
These requirements are applicable to all contracts.

Flow Down
These requirements flow down to contractors and subcontractors who make, present, or submit covered claims and statements.

Program Fraud and False or Fraudulent Statements or Related Acts.

(1) The Contractor acknowledges that the provisions of the Program Fraud Civil Remedies Act of 1986, as amended, 31 U.S.C. § 3801 et seq. and U.S. DOT regulations, "Program Fraud Civil Remedies," 49 C.F.R. Part 31, apply to its actions pertaining to this Project. Upon execution of the underlying contract, the Contractor certifies or affirms the truthfulness and accuracy of any statement it has made, it makes, it may make, or causes to be made, pertaining to the underlying contract or the FTA assisted project for which this contract work is being performed. In addition to other penalties that may be applicable, the Contractor further acknowledges that if it makes, or causes to be made, a false, fictitious, or fraudulent claim, statement, submission, or certification, the Federal Government reserves the right to impose the penalties of the Program Fraud Civil
Remedies Act of 1986 on the Contractor to the extent the Federal Government deems appropriate.

(2) The Contractor also acknowledges that if it makes, or causes to be made, a false, fictitious, or fraudulent claim, statement, submission, or certification to the Federal Government under a contract connected with a project that is financed in whole or in part with Federal assistance originally awarded by FTA under the authority of 49 U.S.C. § 5307, the Government reserves the right to impose the penalties of 18 U.S.C. § 1001 and 49 U.S.C. § 5307(n)(1) on the Contractor, to the extent the Federal Government deems appropriate.

(3) The Contractor agrees to include the above two clauses in each subcontract financed in whole or in part with Federal assistance provided by FTA. It is further agreed that the clauses shall not be modified, except to identify the subcontractor who will be subject to the provisions.

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18. TERMINATION

Refer to the Standard Specifications for Roads, Bridges and Incidental Construction FORM 816 Section 1.05.14

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19. GOVERNMENT-WIDE DEBARMENT AND SUSPENSION (NONPROCUREMENT)

Background and Applicability

In conjunction with the Office of Management and Budget and other affected Federal agencies, DOT published an update to 49 CFR Part 29 on November 26, 2003. This government-wide regulation implements Executive Order 12549, *Debarment and Suspension*, Executive Order 12689, *Debarment and Suspension*, and 31 U.S.C. 6101 note (Section 2455, Public Law 103-355, 108 Stat. 3327).

The provisions of Part 29 apply to all grantee contracts and subcontracts at any level expected to equal or exceed $25,000 as well as any contract or subcontract (at any level) for Federally required auditing services. 49 CFR 29.220(b). This represents a change from prior practice in that the dollar threshold for application of these rules has been lowered from $100,000 to $25,000. These are contracts and subcontracts referred to in the regulation as "covered transactions."

Grantees, contractors, and subcontractors (at any level) that enter into covered transactions are required to verify that the entity (as well as its principals and affiliates) they propose to contract or subcontract with is not excluded or disqualified. They do this by (a) Checking the Excluded Parties List System, (b) Collecting a certification from that person, or (c) Adding a clause or condition to the contract or subcontract. This represents a change from prior practice in that certification is still acceptable but is no longer required. 49 CFR 29.300.

Grantees, contractors, and subcontractors who enter into covered transactions also must require the entities they contract with to comply with 49 CFR 29, subpart C and include this requirement in their own subsequent covered transactions (i.e., the requirement flows down to subcontracts at all levels).

Suspension and Debarment

This contract is a covered transaction for purposes of 49 CFR Part 29. As such, the contractor is required to verify that none of the contractor, its principals, as defined at 49 CFR 29.995, or affiliates, as defined at 49 CFR 29.905, are excluded or disqualified as defined at 49 CFR 29.940 and 29.945.

The contractor is required to comply with 49 CFR 29, Subpart C and must include the requirement to comply with 49 CFR 29, Subpart C in any lower tier covered transaction it enters into.
By signing and submitting its bid or proposal, the bidder or proposer certifies as follows:

The certification in this clause is a material representation of fact relied upon by Connecticut Department of Transportation. If it is later determined that the bidder or proposer knowingly rendered an erroneous certification, in addition to remedies available to Connecticut Department of Transportation., the Federal Government may pursue available remedies, including but not limited to suspension and/or debarment. The bidder or proposer agrees to comply with the requirements of 49 CFR 29, Subpart C while this offer is valid and throughout the period of any contract that may arise from this offer. The bidder or proposer further agrees to include a provision requiring such compliance in its lower tier covered transactions.

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20. CIVIL RIGHTS REQUIREMENTS

29 U.S.C. § 623, 42 U.S.C. § 2000
42 U.S.C. § 6102, 42 U.S.C. § 12112
42 U.S.C. § 12132, 49 U.S.C. § 5332
29 CFR Part 1630, 41 CFR Parts 60 et seq.

Applicability to Contracts
The Civil Rights Requirements apply to all contracts.

Flow Down
The Civil Rights requirements flow down to all third party contractors and their contracts at every tier.
Model Clause/Language
The following clause was predicated on language contained at 49 CFR Part 19, Appendix A, but FTA has shortened the lengthy text.

Civil Rights - The following requirements apply to the underlying contract:

(1) Nondiscrimination - In accordance with Title VI of the Civil Rights Act, as amended, 42 U.S.C. § 2000d, section 303 of the Age Discrimination Act of 1975, as amended, 42 U.S.C. § 6102, section 202 of the Americans with Disabilities Act of 1990, 42 U.S.C. § 12132, and Federal transit law at 49 U.S.C. § 5332, the Contractor agrees that it will not discriminate against any employee or applicant for employment because of race, color, creed, national origin, sex, age, or disability. In addition, the Contractor agrees to comply with applicable Federal implementing regulations and other implementing requirements FTA may issue.

(2) Equal Employment Opportunity - The following equal employment opportunity requirements apply to the underlying contract:
(a) Race, Color, Creed, National Origin, Sex - In accordance with Title VII of the Civil Rights Act, as amended, 42 U.S.C. § 2000e, and Federal transit laws at 49 U.S.C. § 5332, the Contractor agrees to comply with all applicable equal employment opportunity requirements of U.S. Department of Labor (U.S. DOL) regulations, "Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor," 41 C.F.R. Parts 60 et seq., (which implement Executive Order No. 11246, "Equal Employment Opportunity," as amended by Executive Order No. 11375, "Amending Executive Order 11246 Relating to Equal Employment Opportunity," 42 U.S.C. § 2000e note), and with any applicable Federal statutes, executive orders, regulations, and Federal policies that may in the future affect construction activities undertaken in the course of the Project. The Contractor agrees to

take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, creed, national origin, sex, or age. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. In addition, the Contractor agrees to comply with any implementing requirements FTA may issue.

(b) Age - In accordance with section 4 of the Age Discrimination in Employment Act of 1967, as amended, 29 U.S.C. § § 623 and Federal transit law at 49 U.S.C. § 5332, the Contractor agrees to refrain from discrimination against present and prospective employees for reason of age. In addition, the Contractor agrees to comply with any implementing requirements FTA may issue.

(c) Disabilities - In accordance with section 102 of the Americans with Disabilities Act, as amended, 42 U.S.C. § 12112, the Contractor agrees that it will comply with the requirements of U.S. Equal Employment Opportunity Commission, "Regulations to Implement the Equal Employment Provisions of the Americans with Disabilities Act," 29 C.F.R. Part 1630, pertaining to employment of persons with disabilities. In addition, the Contractor agrees to comply with any implementing requirements FTA may issue.

(3) The Contractor also agrees to include these requirements in each subcontract financed in whole or in part with Federal assistance provided by FTA, modified only if necessary to identify the affected parties.

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21. BREACHES AND DISPUTE RESOLUTION

Refer to the Standard Specifications for Roads, Bridges and Incidental Construction, FORM 816, Sections 1.05.01 and 1.08.01 and Connecticut General Statue 4-61(as amended)

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22. TRANSIT EMPLOYEE PROTECTIVE AGREEMENTS
49 U.S.C. § 5310, § 5311, and § 5333
29 CFR Part 215

Applicability to Contracts

The Transit Employee Protective Provisions apply to each contract for transit operations performed by employees of a Contractor recognized by FTA to be a transit operator. (Because transit operations involve many activities apart from directly driving or operating transit vehicles, FTA determines which activities constitute transit "operations" for purposes of this clause.)

Flow Down

These provisions are applicable to all contracts and subcontracts at every tier.

Transit Employee Protective Provisions. (1) The Contractor agrees to the comply with applicable transit employee protective requirements as follows:

(a) General Transit Employee Protective Requirements - To the extent that FTA determines that transit operations are involved, the Contractor agrees to carry out the transit operations work on the underlying contract in compliance with terms and conditions determined by the U.S. Secretary of Labor to be fair and equitable to protect the interests of employees employed under this contract and to meet the employee protective requirements of 49 U.S.C. A 5333(b), and U.S. DOL guidelines at 29

C.F.R. Part 215, and any amendments thereto. These terms and conditions are identified in the letter of certification from the U.S. DOL to FTA applicable to the FTA Recipient's project from which Federal assistance is provided to support work on the underlying contract. The Contractor agrees to carry out that work in compliance with the conditions stated in that U.S. DOL letter. The requirements of this subsection (1), however, do not apply to any contract financed with Federal assistance provided by FTA either for projects for elderly individuals and individuals with disabilities authorized by 49 U.S.C. § 5310(a)(2), or for projects for nonurbanized areas authorized by 49 U.S.C. § 5311. Alternate provisions for those projects are set forth in subsections (b) and (c) of this clause.

(b) Transit Employee Protective Requirements for Projects Authorized by 49 U.S.C. § 5310(a)(2) for Elderly Individuals and Individuals with Disabilities - If the contract involves transit operations financed in whole or in part with Federal assistance authorized by 49 U.S.C. § 5310(a)(2), and if the U.S. Secretary of Transportation has determined or determines in the future that the employee protective requirements of 49 U.S.C. § 5333(b) are necessary or appropriate for the state and the public body subrecipient for which work is performed on the underlying contract, the Contractor agrees to carry out the Project in compliance with the terms and conditions determined by the U.S. Secretary of Labor to meet the requirements of 49 U.S.C. § 5333(b), U.S. DOL guidelines at 29 C.F.R. Part 215, and any amendments thereto. These terms and conditions are identified in the U.S. DOL's letter of certification to FTA, the date of which is set forth Grant Agreement or Cooperative Agreement with the state. The Contractor agrees to perform transit operations in connection with the underlying contract in compliance with the conditions stated in that U.S. DOL letter.

(c) Transit Employee Protective Requirements for Projects Authorized by 49 U.S.C. § 5311 in Nonurbanized Areas - If the contract involves transit operations financed in whole or in part with Federal assistance authorized by 49 U.S.C. § 5311, the Contractor agrees to comply with the terms and conditions of the Special Warranty for the Nonurbanized Area Program agreed to by the U.S. Secretaries of Transportation and Labor, dated May 31, 1979, and the procedures implemented by U.S. DOL or any revision thereto.

(2) The Contractor also agrees to include the any applicable requirements in each subcontract involving transit operations financed in whole or in part with Federal assistance provided by FTA.

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23. DISADVANTAGED BUSINESS ENTERPRISE (DBE)

Refer to the Special Provision section titled D.B.E. Subcontractors and Material Suppliers or Manufacturers

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24. INCORPORATION OF FEDERAL TRANSIT ADMINISTRATION (FTA) TERMS
FTA Circular 4220.1F

Applicability to Contracts
The incorporation of FTA terms applies to all contracts.

Flow Down
The incorporation of FTA terms has unlimited flow down.

Incorporation of Federal Transit Administration (FTA) Terms - The preceding provisions include, in part, certain Standard Terms and Conditions required by DOT, whether or not expressly set forth in

the preceding contract provisions. All contractual provisions required by DOT, as set forth in FTA Circular 4220.1F, are hereby incorporated by reference. Anything to the contrary herein notwithstanding, all FTA mandated terms shall be deemed to control in the event of a conflict with other provisions contained in this Agreement. The Contractor shall not perform any act, fail to perform any act, or refuse to comply with any (name of grantee) requests which would cause (name of grantee) to be in violation of the FTA terms and conditions.

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25. ACCESS FOR INDIVIDUALS WITH DISABILITY

The Contactor agrees to comply with 49 U.S.C. § 5301(d), which states the Federal policy that elderly individuals and individuals with disabilities have the same right as other individuals to use public transportation services and facilities, and that special efforts shall be made in planning and designing those services and facilities to implement transportation accessibility rights for elderly individuals and individuals with disabilities. The Contractor also agrees to comply with all applicable provisions of section 504 of the Rehabilitation Act of 1973, as amended, 29 U.S.C. § 794, which prohibits discrimination on the basis of disability in the administration of programs or activities receiving.

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26. NATIONAL INTELLIGENT TRANSPORTATION SYSTEMS ARCHITECURE AND STANDARDS

To the extent applicable, the Contractor agrees to conform to the National Intelligent Transportation Systems (ITS) Architecture and Standards as required by SAFETEA-LU § 5307(c), 23 U.S.C. § 512 note, and follow the provisions of FTA Notice, "FTA National ITS Architecture Policy on Transit Projects," 66 *Fed. Reg.* 1455 *et seq*., January 8, 2001, and any other implementing directives FTA may issue at a later date, except to the extent FTA determines otherwise in writing.

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27. ASSIGNABILITY CLAUSE

The State agrees to comply with applicable third party procurement requirements of 49 U.S.C. chapter 53, and ensure that for piggybacking purchases made with FTA-assistance, that contract utilized contains assignability clause that authorizes such piggybacking purchases.

Exhibit A of FTA Requirements

Certification requirement for procurement of steel, iron, or manufactured products.

Certificate of Compliance with 49 U.S.C. 5323(j)(1)

The bidder or offeror hereby certifies that it will meet the requirements of 49 U.S.C. 5323(j)(1) and the applicable regulations in 49 C.F.R. Part 661.5.

Date _____

Signature _____

Company Name _____

Title _____

Certificate of Non-Compliance with 49 U.S.C. 5323(j)(1)

The bidder or offeror hereby certifies that it cannot comply with the requirements of 49 U.S.C. 5323(j)(1) and 49 C.F.R. 661.5, but it may qualify for an exception pursuant to 49 U.S.C. 5323(j)(2)(A), 5323(j)(2)(B), or 5323(j)(2)(D), and 49 C.F.R. 661.7.

Date _____

Signature _____

Company Name _____

Title _____

Exhibit B of FTA Requirements

(To be submitted with each bid or offer exceeding $100,000)

The undersigned [Contractor] certifies, to the best of his or her knowledge and belief, that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for making lobbying contacts to an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form--LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions [as amended by "Government wide Guidance for New Restrictions on Lobbying," 61 Fed. Reg. 1413 (1/19/96). Note: Language in paragraph (2) herein has been modified in accordance with Section 10 of the Lobbying Disclosure Act of 1995 (P.L. 104-65, to be codified at 2 U.S.C. 1601, *et seq.*)]

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31, U.S.C. § 1352 (as amended by the Lobbying Disclosure Act of 1995). Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

[Note: Pursuant to 31 U.S.C. § 1352(c)(1)-(2)(A), any person who makes a prohibited expenditure or fails to file or amend a required certification or disclosure form shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such expenditure or failure.]

The Contractor, _____, certifies or affirms the truthfulness and accuracy of each statement of its certification and disclosure, if any. In addition, the Contractor understands and agrees that the provisions of 31 U.S.C. A 3801, *et seq.*, apply to this certification and disclosure, if any.

_____ Signature of Contractor's Authorized Official

_____ Name and Title of Contractor's Authorized Official

_____ Date

EXHIBIT B

TITLE VI CONTRACTOR ASSURANCES

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 C

CONTRACTOR WORKFORCE UTILIZATION (FEDERAL EXECUTIVE ORDER 11246) / EQUAL EMPLOYMENT OPPORTUNITY

1. **Project Workforce Utilization Goals:**
   These goals are applicable to all the Contractor's construction work (whether or not it is Federal or Federally assisted or funded) performed in the covered area. If the contractor performs construction work in a geographical area located outside of the covered area, it shall apply the goals established for the geographical area where the work is actually performed.

   Whenever the Contractor, or any Subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of $10,000 the provisions of these specifications which contain the applicable goals for minority and female participation.

   The goals for minority and female utilization are expressed in percentage terms for the contractor's aggregate work-force in each trade on all construction work in the covered area, are referenced in the attached Appendix A.

2. **Executive Order 11246**
   The Contractor's compliance with Executive Order 11246 and 41-CFR Part 60-4 shall be based on its implementation of the specific affirmative action obligations required by the specifications set forth in 41 CFR 60-4.3(A) and its efforts to meet the goals established for the geographical area where the contract is to be performed. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade, and the contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from contractor to contractor or from project to project for the sole purpose of meeting the contractor's goals shall be a violation of the contract, the Executive Order and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hour performed.

   If the Contractor is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each Contractor or Subcontractor participating in an approved Plan is individually required to comply with its obligations under the EEO clause, and to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other Contractors or subcontractors toward a goal in an approved Pan does not excuse any covered Contractor's of subcontractor's failure to take good faith efforts to achieve the plan goals and timetables.

   The Contractor shall implement the specific affirmative action standards provided in a through p of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. Covered Construction contractors performing

construction work in geographical areas where they do not have a federal or federally assisted construction contract shall apply the minority and female goals established for the geographical area where the work is being performed. Goals are published periodically in the Federal Register in notice form and such notices may be obtained from any Office of Federal Contract Compliance Programs (OFCCP) Office or from Federal procurement contracting officers. The Contractor is expected to make substantially uniform progress in meeting its goals in each craft during the period specified.

Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the Contractor has a collective bargaining agreement, to refer either minorities or women shall excuse the Contractors obligations under these specifications, Executive Order 11246, or the regulations promulgated pursuant hereto.

In order for the nonworking training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the Contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.

The Contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully, and shall implement affirmative action steps at least as extensive as the following:

a. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites; and in all facilities at which the Contractor's employees are assigned to work. The Contractor, where possible, will assign two or more women to each construction project. The Contractor shall specifically ensure that all foremen, superintendents, and other on-site supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.

b. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the Contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.

c. Maintain a current file of the names, addresses and telephone numbers of each minority and female off the street applicant and minority or female referral from a union, a recruitment source or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union or, if referred, not employed by the Contractor, this shall be documented in the file with the reason thereafter; along with whatever additional actions the Contractor may have taken.

d. Provide immediate written notification to the Director when the Union or Unions with which the Contractor has a collective bargaining agreement has not referred to the Contractor a minority person or women sent by the Contractor, or when the Contractor has other information that the Union referral process has impeded the Contractor's efforts to meet its obligations.

e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the sources compiled under b above.

f. Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO Policy on bulletin boards accessible to all employees at each location where construction work is performed.

g. Review, at least annually, the company EEO Policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination or other employment, decisions including specific Foreman, etc. prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.

h. Disseminate the Contractor's EEO Policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the Contractor's EEO policy with other Contractors and subcontractors with whom the Contractor does or anticipates doing business.

i. Direct its recruitment efforts, both oral and written, to minority female and community organizations, to schools with minority and female students and to minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the contractor shall send written notification to organizations such as the above, describing the openings, screening procedures and tests to be used in the selection process.

j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer and vacation employment to minority and female youth both on the site and in other areas of a Contractor's work-force.

k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR Part 60-3.

l. Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.

m. Ensure that seniority practices, job classifications, work assignments and other personnel practices, do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.

n. Ensure that all facilities and company activities are non-segregated except that separate or single user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.

o. Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.

p. Conduct a review at least annually of all supervisors' adherence to and performance under the Contractor's EEO policies and affirmative action obligations.

Contractors are encouraged to participate in voluntary associations which assist in fulfilling one or more of their affirmative action obligations (a through p). The efforts of a contractor association, joint contractor union, contractor community, or other similar group of which the contractor is a member and participant, may be asserted as fulfilling any one or more of its obligations under a through p of these specifications provided that the contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the Contractor's minority and female work-force participation, makes a good faith effort to meet with individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply, however, is the Contractor's and failure of such a group to fulfill an obligation shall not be a defense for the Contractor's noncompliance.

A single goal for minorities and a separate single goal for women have been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, the Contractor may be in violation of Executive Order 11246 if a particular group is employed in a substantially disparate manner, (for example, even though the Contractor has achieved its goals for women generally, the Contractor may be in violation of the Executive Order if a specific minority group of women is under utilized).

The Contractor shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, religion, sex, or national origin.

The Contractor shall not enter into any Subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.

The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations by the Office of Federal Contract Compliance Programs. Any Contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.

The Contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the

implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR 60-4 8.

The Contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government and to keep records. Records shall at least include for each employee the name, address, telephone numbers, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status, (e.g. mechanic, apprentice, trainee, helper, or laborer) dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.

Nothing herein provided shall be construed as a limitation upon the application of their laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g. those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

The Director of the Office of Federal Contract Compliance Programs, from time to time, shall issue goals and timetables for minority and female utilization which shall be based on appropriate work-force, demographic or other relevant data and which shall cover construction projects or construction contracts performed in specific geographical areas. The goals, which shall be applicable to each construction trade in a covered contractor's or timetables, shall be published as notices in the Federal Register, and shall be inserted by the Contracting officers and applicants, as applicable, in the Notice required by 41 CFR 60-4.2.

FEDERALLY FUNDED OR ASSISTED PROJECTS
APPENDIX A
(Labor Market Goals)

Standard Metropolitan Statistical Area (SMSA)

Female **Minority**

Bridgeport – Stamford – Norwalk – Danbury			**10.2%**
6.9%			
Bethel	Bridgeport	Brookfield	Danbury
Darien	Derby	Easton	Fairfield
Greenwich	Milford	Monroe	New Canaan
New Fairfield	Newton	Norwalk	Redding
Shelton	Stamford	Stratford	Trumbull
Weston	Westport	Wilton	

Hartford – Bristol – New Britain			**6.9%**
6.9%			
Andover	Avon	Berlin	Bloomfield
Bolton	Bristol	Burlington	Canton
Colchester	Columbia	Coventry	Cromwell
East Granby	East Hampton	East Hartford	East Windsor
Ellington	Enfield	Farmington	Glastonbury
Granby	Hartford	Hebron	Manchester
Marlborough	New Britain	New Hartford	Newington
Plainville	Plymouth	Portland	Rocky Hill
Simsbury	South Windsor	Southington	Stafford
Suffield	Tolland	Vernon	West Hartford
Wethersfield	Willington	Windsor	Windsor Locks

New Haven – Waterbury – Meriden			**9.0%**
6.9%			
Beacon Falls	Bethany	Branford	Cheshire
Clinton	East Haven	Guilford	Hamden
Madison	Meriden	Middlebury	Naugatuck
New Haven	North Branford	North Haven	Orange
Prospect	Southbury	Thomaston	Wallingford
Waterbury	Watertown	West Haven	Wolcott
Woodbridge	Woodbury		

New London – Norwich			**4.5%**
6.9%			
Bozrah	East Lyme	Griswold	Groton
Ledyard	Lisbon	Montville	New London
Norwich	Old Lyme	Old Saybrook	Preston
Sprague	Stonington	Waterford	

Non SMSA

Female				**Minority**
Litchfield – Windham 6.9%				**5.9%**
Abington	Ashford	Ballouville	Bantam	
Barkhamsted	Bethlehem	Bridgewater	Brooklyn	
Canaan	Canterbury	Central Village	Cahplin	
Colebrook	Cornwall	Cornwall Bridge	Danielson	
Dayville	East Canaan	East Killingly	East Woodstock	
Eastford	Falls Village	Gaylordsville	Goshen	
Grosvenor Dale	Hampton	Harwinton	Kent	
Killignly	Lakeside	Litchfield	Moosup	
Morris	New Milford	New Preston	New Preston Marble Dale	
Norfolk	North Canaan	No. Grosvenordale	North Windham	
Oneco	Pequabuck	Pine Meadow	Plainfield	
Pleasant Valley	Pomfret	Pomfret Center	Putnam	
Quinebaug	Riverton	Rogers	Roxbury	
Salisbury	Scotland	Sharon	South Kent	
South Woodstock	Sterling	Taconic	Terryville	
Thompson	Torrington	Warren	Warrenville	
Washington	Washington Depot	Wauregan	West Cornwall	
Willimantic	Winchester	Winchester Center	Windham	
Winsted	Woodstock	Woodstock Valley		

EXHIBIT D

Health Insurance Portability and Accountability Act of 1996 ("HIPAA").

(a) If the Contactor is a Business Associate under the requirements of the Health Insurance Portability and Accountability Act of 1996 ("HIPAA"), the Contractor must comply with all terms and conditions of this Section of the Contract. If the Contractor is not a Business Associate under HIPAA, this Section of the Contract does not apply to the Contractor for this Contract.

(b) The Contractor is required to safeguard the use, publication and disclosure of information on all applicants for, and all clients who receive, services under the Contract in accordance with all applicable federal and state law regarding confidentiality, which includes but is not limited to HIPAA, more specifically with the Privacy and Security Rules at 45 C.F.R. Part 160 and Part 164, subparts A, C, and E; and

(c) The State of Connecticut Agency named on page 1 of this Contract (hereinafter the "Department") is a "covered entity" as that term is defined in 45 C.F.R. § 160.103; and

(d) The Contractor, on behalf of the Department, performs functions that involve the use or disclosure of "individually identifiable health information," as that term is defined in 45 C.F.R. § 160.103; and

(e) The Contractor is a "business associate" of the Department, as that term is defined in 45 C.F.R. § 160.103; and

(f) The Contractor and the Department agree to the following in order to secure compliance with the HIPAA, the requirements of Subtitle D of the Health Information Technology for Economic and Clinical Health Act (hereinafter the HITECH Act), (Pub. L. 111-5, sections 13400 to 13423), and more specifically with the Privacy and Security Rules at 45 C.F.R. Part 160 and Part 164, subparts A, C, and E.

(g) Definitions

(1) "Breach shall have the same meaning as the term is defined in section 13400 of the HITECH Act (42 U.S.C. §17921(1))

(2) "Business Associate" shall mean the Contractor.

(3) "Covered Entity" shall mean the Department of the State of Connecticut named on page 1 of this Contract.

(4) "Designated Record Set" shall have the same meaning as the term "designated record set" in 45 C.F.R. § 164.501.

(5) "Electronic Health Record" shall have the same meaning as the term is defined in section 13400 of the HITECH Act (42 U.S.C. §17921(5))

(6) "Individual" shall have the same meaning as the term "individual"' in 45 C.F.R. § 160.103 and shall include a person who qualifies as a personal representative as defined in 45 C.F.R. § 164.502(g).

(7) "Privacy Rule" shall mean the Standards for Privacy of Individually Identifiable Health Information at 45 C.F.R. part 160 and parts 164, subparts A and E.

(8) "Protected Health Information" or "PHI" shall have the same meaning as the term "protected health information" in 45 C.F.R. § 160.103, limited to information created or received by the Business Associate from or on behalf of the Covered Entity.

(9) "Required by Law"' shall have the same meaning as the term "required by law" in 45 C.F.R. § 164.103.

(10) "Secretary" shall mean the Secretary of the Department of Health and Human Services or his designee.

(11) "More stringent" shall have the same meaning as the term "more stringent" in 45 C.F.R. § 160.202.

(12) "This Section of the Contract" refers to the HIPAA Provisions stated herein, in their entirety.

(13) "Security Incident" shall have the same meaning as the term "security incident" in 45 C.F.R.§ 164.304.

(14) "Security Rule" shall mean the Security Standards for the Protection of Electronic Protected Health Information at 45 C.F.R. part 160 and parts 164, subpart A and C.

(15) "Unsecured protected health information" shall have the same meaning as the term as defined in section 13402(h)(1)(A) of HITECH. Act. (42 U.S.C. §17932(h)(1)(A)).

(h) Obligations and Activities of Business Associates.

(1) Business Associate agrees not to use or disclose PHI other than as permitted or required by this Section of the Contract or as Required by Law.

(2) Business Associate agrees to use appropriate safeguards to prevent use or disclosure of PHI other than as provided for in this Section of the Contract.

(3) Business Associate agrees to use administrative, physical and technical safeguards that reasonably and appropriately protect the confidentiality, integrity, and availability of electronic protected health information that it creates, receives, maintains, or transmits on behalf of the Covered Entity.

(4) Business Associate agrees to mitigate, to the extent practicable, any harmful effect that is known to the Business Associate of a use or disclosure of PHI by Business Associate in violation of this Section of the Contract.

(5) Business Associate agrees to report to Covered Entity any use or disclosure of PHI not provided for by this Section of the Contract or any security incident of which it becomes aware.

(6) Business Associate agrees to insure that any agent, including a subcontractor, to whom it provides PHI received from, or created or received by Business Associate, on behalf of the Covered Entity, agrees to the same restrictions and conditions that apply through this Section of the Contract to Business Associate with respect to such information.

(7) Business Associate agrees to provide access, at the request of the Covered Entity, and in the time and manner agreed to by the parties, to PHI in a Designated Record Set, to Covered Entity or, as directed by Covered Entity, to an Individual in order to meet the requirements under 45 C.F.R. § 164.524.

(8) Business Associate agrees to make any amendments to PHI in a Designated Record Set that the Covered Entity directs or agrees to pursuant to 45 C.F.R. § 164.526 at the request of the Covered Entity, and in the time and manner agreed to by the parties.

(9) Business Associate agrees to make internal practices, books, and records, including policies and procedures and PHI, relating to the use and disclosure of PHI received from, or created or received by, Business Associate on behalf of Covered Entity, available to Covered Entity or to the Secretary in a time and manner agreed to by the parties or designated by the Secretary, for purposes of the Secretary determining Covered Entity's compliance with the Privacy Rule.

(10) Business Associate agrees to document such disclosures of PHI and information related to such disclosures as would be required for Covered Entity to respond to a request by an Individual for an accounting of disclosures of PHI in accordance with 45 C.F.R. § 164.528 and section 13405 of the HITECH Act (42 U.S.C. § 17935) and any regulations promulgated thereunder.

(11) Business Associate agrees to provide to Covered Entity, in a time and manner agreed to by the parties, information collected in accordance with clause h. (10) of this Section of the Contract, to permit Covered Entity to respond to a request by an Individual for an accounting of disclosures of PHI in accordance with 45 C.F.R. § 164.528 and section 13405 of the HITECH Act (42 U.S.C. § 17935) and any regulations promulgated thereunder. Business Associate agrees at the Covered Entity's direction to provide an accounting of disclosures of PHI directly to an individual in accordance with 45 C.F.R. § 164.528 and section 13405 of the HITECH Act (42 U.S.C. § 17935) and any regulations promulgated thereunder.

(12) Business Associate agrees to comply with any state or federal law that is more stringent than the Privacy Rule.

(13) Business Associate agrees to comply with the requirements of the HITECH Act relating to privacy and security that are applicable to the Covered Entity and with the requirements of 45 C.F.R. sections 164.504(e), 164.308, 164.310, 164.312, and 164.316.

(14) In the event that an individual requests that the Business Associate (a) restrict disclosures of PHI; (b) provide an accounting of disclosures of the individual's PHI; or (c) provide a copy of the individual's PHI in an electronic health record, the Business Associate agrees to notify the covered entity, in writing, within two business days of the request.

(15) Business Associate agrees that it shall not, directly or indirectly, receive any remuneration in exchange for PHI of an individual without (1) the written approval of the covered entity, unless receipt of remuneration in exchange for PHI is expressly authorized by this Contract and (2) the valid authorization of the individual, except for the purposes provided under section 13405(d)(2) of the HITECH Act,(42 U.S.C. § 17935(d)(2)) and in any accompanying regulations

(16) Obligations in the Event of a Breach

A. The Business Associate agrees that, following the discovery of a breach of unsecured protected health information, it shall notify the Covered Entity of such breach in accordance with the requirements of section 13402 of HITECH (42 U.S.C. 17932(b) and the provisions of this Section of the Contract.
B. Such notification shall be provided by the Business Associate to the Covered Entity without unreasonable delay, and in no case later than 30 days after the breach is discovered by the Business Associate, except as otherwise instructed in writing by a law enforcement official pursuant to section 13402 (g) of HITECH (42 U.S.C. 17932(g)) . A breach is considered discovered as of the first day on which it is, or reasonably should have been, known to the Business Associate. The notification shall include the identification and last known address, phone number and email address of each individual (or the next of kin of the individual if the individual is deceased) whose unsecured protected health information has been, or is reasonably believed by the Business Associate to have been, accessed, acquired, or disclosed during such breach.
C. The Business Associate agrees to include in the notification to the Covered Entity at least the following information:
    1. A brief description of what happened, including the date of the breach and the date of the discovery of the breach, if known.

    2. A description of the types of unsecured protected health information that were involved in the breach (such as full name, Social Security number, date of birth, home address, account number, or disability code).

    3. The steps the Business Associate recommends that individuals take to protect themselves from potential harm resulting from the breach.

    4. A detailed description of what the Business Associate is doing to investigate the breach, to mitigate losses, and to protect against any further breaches.

    5. Whether a law enforcement official has advised either verbally or in writing the Business Associate that he or she has determined that notification or notice to

individuals or the posting required under section 13402 of the HITECH Act would impede a criminal investigation or cause damage to national security and; if so, include contact information for said official.

D. Business Associate agrees to provide appropriate staffing and have established procedures to ensure that individuals informed by the Covered Entity of a breach by the Business Associate have the opportunity to ask questions and contact the Business Associate for additional information regarding the breach. Such procedures shall include a toll-free telephone number, an e-mail address, a posting on its Web site and a postal address. Business Associate agrees to include in the notification of a breach by the Business Associate to the Covered Entity, a written description of the procedures that have been established to meet these requirements. Costs of such contact procedures will be borne by the Contractor.

E. Business Associate agrees that, in the event of a breach, it has the burden to demonstrate that it has complied with all notifications requirements set forth above, including evidence demonstrating the necessity of a delay in notification to the Covered Entity.

(i) Permitted Uses and Disclosure by Business Associate.

(1) General Use and Disclosure Provisions Except as otherwise limited in this Section of the Contract, Business Associate may use or disclose PHI to perform functions, activities, or services for, or on behalf of, Covered Entity as specified in this Contract, provided that such use or disclosure would not violate the Privacy Rule if done by Covered Entity or the minimum necessary policies and procedures of the Covered Entity.

(2) Specific Use and Disclosure Provisions

(A) Except as otherwise limited in this Section of the Contract, Business Associate may use PHI for the proper management and administration of Business Associate or to carry out the legal responsibilities of Business Associate.

(B) Except as otherwise limited in this Section of the Contract, Business Associate may disclose PHI for the proper management and administration of Business Associate, provided that disclosures are Required by Law, or Business Associate obtains reasonable assurances from the person to whom the information is disclosed that it will remain confidential and used or further disclosed only as Required by Law or for the purpose for which it was disclosed to the person, and the person notifies Business Associate of any instances of which it is aware in which the confidentiality of the information has been breached.

(C) Except as otherwise limited in this Section of the Contract, Business Associate may use PHI to provide Data Aggregation services to Covered Entity as permitted by 45 C.F.R. § 164.504(e)(2)(i)(B).

(j) Obligations of Covered Entity.

(1) Covered Entity shall notify Business Associate of any limitations in its notice of privacy practices of Covered Entity, in accordance with 45 C.F.R. § 164.520, or to the extent that such limitation may affect Business Associate's use or disclosure of PHI.

(2) Covered Entity shall notify Business Associate of any changes in, or revocation of, permission by Individual to use or disclose PHI, to the extent that such changes may affect Business Associate's use or disclosure of PHI.

(3) Covered Entity shall notify Business Associate of any restriction to the use or disclosure of PHI that Covered Entity has agreed to in accordance with 45 C.F.R. § 164.522, to the extent that such restriction may affect Business Associate's use or disclosure of PHI.

(k) Permissible Requests by Covered Entity. Covered Entity shall not request Business Associate to use or disclose PHI in any manner that would not be permissible under the Privacy Rule if done by the Covered Entity, except that Business Associate may use and disclose PHI for data aggregation, and management and administrative activities of Business Associate, as permitted under this Section of the Contract.

(l) Term and Termination.

(1) Term. The Term of this Section of the Contract shall be effective as of the date the Contract is effective and shall terminate when the information collected in accordance with clause h. (10) of this Section of the Contract is provided to the Covered Entity and all of the PHI provided by Covered Entity to Business Associate, or created or received by Business Associate on behalf of Covered Entity, is destroyed or returned to Covered Entity, or, if it is infeasible to return or destroy PHI, protections are extended to such information, in accordance with the termination provisions in this Section.

(2) Termination for Cause Upon Covered Entity's knowledge of a material breach by Business Associate, Covered Entity shall either:

(A) Provide an opportunity for Business Associate to cure the breach or end the violation and terminate the Contract if Business Associate does not cure the breach or end the violation within the time specified by the Covered Entity; or

(B) Immediately terminate the Contract if Business Associate has breached a material term of this Section of the Contract and cure is not possible; or

(C) If neither termination nor cure is feasible, Covered Entity shall report the violation to the Secretary.

(3) Effect of Termination

(A) Except as provided in (l)(2) of this Section of the Contract, upon termination of this Contract, for any reason, Business Associate shall return or destroy all PHI received from Covered Entity, or created or received by Business Associate on behalf of Covered Entity. Business Associate shall also provide the information collected in accordance with clause h. (10) of this Section of the Contract to the Covered Entity

within ten business days of the notice of termination. This provision shall apply to PHI that is in the possession of subcontractors or agents of Business Associate. Business Associate shall retain no copies of the PHI.

(B) In the event that Business Associate determines that returning or destroying the PHI is infeasible, Business Associate shall provide to Covered Entity notification of the conditions that make return or destruction infeasible. Upon documentation by Business Associate that return or destruction of PHI is infeasible, Business Associate shall extend the protections of this Section of the Contract to such PHI and limit further uses and disclosures of PHI to those purposes that make return or destruction infeasible, for as long as Business Associate maintains such PHI. Infeasibility of the return or destruction of PHI includes, but is not limited to, requirements under state or federal law that the Business Associate maintains or preserves the PHI or copies thereof.

(m) Miscellaneous Provisions.

(1) Regulatory References. A reference in this Section of the Contract to a section in the Privacy Rule means the section as in effect or as amended.

(2) Amendment. The Parties agree to take such action as in necessary to amend this Section of the Contract from time to time as is necessary for Covered Entity to comply with requirements of the Privacy Rule and the Health Insurance Portability and Accountability Act of 1996, Pub. L. No. 104-191.

(3) Survival. The respective rights and obligations of Business Associate shall survive the termination of this Contract.

(4) Effect on Contract. Except as specifically required to implement the purposes of this Section of the Contract, all other terms of the Contract shall remain in force and effect.

(5) Construction. This Section of the Contract shall be construed as broadly as necessary to implement and comply with the Privacy Standard. Any ambiguity in this Section of the Contract shall be resolved in favor of a meaning that complies, and is consistent with, the Privacy Standard.

(6) Disclaimer. Covered Entity makes no warranty or representation that compliance with this Section of the Contract will be adequate or satisfactory for Business Associate's own purposes. Covered Entity shall not be liable to Business Associate for any claim, civil or criminal penalty, loss or damage related to or arising from the unauthorized use or disclosure of PHI by Business Associate or any of its officers, directors, employees, contractors or agents, or any third party to whom Business Associate has disclosed PHI contrary to the provisions of this Contract or applicable law. Business Associate is solely responsible for all decisions made, and actions taken, by Business Associate regarding the safeguarding, use and disclosure of PHI within its possession, custody or control.

(7) Indemnification. The Business Associate shall indemnify and hold the Covered Entity harmless from and against any and all claims, liabilities, judgments, fines, assessments, penalties, awards and any statutory damages that may be imposed or assessed pursuant to HIPAA, as amended or the

HITECH Act, including, without limitation, attorney's fees, expert witness fees, costs of investigation, litigation or dispute resolution, and costs awarded thereunder, relating to or arising out of any violation by the Business Associate and its agents, including subcontractors, of any obligation of Business Associate and its agents, including subcontractors, under this section of the contract, under HIPAA, the HITECH Act, the Privacy Rule and the Security Rule.

Notice to Executive Branch State Contractors and Prospective State Contractors of Campaign Contribution and Solicitation Limitations

This notice is provided under the authority of Connecticut General Statutes §9-612(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 F

(federal wage rate package will be inserted here)

EXHIBIT G

(state wages will be inserted here)

CT1
General Decision Number: CT140001 07/11/2014 CT1

Superseded General Decision Number: CT20130001

State: Connecticut

Construction Type: Highway

Counties: Fairfield, Litchfield, Middlesex, New Haven, Tolland and Windham Counties in Connecticut.

HIGHWAY CONSTRUCTION PROJECTS

Modification Number	Publication Date
0	01/03/2014
1	01/31/2014
2	04/11/2014
3	05/23/2014
4	05/30/2014
5	06/13/2014
6	06/27/2014
7	07/04/2014
8	07/11/2014

BRCT0001-004 12/30/2013

	Rates	Fringes
BRICKLAYER		
BRICKLAYERS, CEMENT MASONS, CEMENT FINISHERS, PLASTERERS AND STONE MASONS	$ 32.50	27.06

CARP0024-006 05/05/2014

LITCHFIELD COUNTY
Harwinton, Plymouth, Thomaston, Watertown
MIDDLESEX COUNTY
NEW HAVEN COUNTY
Beacon Falls, Bethany, Branford, Cheshire, East Haven, Guilford, Hamden. Madison, Meriden, Middlebury, Naugatuck, New Haven, North Branford, North Haven, Orange (east of Orange Center Road and north of Route 1, and north of Route 1 and east of the Oyster River), Prospect, Southbury, Wallingford, Waterbury, West Haven, Wolcott, Woodbridge
TOLLAND COUNTY
Andover, Columbia, Coventry, Hebron, Mansfield, Union, Willington
WINDHAM COUNTY

	Rates	Fringes
Carpenters:		
CARPENTERS, PILEDRIVERS	$ 31.00	22.50
DIVER TENDERS	$ 31.00	22.50
DIVERS	$ 39.46	22.50
MILLWRIGHTS	$ 31.60	22.75

CARP0043-004 05/05/2014

	Rates	Fringes

Carpenters: (TOLLAND COUNTY
Bolton, Ellington, Somers,
Tolland, Vernon)

CARPENTERS, PILEDRIVERS.....	$ 31.00	22.50
DIVER TENDERS.....	$ 31.00	22.50
DIVERS.....	$ 39.46	22.50
MILLWRIGHT.....	$ 31.60	22.75

CARP0210-002 05/05/2014

	Rates	Fringes
Carpenters:		
CARPENTERS, PILEDRIVERS.....	$ 31.00	22.50
DIVER TENDERS.....	$ 31.00	22.50
DIVERS.....	$ 39.46	22.50
MILLWRIGHTS.....	$ 31.60	22.75

FAIRFIELD COUNTY

Bethel, Bridgeport, Brookfield, Danbury, Darien, Easton, Fairfield, Greenwich, Monroe, New Canaan, New Fairfield, Newtown, Norwalk, Redding, Ridgefield, Shelton, Sherman, Stamford, Stratford, Trumbull, Weston, Westport, Wilton;

LITCHFIELD COUNTY

Barkhamstead, Bethlehem, Bridgewater, Canaan, Colebrook, Cornwall, Goshen, Kent, Litchfield, Morris, New Hartford, New Milford, Norfolk, North Canaan, Roxbury, Salisbury, Sharon, Torrington, Warren, Washington, Winchester, Woodbury;

NEW HAVEN COUNTY

Ansonia, Derby, Milford, Orange (west of Orange Center Road and south of Route 1 and west of the Oyster River), Oxford, Seymour;

ELEC0003-002 05/08/2008

	Rates	Fringes
Electricians		
FAIRFIELD COUNTY		
Darien, Greenwich, New Canaan, Stamford.....	$ 44.75	30.42

ELEC0035-001 06/01/2014

	Rates	Fringes
Electricians:		
MIDDLESEX COUNTY (Cromwell, Middlefield, Middleton and Portland); TOLLAND COUNTY; WINDHAM COUNTY.....	$ 38.10	23.86

ELEC0090-002 06/01/2014

	Rates	Fringes

Electricians:.....$ 37.05 24.37

LITCHFIELD COUNTY

Plymouth Township;

MIIDDLESEX COUNTY

Chester, Clinton, Deep River, Durham, East Haddam, East Hampton, Essex, Haddam, Killingworth, Old Saybrook, Westbrook;

NEW HAVEN COUNTY

All Townships excluding Beacon Falls, Middlebury,Milford, Naugatuck, Oxford, Prospect, Seymour, Southbury, Waterbury and Wolcott.

ELEC0488-002 06/01/2014

	Rates	Fringes
Electricians.....	$ 37.27	23.37

FAIRFIELD COUNTY

Bethel, Bridgeport, Brookfield, Danbury, Easton, Fairfield, Monroe, New Fairfield, Newtown, Norwalk, Redding, Ridgefield, Shelton, Sherman, Stratford, Trumbull, Weston, Westport and Wilton.

LITCHFIELD COUNTY

Except Plymouth;

NEW HAVEN COUNTY

Beacon Falls, Middlebury, Milford, Naugatuck, Oxford, Prospect, Seymour, Southbury, Waterbury and Wolcott

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ENGI0478-001 04/06/2014

	Rates	Fringes
Power equipment operators:		
GROUP 1.....	$ 36.80	22.30
GROUP 2.....	$ 36.48	22.30
GROUP 3.....	$ 35.74	22.30
GROUP 4.....	$ 35.35	22.30
GROUP 5.....	$ 34.76	22.30
GROUP 6.....	$ 34.45	22.30
GROUP 7.....	$ 34.11	22.30
GROUP 8.....	$ 33.71	22.30
GROUP 9.....	$ 33.28	22.30
GROUP 10.....	$ 31.24	22.30
GROUP 11.....	$ 31.24	22.30
GROUP 12.....	$ 31.18	22.30
GROUP 13.....	$ 32.71	22.30
GROUP 14.....	$ 30.60	22.30
GROUP 15.....	$ 30.29	22.30
GROUP 16.....	$ 29.46	22.30
GROUP 17.....	$ 29.05	22.30
GROUP 18.....	$ 28.40	22.30

Hazardous waste premium $3.00 per hour over classified rate.

Crane with boom, including jib, 150 feet - $1.50 extra.
Crane with boom, including jib, 200 feet - $2.50 extra.
Crane with boom, including jib, 250 feet - $5.00 extra.
Crane with boom, including jib, 300 feet - $7.00 extra.
Crane with boom, including jib, 400 feet - $10.00 extra

All Cranes: When crane operator is operating equipment that requires a fully licensed crane operator to operate he receives an extra $1.00 premium in addition to the hourly wage rate and benefit contributions:

1) Crane handling or erecting structural steel or stone, hoisting engineer(2 drums or over)
2) Cranes(100 ton rated capacity and over) Bauer Drill/Caisson
3) Cranes(under 100 ton rated capacity)

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.

POWER EQUIPMENT OPERATORS CLASSIFICATIONS

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.

GROUP 2: Cranes (100 ton capacity & over), Excavator over 2 cubic yards, piledriver ($3.00 premium when operator controls hammer), Bauer Drill/Caisson

GROUP 3: Excavator, 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 or operation) Rubber Tire Excavator (drott 1085 or similar); Grader Operator; Bulldozer Fine Grade (slopes, shaping, laser or GPS, etc.)

GROUP 4: Trenching machines, lighter derrick, concrete finishing machine, CMI machine or similar, Koehring Loader (skooper).

GROUP 5: Specialty railroad equipment, asphalt spreader, asphalt reclaiming machine, line grider, concrete pumps, drills with self contained power units, boring machine, post hole digger, auger, pounder, well digger, milling machine (over 24' mandrel), side boom, combination hoe and loader, directional driller

GROUP 6: Front end loader (3 cu. yds. up to 7 cu. yards), bulldozer (Rough grade dozer) .

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).

GROUP 8: Mechanic, grease truck operator, hydoblaster, barrier mover, power stone spreader, welder, work boat under 26 ft. transfer machine.

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).

GROUP 10: Vibratory hammer,ice machine, diesel & air, hammer, etc.

GROUP 11: Conveyor, earth roller, power pavement breaker (whiphammer), robot demolition equipment.

GROUP 12: Wellpoint operator.

GROUP 13: Portable asphalt plant operator, portable concrete plant operator, portable crusher plant operator.

GROUP 14: Compressor battery operator.

GROUP 15: Power Safety boat, Vacuum truck, Zim mixer, Sweeper; (Minimum for any job requiring a CDL license) .

GROUP 16: Elevator operator, tow motor operator (solid tire no rough terrain).

GROUP 17: Generator operator, compressor operator, pump operator,welding machine operator; Heater operator.

GROUP 18: Maintenance engineer.

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* IRON0015-002 06/30/2014

	Rates	Fringes
Ironworkers: (Reinforcing, Structural and Precast Concrete Erection)	$ 34.47	29.74

a. PAID HOLIDAY: Labor Day provided employee has been on the payroll for the 5 consecutive work days prior to Labor Day.

LABO0056-003 04/06/2014

	Rates	Fringes
Laborers:		
GROUP 1	$ 27.05	17.80
GROUP 2	$ 27.30	17.80
GROUP 3	$ 27.55	17.80
GROUP 4	$ 28.05	17.80
GROUP 5	$ 28.80	17.80
GROUP 6	$ 29.05	17.80
GROUP 7	$ 16.00	17.80

LABORERS CLASSIFICATIONS

GROUP 1: Laborers (Unskilled), acetylene burner, concrete specialist

GROUP 2: Chain saw operators, fence and guard rail erectors, pneumatic tool operators and powdermen.

GROUP 3: Pipelayers, Jackhammer/Pavement breaker (handheld),

mason
tenders/catch basin builders, asphalt rakers, air track
operators, block paver and curb setter

GROUP 4: Asbestos/lead removal

GROUP 5: Blasters

GROUP 6: Toxic waste remover

GROUP 7: Traffic control signalman

LABO0056-004 04/06/2014

	Rates	Fringes
Laborers: (TUNNEL CONSTRUCTION)		
CLEANING, CONCRETE AND CAULKING TUNNEL:		
Concrete Workers, Form Movers and Strippers	$ 30.37	17.80
Form Erectors	$ 30.68	17.80
ROCK SHAFT, CONCRETE, LINING OF SAME AND TUNNEL IN FREE AIR:		
Brakemen, Trackmen, Tunnel Laborers, Shaft Laborers	$ 30.37	17.80
Laborers Topside, Cage Tenders, Bellman	$ 30.26	17.80
Miners	$ 31.28	17.80
SHIELD DRIVE AND LINER PLATE TUNNELS IN FREE AIR:		
Brakemen and Trackmen	$ 30.37	17.80
Miners, Motormen, Mucking Machine Operators, Nozzlemen, Grout Men, Shaft and Tunnel, Steel and Rodmen, Shield and Erector, Arm Operator, Cable Tenders	$ 31.28	17.80
TUNNELS, CAISSON AND CYLINDER WORK IN COMPRESSED AIR:		
Blaster	$ 37.41	17.80
Brakemen, Trackmen, Groutman, Laborers, Outside Lock Tender, Gauge Tenders	$ 37.22	17.80
Change House Attendants, Powder Watchmen, Top on Iron Bolts	$ 35.35	17.80
Mucking Machine Operator	$ 37.97	17.80

a. PAID HOLIDAYS: On tunnel work only: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day.

No employee shall be eligible for holiday pay when he fails, without cause, to work the regular work day preceding the holiday or the regular work day following the holiday.

PAIN0011-001 06/01/2014

	Rates	Fringes
Painters:		
Blast and Spray	$ 34.02	18.55
Brush and Roll	$ 31.02	18.55
Tanks, Towers, Swing	$ 33.02	18.55

PAIN0011-003 06/01/2014

	Rates	Fringes
Painters: (BRIDGE CONSTRUCTION)		
Brush, Roller, Blasting (Sand, Water, etc.) Spray	$ 45.10	18.55

TEAM0064-001 04/06/2014

	Rates	Fringes
Truck drivers:		
2 Axle Ready Mix	$ 28.43	19.14
2 Axle	$ 28.33	19.14
3 Axle Ready Mix	$ 28.48	19.14
3 Axle	$ 28.43	19.14
4 Axle Ready Mix	$ 28.58	19.14
4 Axle	$ 28.53	19.14
Heavy Duty Trailer 40 tons and over	$ 28.78	19.14
Heavy Duty Trailer up to 40 tons	$ 28.53	19.14
Specialized (Earth moving equipment other than conventional type on-the-road trucks and semi-trailers, including Euclids)	$ 28.58	19.14

Hazardous waste removal work receives additional $1.25 per hour.

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.

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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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 clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is union or non-union.

Union Identifiers

An identifier enclosed in dotted lines beginning with characters other than "SU" denotes that the union classification and rate have found to be prevailing for that classification. Example: PLUM0198-005 07/01/2011. The first four letters , PLUM, indicate the international union and the four-digit number, 0198, that follows indicates the local union number or district council number where applicable , i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. The date, 07/01/2011, following these characters is the effective date of the most current negotiated rate/collective bargaining agreement which would be July 1, 2011 in the above example.

Union prevailing wage rates will be updated to reflect any changes in the collective bargaining agreements governing the rates.

0000/9999: weighted union wage rates will be published annually each January.

Non-Union Identifiers

Classifications listed under an "SU" identifier were derived from survey data by computing average rates and are not union rates; however, the data used in computing these rates may include both union and non-union data. Example: SULA2004-007 5/13/2010. SU indicates the rates are not union majority rates, LA indicates the State of Louisiana; 2004 is the year of the survey; and 007 is an internal number used in producing the wage determination. A 1993 or later date, 5/13/2010, indicates the classifications and rates under that identifier were issued as a General Wage Determination on that date.

Survey wage rates will remain in effect and will not change until a new survey is conducted.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination

* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION

General Decision Number: CT140002 07/11/2014 CT2

Superseded General Decision Number: CT20130002

State: Connecticut

Construction Type: Highway

County: New London County in Connecticut.

HIGHWAY CONSTRUCTION PROJECTS

Modification Number	Publication Date
0	01/03/2014
1	01/31/2014
2	04/11/2014
3	05/23/2014
4	05/30/2014
5	06/13/2014
6	06/27/2014
7	07/04/2014
8	07/11/2014

BRCT0001-003 12/30/2013

	Rates	Fringes
BRICKLAYER		
BRICKLAYERS, CEMENT MASONS, CEMENT FINISHERS, PLASTERERS, STONE MASONS	$ 32.50	27.06

CARP0024-002 05/05/2014

	Rates	Fringes
Carpenters:		
CARPENTERS, PILEDRIVERS	$ 31.00	22.50
DIVER TENDERS	$ 31.00	22.50
DIVERS	$ 39.46	22.50
MILLWRIGHTS	$ 31.60	22.75

ELEC0035-003 06/01/2014

	Rates	Fringes
Electricians:		
Bozrah, Colchester, Franklin, Griswold, Lebanon, Ledyard, Lisbon, Montville, North Stonington, Norwich, Preston, Salem, Sprague, Stonington and Voluntown	$ 38.10	23.86

ELEC0090-003 06/01/2014

East Lyme, Groton, New London, Old Lyme, Waterford, plus the part of Ledyard wherein the property of the Submarine Base is located

	Rates	Fringes

ELECTRICIAN.....$ 37.05 24.37

ENGI0478-002 04/06/2014

	Rates	Fringes
Power equipment operators:		
GROUP 1	$ 36.80	22.30
GROUP 2	$ 36.48	22.30
GROUP 3	$ 35.74	22.30
GROUP 4	$ 35.35	22.30
GROUP 5	$ 34.76	22.30
GROUP 6	$ 34.45	22.30
GROUP 7	$ 34.11	22.30
GROUP 8	$ 33.71	22.30
GROUP 9	$ 33.28	22.30
GROUP 10	$ 31.24	22.30
GROUP 11	$ 31.24	22.30
GROUP 12	$ 31.18	22.30
GROUP 13	$ 32.71	22.30
GROUP 14	$ 30.60	22.30
GROUP 15	$ 30.29	22.30
GROUP 16	$ 29.46	22.30
GROUP 17	$ 29.05	22.30
GROUP 18	$ 28.40	22.30

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 Cranes: When crane operator is operating equipment that requires a fully licensed crane operator to operate he receives an extra $1.00 premium in addition to the hourly wage rate and benefit contributions:

1) Crane handling or erecting structural steel or stone, hoisting engineer(2 drums or over)
2) Cranes(100 ton rated capacity and over) Bauer Drill/Caisson
3) Cranes(under 100 ton rated capacity)

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.

POWER EQUIPMENT OPERATORS CLASSIFICATIONS

GROUP 1: Crane Handling or Erecting Structural Steel or tone; Hoisting Engineer (2 drums or over); Front End Loader (7 cubic yards or over) Work Boat 26 ft. & over.

GROUP 2: Cranes (100 ton rated capacity and over); Excavator over 2 cubic yards; Piledriver ($3.00 premium when operator controls hammer); Bauer Drill/Caisson

GROUP 3: Excavator; 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.)

GROUP 4: Trenching machines; Lighter Derrick; Concrete Finishing Machine, cmi Machine or Similar; Koehring Loader Skooper).

GROUP 5: Specialty Railroad Equipment; Asphalt Spreader; Asphalt Reclaiming achine; Line Grinder; Concrete Pumps; Drills with Self Contained Power Units; Boring Machine; Post Hole Digger; Auger; Pounder; Well Digger; Milling Machine (over 24" Mandrell); Side Boom; Combination Hoe and Loader; Directional Driller.

GROUP 6: Front End Loader (3 cu. yds. up to 7 cubic yards); Bulldozer (Rough grade dozer).

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).

GROUP 8: Mechanic; Grease Truck Operator; Hydroblaster; Barrier Mover; Power Stone Spreader; Welder; Work Boat Under 26 ft.; Transfer Machine.

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).

GROUP 10: Vibratory Hammer, Ice Machine, Diesel and Air Hammer, etc.

GROUP 11: Conveyor; Earth Roller; Power Pavement Breaker (Whiphammer); Robot Demolition Equipment.

GROUP 12: Wellpoint Operator.

GROUP 13: Portable Asphalt Plant Operator; Portable Concrete Plant Operator; Portable Crusher Plant Operator.

GROUP 14: Compressor Battery Operator.

GROUP 15: Power Safety Boat; Vacuum Truck; Zim Mixer; Sweeper; (Minimum for any job requiring a CDL License)

GROUP 16: Elevator Operator; Tow Motor Operator (Solid Tire No Rough Terrain).

GROUP 17: Generator Operator; Compressor Operator; Pump Operator; Welding Machine Operator; Heater operator.

GROUP 18: Maintenance Engineer.

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* IRON0015-003 06/30/2014

	Rates	Fringes
Ironworkers: (Reinforcing &		

Structural).....$ 34.47 29.74

a. PAID HOLIDAY: Labor Day provided employee has been on the payroll for the 5 consecutive work days prior to Labor Day.

LABO0056-003 04/06/2014

	Rates	Fringes
Laborers:		
GROUP 1	$ 27.05	17.80
GROUP 2	$ 27.30	17.80
GROUP 3	$ 27.55	17.80
GROUP 4	$ 28.05	17.80
GROUP 5	$ 28.80	17.80
GROUP 6	$ 29.05	17.80
GROUP 7	$ 16.00	17.80

LABORERS CLASSIFICATIONS

GROUP 1: Laborers (Unskilled), acetylene burner, concrete specialist

GROUP 2: Chain saw operators, fence and guard rail erectors, pneumatic tool operators and powdermen.

GROUP 3: Pipelayers, Jackhammer/Pavement breaker (handheld), mason tenders/catch basin builders, asphalt rakers, air track operators, block paver and curb setter

GROUP 4: Asbestos/lead removal

GROUP 5: Blasters

GROUP 6: Toxic waste remover

GROUP 7: Traffic control signalman

LABO0056-004 04/06/2014

	Rates	Fringes
Laborers: (TUNNEL CONSTRUCTION)		
CLEANING, CONCRETE AND CAULKING TUNNEL:		
Concrete Workers, Form Movers and Strippers	$ 30.37	17.80
Form Erectors	$ 30.68	17.80
ROCK SHAFT, CONCRETE, LINING OF SAME AND TUNNEL IN FREE AIR:		
Brakemen, Trackmen, Tunnel Laborers, Shaft Laborers	$ 30.37	17.80
Laborers Topside, Cage Tenders, Bellman	$ 30.26	17.80
Miners	$ 31.28	17.80
SHIELD DRIVE AND LINER PLATE TUNNELS IN FREE AIR:		

Brakemen and Trackmen.....$ 30.37 17.80
Miners, Motormen, Mucking
Machine Operators,
Nozzlemen, Grout Men,
Shaft and Tunnel, Steel
and Rodmen, Shield and
Erector, Arm Operator,
Cable Tenders.....$ 31.28 17.80
TUNNELS, CAISSON AND
CYLINDER WORK IN
COMPRESSED AIR:
Blaster.....$ 37.41 17.80
Brakemen, Trackmen,
Groutman, Laborers,
Outside Lock Tender,
Gauge Tenders.....$ 37.22 17.80
Change House Attendants,
Powder Watchmen, Top on
Iron Bolts.....$ 35.35 17.80
Mucking Machine Operator...$ 37.97 17.80

a. PAID HOLIDAYS: On tunnel work only: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day.

No employee shall be eligible for holiday pay when he fails, without cause, to work the regular work day preceding the holiday or the regular work day following the holiday.

PAIN0011-002 06/01/2014

	Rates	Fringes
Painters:		
Blast and Spray	$ 34.02	18.55
Brush and Roll	$ 31.02	18.55
Tanks, Towers, Swing	$ 33.02	18.55

PAIN0011-003 06/01/2014

	Rates	Fringes
Painters: (BRIDGE CONSTRUCTION)		
Brush, Roller, Blasting (Sand, Water, etc.) Spray	$ 45.10	18.55

TEAM0064-003 04/06/2014

	Rates	Fringes
Truck drivers:		
2 Axle Ready Mix	$ 28.43	19.14
2 Axle	$ 28.33	19.14
3 Axle Ready Mix	$ 28.48	19.14
3 Axle	$ 28.43	19.14
4 Axle Ready Mix	$ 28.58	19.14
4 Axle	$ 28.53	19.14
Heavy Duty Trailer 40 tons and over	$ 28.78	19.14
Heavy Duty Trailer up to 40 tons	$ 28.53	19.14

Specialized (Earth moving equipment other than conventional type on-the-road trucks and semi-trailers, including Euclids).....$ 28.58 19.14

Hazardous waste removal work receives additional $1.25 per hour.

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.

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

==========

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 clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is union or non-union.

Union Identifiers

An identifier enclosed in dotted lines beginning with characters other than "SU" denotes that the union classification and rate have found to be prevailing for that classification. Example: PLUM0198-005 07/01/2011. The first four letters , PLUM, indicate the international union and the four-digit number, 0198, that follows indicates the local union number or district council number where applicable , i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. The date, 07/01/2011, following these characters is the effective date of the most current negotiated rate/collective bargaining agreement which would be July 1, 2011 in the above example.

Union prevailing wage rates will be updated to reflect any changes in the collective bargaining agreements governing the rates.

0000/9999: weighted union wage rates will be published annually each January.

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Survey wage rates will remain in effect and will not change until a new survey is conducted.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
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Wage and Hour Division
U.S. Department of Labor
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Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

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The request should be accompanied by a full statement of the interested party's position and by any information (wage

payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

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200 Constitution Avenue, N.W.
Washington, DC 20210

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END OF GENERAL DECISION

General Decision Number: CT140003 07/11/2014 CT3

Superseded General Decision Number: CT20130003

State: Connecticut

Construction Type: Highway

County: Hartford County in Connecticut.

HIGHWAY CONSTRUCTION PROJECTS

Modification Number	Publication Date
0	01/03/2014
1	01/31/2014
2	04/11/2014
3	05/23/2014
4	05/30/2014
5	06/13/2014
6	06/27/2014
7	07/04/2014
8	07/11/2014

BRCT0001-003 12/30/2013

	Rates	Fringes
BRICKLAYER		
BRICKLAYERS, CEMENT MASONS, CEMENT FINISHERS, PLASTERERS, STONE MASONS	$ 32.50	27.06

CARP0024-005 05/05/2014

	Rates	Fringes
Carpenters: (Berlin, Bristol, Burlington,Canton, Marlborough, New Britain, Newington, Plainville, Southington)		
CARPENTERS; PILEDRIVERS	$ 31.00	22.50
DIVER TENDERS	$ 31.00	22.50
DIVERS	$ 39.46	22.50
MILLWRIGHTS	$ 31.60	22.75

CARP0043-003 05/05/2014

	Rates	Fringes
Carpenters: (Avon, Bloomfied, East Granby, East Hartford, East Windsor, Enfield, Farmington, Glastonbury, Granby, Hartford, hartland, Manchester, Rocky Hill, Simsbury, South Windsor, Suffield, West Hartford, Wethersfield, Windsor, Windsor Locks)		
CARPENTERS; PILEDRIVERS	$ 31.00	22.50
DIVER TENDERS	$ 31.00	22.50
DIVERS	$ 39.46	22.50

MILLWRIGHTS.....$ 31.60 22.75

ELEC0035-002 06/01/2014

	Rates	Fringes
Electricians:		
Entire County, excluding Berlin, Bristol, Hartland, New Britain, Newington, Plainville and Southington..	$ 38.10	23.86

ELEC0090-001 06/01/2014

	Rates	Fringes
Electricians:		
Berlin, Bristol, New Britain, Newington, Plainville, Southington.....	$ 37.05	24.37

ELEC0488-004 06/01/2014

	Rates	Fringes
Electricians:.....	$ 37.27	23.37

ENGI0478-002 04/06/2014

	Rates	Fringes
Power equipment operators:		
GROUP 1.....	$ 36.80	22.30
GROUP 2.....	$ 36.48	22.30
GROUP 3.....	$ 35.74	22.30
GROUP 4.....	$ 35.35	22.30
GROUP 5.....	$ 34.76	22.30
GROUP 6.....	$ 34.45	22.30
GROUP 7.....	$ 34.11	22.30
GROUP 8.....	$ 33.71	22.30
GROUP 9.....	$ 33.28	22.30
GROUP 10.....	$ 31.24	22.30
GROUP 11.....	$ 31.24	22.30
GROUP 12.....	$ 31.18	22.30
GROUP 13.....	$ 32.71	22.30
GROUP 14.....	$ 30.60	22.30
GROUP 15.....	$ 30.29	22.30
GROUP 16.....	$ 29.46	22.30
GROUP 17.....	$ 29.05	22.30
GROUP 18.....	$ 28.40	22.30

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 Cranes: When crane operator is operating equipment that requires a fully licensed crane operator to operate he receives an extra $1.00 premium in addition to the hourly wage rate and benefit contributions:

1) Crane handling or erecting structural steel or stone, hoisting engineer(2 drums or over)
2) Cranes(100 ton rated capacity and over) Bauer Drill/Caisson
3) Cranes(under 100 ton rated capacity)

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.

POWER EQUIPMENT OPERATORS CLASSIFICATIONS

GROUP 1: Crane Handling or Erecting Structural Steel or tone; Hoisting Engineer (2 drums or over); Front End Loader (7 cubic yards or over) Work Boat 26 ft. & over.

GROUP 2: Cranes (100 ton rated capacity and over); Excavator over 2 cubic yards; Piledriver ($3.00 premium when operator controls hammer); Bauer Drill/Caisson

GROUP 3: Excavator; 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.)

GROUP 4: Trenching machines; Lighter Derrick; Concrete Finishing Machine, cmi Machine or Similar; Koehring Loader Skooper).

GROUP 5: Specialty Railroad Equipment; Asphalt Spreader; Asphalt Reclaiming achine; Line Grinder; Concrete Pumps; Drills with Self Contained Power Units; Boring Machine; Post Hole Digger; Auger; Pounder; Well Digger; Milling Machine (over 24" Mandrell); Side Boom; Combination Hoe and Loader; Directional Driller.

GROUP 6: Front End Loader (3 cu. yds. up to 7 cubic yards); Bulldozer (Rough grade dozer).

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).

GROUP 8: Mechanic; Grease Truck Operator; Hydroblaster; Barrier Mover; Power Stone Spreader; Welder; Work Boat Under 26 ft.; Transfer Machine.

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).

GROUP 10: Vibratory Hammer, Ice Machine, Diesel and Air Hammer, etc.

GROUP 11: Conveyor; Earth Roller; Power Pavement Breaker (Whiphammer); Robot Demolition Equipment.

GROUP 12: Wellpoint Operator.

GROUP 13: Portable Asphalt Plant Operator; Portable Concrete Plant Operator; Portable Crusher Plant Operator.

GROUP 14: Compressor Battery Operator.

GROUP 15: Power Safety Boat; Vacuum Truck; Zim Mixer; Sweeper; (Minimum for any job requiring a CDL License)

GROUP 16: Elevator Operator; Tow Motor Operator (Solid Tire No Rough Terrain).

GROUP 17: Generator Operator; Compressor Operator; Pump Operator; Welding Machine Operator; Heater operator.

GROUP 18: Maintenance Engineer.

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* IRON0015-002 06/30/2014

	Rates	Fringes
Ironworkers: (Reinforcing, Structural and Precast Concrete Erection)	$ 34.47	29.74

a. PAID HOLIDAY: Labor Day provided employee has been on the payroll for the 5 consecutive work days prior to Labor Day.

LABO0056-003 04/06/2014

	Rates	Fringes
Laborers:		
GROUP 1	$ 27.05	17.80
GROUP 2	$ 27.30	17.80
GROUP 3	$ 27.55	17.80
GROUP 4	$ 28.05	17.80
GROUP 5	$ 28.80	17.80
GROUP 6	$ 29.05	17.80
GROUP 7	$ 16.00	17.80

LABORERS CLASSIFICATIONS

GROUP 1: Laborers (Unskilled), acetylene burner, concrete specialist

GROUP 2: Chain saw operators, fence and guard rail erectors, pneumatic tool operators and powdermen.

GROUP 3: Pipelayers, Jackhammer/Pavement breaker (handheld), mason tenders/catch basin builders, asphalt rakers, air track operators, block paver and curb setter

GROUP 4: Asbestos/lead removal

GROUP 5: Blasters

GROUP 6: Toxic waste remover

GROUP 7: Traffic control signalman

LABO0056-004 04/06/2014

	Rates	Fringes
Laborers: (TUNNEL CONSTRUCTION)		
CLEANING, CONCRETE AND CAULKING TUNNEL:		
Concrete Workers, Form Movers and Strippers	$ 30.37	17.80
Form Erectors	$ 30.68	17.80
ROCK SHAFT, CONCRETE, LINING OF SAME AND TUNNEL IN FREE AIR:		
Brakemen, Trackmen, Tunnel Laborers, Shaft Laborers	$ 30.37	17.80
Laborers Topside, Cage Tenders, Bellman	$ 30.26	17.80
Miners	$ 31.28	17.80
SHIELD DRIVE AND LINER PLATE TUNNELS IN FREE AIR:		
Brakemen and Trackmen	$ 30.37	17.80
Miners, Motormen, Mucking Machine Operators, Nozzlemen, Grout Men, Shaft and Tunnel, Steel and Rodmen, Shield and Erector, Arm Operator, Cable Tenders	$ 31.28	17.80
TUNNELS, CAISSON AND CYLINDER WORK IN COMPRESSED AIR:		
Blaster	$ 37.41	17.80
Brakemen, Trackmen, Groutman, Laborers, Outside Lock Tender, Gauge Tenders	$ 37.22	17.80
Change House Attendants, Powder Watchmen, Top on Iron Bolts	$ 35.35	17.80
Mucking Machine Operator	$ 37.97	17.80

a. PAID HOLIDAYS: On tunnel work only: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day.

No employee shall be eligible for holiday pay when he fails, without cause, to work the regular work day preceding the holiday or the regular work day following the holiday.

PAIN0011-003 06/01/2014

	Rates	Fringes
Painters: (BRIDGE CONSTRUCTION)		
Brush, Roller, Blasting (Sand, Water, etc.) Spray	$ 45.10	18.55

PAIN0011-004 06/01/2014

	Rates	Fringes
Painters:		
Blast and Spray	$ 34.02	18.55
Brush and Roll	$ 31.02	18.55
Tanks, Towers, Swing	$ 33.02	18.55

TEAM0064-005 04/06/2014

	Rates	Fringes
Truck drivers:		
2 Axle Ready Mix	$ 28.43	19.14
2 Axle	$ 28.33	19.14
3 Axle Ready Mix	$ 28.48	19.14
3 Axle	$ 28.43	19.14
4 Axle Ready Mix	$ 28.58	19.14
4 Axle	$ 28.53	19.14
Heavy Duty Trailer 40 tons and over	$ 28.78	19.14
Heavy Duty Trailer up to 40 tons	$ 28.53	19.14
Specialized (Earth moving equipment other than conventional type on-the-road trucks and semi-trailers, including Euclids)	$ 28.58	19.14

Hazardous waste removal work receives additional $1.25 per hour.

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.

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Survey wage rates will remain in effect and will not change until a new survey is conducted.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
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END OF GENERAL DECISION

General Decision Number: CT140005 01/03/2014 CT5

Superseded General Decision Number: CT20130005

State: Connecticut

Construction Types: Heavy Dredging

Counties: Fairfield, Middlesex, New Haven and New London Counties in Connecticut.

HOPPER DREDGING CONSTRUCTION PROJECTS

Modification Number	Publication Date
0	01/03/2014

SUCT1993-001 05/20/1993

	Rates	Fringes
Self-Propelled Hopper Dredge Drag Tenders	$ 8.21	

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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example.

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END OF GENERAL DECISION

General Decision Number: CT140006 10/03/2014 CT6

Superseded General Decision Number: CT20130006

State: Connecticut

Construction Type: Heavy Dredging

Counties: Connecticut Statewide.

CONNECTICUT

ALL DREDGING, EXCEPT SELF-PROPELLED HOPPER DREDGES, ON THE ATLANTIC OCEAN AND TRIBUTARY WATERS EMPTYING INTO THE ATLANTIC OCEAN.

Modification Number	Publication Date
0	01/03/2014
1	01/24/2014
2	06/20/2014
3	10/03/2014

* ENGI0025-001 10/01/2014

STATEWIDE

	Rates	Fringes
Dredging:		
CLASS A	$ 35.63	14.77+a+b
CLASS B1	$ 30.81	14.38+a+b
CLASS B2	$ 29.01	14.24+a+b
CLASS C1	$ 28.22	13.43+a+b
CLASS C2	$ 27.30	13.35+a+b
CLASS D	$ 22.68	12.23+a+b

CLASSIFICATIONS:
CLASS A: Lead Dredgeman, Operator, Leverman, Licensed Tug Operator over 1000 HP.
CLASS B1: Derrick Operator, Spider/Spill Barge Operator, Engineer, Electrician, Chief Welder, Chief Mate, Fill Placer, Operator II, Maintenance Engineer, Licensed Boat Operator. CLASS B2: Certified Welder.
CLASS C1: Mate, Drag Barge Operator, Steward, Assistant Fill Placer, Welder.
CLASS C2: Boat Operator
CLASS D: Shoreman, Deckhand, Rodman, Scowman, Cook, Messman, Porter/Janitor, Oiler.

INCENTIVE PAY: (Add to Hourly Rate)
Operator (NCCCO License/Certification) $1.50 Licensed Tug Operator over 1000 HP (Assigned as Master) (USCG licensed Master of Towing Vessels (MOTV) $1.50; Licensed Boat Operator (Assigned as lead boat captain) USCG licensed boat operator $1.00; Engineer (QMED and Tankerman endorsement or licensed engineer (USCG) $1.50
Oiler (QMED and Tankerman endorsement (USCG) $1.50; All classifications (Tankerman endorsement only) USCG $1.25; Deckhand or Mate (AB with Lifeboatman endorsement (USCG) $1.50; All classifications (lifeboatman endorsement only (USCG) $1.25; Welder (ABS certification) $0.50

FOOTNOTES APPLICABLE TO ABOVE CRAFTS:
a. PAID HOLIDAYS: New Year's Day, Martin Luther King, Jr.'s Birthday, Memorial Day, Good Friday, Independence Day, Labor Day, Veterans' Day, Thanksgiving Day and Christmas Day
b. VACATION: Eight percent (8%) of the straight time rate, multiplied by the total hours worked.

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

==========

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Administrative Review Board
U.S. Department of Labor

CT6
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION

General Decision Number: CT140013 07/11/2014 CT13

Superseded General Decision Number: CT20130013

State: Connecticut

Construction Type: Heavy

County: Fairfield County in Connecticut.

HEAVY CONSTRUCTION PROJECTS

Modification Number	Publication Date
0	01/03/2014
1	01/31/2014
2	04/11/2014
3	05/23/2014
4	05/30/2014
5	06/13/2014
6	07/04/2014
7	07/11/2014

BRCT0001-011 12/30/2013

	Rates	Fringes
BRICKLAYER	$ 32.50	27.06

BRCT0001-012 12/30/2013

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER	$ 32.50	27.06

CARP0210-005 05/06/2014

	Rates	Fringes
CARPENTER		
CARPENTER, PILEDRIVER	$ 31.00	22.50
DIVER TENDER	$ 31.00	22.50
DIVER	$ 39.46	22.50
MILLWRIGHT	$ 31.60	22.75

ELEC0003-004 05/02/2013

Darien, Greenwich, New Canaan, Stamford and the portion of Norwalk lying West of Five Mile River

	Rates	Fringes
ELECTRICIAN	$ 50.75	39.65

ELEC0488-006 06/01/2014

Bethel, Bridgeport, Brookfield, Danbury, Easton, Fairfield, Monroe, New Fairfield, Newtown, Norwalk, Redding, Ridgefield, Shelton, Sherman, Stratford, Trumball, Weston, Westport and Wilton Townships

	Rates	Fringes

ELECTRICIAN.....$ 37.27 23.37

ENGI0478-001 04/06/2014

	Rates	Fringes
Power equipment operators:		
GROUP 1	$ 36.80	22.30
GROUP 2	$ 36.48	22.30
GROUP 3	$ 35.74	22.30
GROUP 4	$ 35.35	22.30
GROUP 5	$ 34.76	22.30
GROUP 6	$ 34.45	22.30
GROUP 7	$ 34.11	22.30
GROUP 8	$ 33.71	22.30
GROUP 9	$ 33.28	22.30
GROUP 10	$ 31.24	22.30
GROUP 11	$ 31.24	22.30
GROUP 12	$ 31.18	22.30
GROUP 13	$ 32.71	22.30
GROUP 14	$ 30.60	22.30
GROUP 15	$ 30.29	22.30
GROUP 16	$ 29.46	22.30
GROUP 17	$ 29.05	22.30
GROUP 18	$ 28.40	22.30

Hazardous waste premium $3.00 per hour over classified rate.

Crane with boom, including jib, 150 feet - $1.50 extra.
Crane with boom, including jib, 200 feet - $2.50 extra.
Crane with boom, including jib, 250 feet - $5.00 extra.
Crane with boom, including jib, 300 feet - $7.00 extra.
Crane with boom, including jib, 400 feet - $10.00 extra

All Cranes: When crane operator is operating equipment that requires a fully licensed crane operator to operate he receives an extra $1.00 premium in addition to the hourly wage rate and benefit contributions:

1) Crane handling or erecting structural steel or stone, hoisting engineer(2 drums or over)
2) Cranes(100 ton rated capacity and over) Bauer Drill/Caisson
3) Cranes(under 100 ton rated capacity)

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.

POWER EQUIPMENT OPERATORS CLASSIFICATIONS

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.

GROUP 2: Cranes (100 ton capacity & over), Excavator over 2 cubic yards, piledriver ($3.00 premium when operator controls hammer), Bauer Drill/Caisson

GROUP 3: Excavator, 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 or operation) Rubber Tire Excavator (drott 1085 or similar); Grader Operator; Bulldozer Fine Grade (slopes, shaping, laser or GPS, etc.)

GROUP 4: Trenching machines, lighter derrick, concrete finishing machine, CMI machine or similar, Koehring Loader (skooper).

GROUP 5: Specialty railroad equipment, asphalt spreader, asphalt reclaiming machine, line grider, concrete pumps, drills with self contained power units, boring machine, post hole digger, auger, pounder, well digger, milling machine (over 24' mandrel), side boom, combination hoe and loader, directional driller

GROUP 6: Front end loader (3 cu. yds. up to 7 cu. yards), bulldozer (Rough grade dozer) .

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).

GROUP 8: Mechanic, grease truck operator, hydoblaster, barrier mover, power stone spreader, welder, work boat under 26 ft. transfer machine.

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).

GROUP 10: Vibratory hammer,ice machine, diesel & air, hammer, etc.

GROUP 11: Conveyor, earth roller, power pavement breaker (whiphammer), robot demolition equipment.

GROUP 12: Wellpoint operator.

GROUP 13: Portable asphalt plant operator, portable concrete plant operator, portable crusher plant operator.

GROUP 14: Compressor battery operator.

GROUP 15: Power Safety boat, Vacuum truck, Zim mixer, Sweeper; (Minimum for any job requiring a CDL license) .

GROUP 16: Elevator operator, tow motor operator (solid tire no rough terrain).

GROUP 17: Generator operator, compressor operator, pump operator,welding machine operator; Heater operator.

GROUP 18: Maintenance engineer.

ENGI0478-007 04/06/2014

	Rates	Fringes
POWER EQUIPMENT OPERATOR:		

Asphalt Paver	$ 34.76	22.30
Asphalt Roller	$ 34.11	22.30
Asphalt Spreader	$ 34.76	22.30
Backhoe/Excavator 2 cubic yards and over	$ 36.48	22.30
Backhoe/Excavator under 2 cubic yards	$ 35.74	22.30
Bulldozer (Rough Grade Dozer)	$ 34.45	22.30
Bulldozer Fine Grade(includes slopes, shaping, laser or gps)	$ 35.74	22.30
Crane handling or erecting structural steel or stone	$ 36.80	22.30
Cranes (100 ton capacity & over)	$ 36.48	22.30
Cranes (under 100 ton rated capacity)	$ 35.74	22.30
Drills with self contained power units; Directional driller	$ 34.76	22.30
Earth Roller	$ 31.24	22.30
Forklift	$ 33.28	22.30
Front End Loader (3 cubic yards up to 7 cubic yards)	$ 34.45	22.30
Front End Loader (7 cubic yards or over)	$ 36.80	22.30
Front End Loader (under 3 cubic yards)	$ 33.28	22.30
Grader/Blade	$ 35.74	22.30
Maintenance Engineer/Oiler	$ 28.40	22.30
Mechanic	$ 33.71	22.30
Rubber Tire Backhoe/Excavator	$ 35.74	22.30

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.

b. Crane with boom, including jib, 150 feet - $1.50 extra .
Crane with boom, including jib, 200 feet- $2.50 extra.
Crane with boom, including jib, 250 feet - $5.00 extra.
Crane with boom, including jib, 300 feet - $7.00 extra.
Crane with boom, including jib, 400 feet - $10.00 extra.

All Cranes: When crane operator is operating equipment that requires a fully licensed crane operator to operate he receives an extra $1.00 premium in addition to the hourly wage rate and benefit contributions:

1) Crane handling or erecting structural steel or stone, hoisting engineer(2 drums or over)
2) Cranes(100 ton rated capacity and over) Bauer Drill/Caisson
3) Cranes(under 100 ton rated capacity)

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* IRON0015-005 06/30/2014

	Rates	Fringes

IRONWORKER, REINFORCING.....$ 34.47 29.74

a. PAID HOLIDAY: Labor Day provided employee has been on the payroll for the 5 consecutive work days prior to Labor Day.

LABO0056-004 04/06/2014

	Rates	Fringes
Laborers: (TUNNEL CONSTRUCTION)		
CLEANING, CONCRETE AND CAULKING TUNNEL:		
Concrete Workers, Form Movers and Strippers	$ 30.37	17.80
Form Erectors	$ 30.68	17.80
ROCK SHAFT, CONCRETE, LINING OF SAME AND TUNNEL IN FREE AIR:		
Brakemen, Trackmen, Tunnel Laborers, Shaft Laborers	$ 30.37	17.80
Laborers Topside, Cage Tenders, Bellman	$ 30.26	17.80
Miners	$ 31.28	17.80
SHIELD DRIVE AND LINER PLATE TUNNELS IN FREE AIR:		
Brakemen and Trackmen	$ 30.37	17.80
Miners, Motormen, Mucking Machine Operators, Nozzlemen, Grout Men, Shaft and Tunnel, Steel and Rodmen, Shield and Erector, Arm Operator, Cable Tenders	$ 31.28	17.80
TUNNELS, CAISSON AND CYLINDER WORK IN COMPRESSED AIR:		
Blaster	$ 37.41	17.80
Brakemen, Trackmen, Groutman, Laborers, Outside Lock Tender, Gauge Tenders	$ 37.22	17.80
Change House Attendants, Powder Watchmen, Top on Iron Bolts	$ 35.35	17.80
Mucking Machine Operator	$ 37.97	17.80

a. PAID HOLIDAYS: On tunnel work only: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day.

No employee shall be eligible for holiday pay when he fails, without cause, to work the regular work day preceding the holiday or the regular work day following the holiday.

LABO0056-005 04/06/2014

	Rates	Fringes
LABORERS		

GROUP 1	$ 27.05	17.80
GROUP 2	$ 27.30	17.80
GROUP 3	$ 27.55	17.80
GROUP 4	$ 28.05	17.80
GROUP 5	$ 28.80	17.80
GROUP 6	$ 29.05	17.80
GROUP 7	$ 16.00	17.80

LABORERS CLASSIFICATIONS

GROUP 1: Laborers (Unskilled), acetylene burner, concrete specialist

GROUP 2: Chain saw operators, fence and guard rail erectors, pneumatic tool operators and powdermen.

GROUP 3: Pipelayers, Jackhammer/Pavement breaker (handheld), mason tenders/catch basin builders, asphalt rakers, air track operators, block paver and curb setter

GROUP 4: Asbestos/lead removal

GROUP 5: Blasters

GROUP 6: Toxic waste remover

GROUP 7: Traffic control signalman

PAIN0011-013 06/01/2013

	Rates	Fringes
PAINTER		
Brush and Roller	$ 30.62	17.75
Spray Only	$ 33.62	17.75
Steel Only	$ 32.62	17.75

TEAM0064-001 04/06/2014

	Rates	Fringes
Truck drivers:		
2 Axle Ready Mix	$ 28.43	19.14
2 Axle	$ 28.33	19.14
3 Axle Ready Mix	$ 28.48	19.14
3 Axle	$ 28.43	19.14
4 Axle Ready Mix	$ 28.58	19.14
4 Axle	$ 28.53	19.14
Heavy Duty Trailer 40 tons and over	$ 28.78	19.14
Heavy Duty Trailer up to 40 tons	$ 28.53	19.14
Specialized (Earth moving equipment other than conventional type on-the-road trucks and semi-trailers, including Euclids)	$ 28.58	19.14

Hazardous waste removal work receives additional $1.25 per hour.

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.

TEAM0064-006 04/06/2014

	Rates	Fringes
TRUCK DRIVER: 4 Axle Truck.....	$ 28.53	19.14

Hazardous waste removal work receives additional $1.25 per hour.

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.

SUCT2002-008 12/16/2008

	Rates	Fringes
IRONWORKER, STRUCTURAL.....	$ 28.62	10.84

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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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 clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is union or non-union.

Union Identifiers

An identifier enclosed in dotted lines beginning with characters other than "SU" denotes that the union classification and rate have found to be prevailing for that classification. Example: PLUM0198-005 07/01/2011. The first four letters , PLUM, indicate the international union and the four-digit number, 0198, that follows indicates the local union number or district council number where applicable , i.e.,

Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. The date, 07/01/2011, following these characters is the effective date of the most current negotiated rate/collective bargaining agreement which would be July 1, 2011 in the above example.

Union prevailing wage rates will be updated to reflect any changes in the collective bargaining agreements governing the rates.

0000/9999: weighted union wage rates will be published annually each January.

Non-Union Identifiers

Classifications listed under an "SU" identifier were derived from survey data by computing average rates and are not union rates; however, the data used in computing these rates may include both union and non-union data. Example: SULA2004-007 5/13/2010. SU indicates the rates are not union majority rates, LA indicates the State of Louisiana; 2004 is the year of the survey; and 007 is an internal number used in producing the wage determination. A 1993 or later date, 5/13/2010, indicates the classifications and rates under that identifier were issued as a General Wage Determination on that date.

Survey wage rates will remain in effect and will not change until a new survey is conducted.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION

General Decision Number: CT140014 07/11/2014 CT14

Superseded General Decision Number: CT20130014

State: Connecticut

Construction Type: Heavy

County: Hartford County in Connecticut.

HEAVY CONSTRUCTION PROJECTS

Modification Number	Publication Date
0	01/03/2014
1	01/31/2014
2	04/11/2014
3	05/23/2014
4	05/30/2014
5	06/13/2014
6	07/04/2014
7	07/11/2014

BRCT0001-012 12/30/2013

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER	$ 32.50	27.06

CARP0024-014 05/05/2014

Berlin, Bristol, Burlington, Canton, Marlborough, New Britain, Newington, Plainville and Southington

	Rates	Fringes
CARPENTER		
CARPENTERS, PILEDRIVERS	$ 31.00	22.50
DIVER TENDER	$ 31.00	22.50
DIVER	$ 39.46	22.50
MILLWRIGHTS	$ 31.60	22.75

CARP0043-005 05/05/2014

Avon, Bloomfield, East Branby, East Hartfod, East Windsor, Enfield, Farmington, Glastonbury, Granby, Hartford, Hartland, Manchester, Rocky Hill, Simsbury, South Windsor, Suffield, West Hartford, Wethersfield, Windsor, Windsor Locks

	Rates	Fringes
CARPENTER		
CARPENTER, PILEDRIVER	$ 31.00	22.50
DIVER TENDER	$ 31.00	22.50
DIVER	$ 39.46	22.50
MILLWRIGHT	$ 31.60	22.75

ELEC0035-006 06/01/2014

Entire County excluding Berlin, Bristol, Hartland, New Britain, Newington, Plainville and Southington Townships

	Rates	Fringes
ELECTRICIAN	$ 38.10	23.86

ELEC0090-005 06/01/2014

Berlin, Bristol, New Britain, Newington, Plainville, Southington Townships

	Rates	Fringes
ELECTRICIAN	$ 37.05	24.37

ELEC0488-005 06/01/2014

Hartland Township

	Rates	Fringes
ELECTRICIAN	$ 37.27	23.37

ENGI0478-001 04/06/2014

	Rates	Fringes
Power equipment operators:		
GROUP 1	$ 36.80	22.30
GROUP 2	$ 36.48	22.30
GROUP 3	$ 35.74	22.30
GROUP 4	$ 35.35	22.30
GROUP 5	$ 34.76	22.30
GROUP 6	$ 34.45	22.30
GROUP 7	$ 34.11	22.30
GROUP 8	$ 33.71	22.30
GROUP 9	$ 33.28	22.30
GROUP 10	$ 31.24	22.30
GROUP 11	$ 31.24	22.30
GROUP 12	$ 31.18	22.30
GROUP 13	$ 32.71	22.30
GROUP 14	$ 30.60	22.30
GROUP 15	$ 30.29	22.30
GROUP 16	$ 29.46	22.30
GROUP 17	$ 29.05	22.30
GROUP 18	$ 28.40	22.30

Hazardous waste premium $3.00 per hour over classified rate.

Crane with boom, including jib, 150 feet - $1.50 extra.
Crane with boom, including jib, 200 feet - $2.50 extra.
Crane with boom, including jib, 250 feet - $5.00 extra.
Crane with boom, including jib, 300 feet - $7.00 extra.
Crane with boom, including jib, 400 feet - $10.00 extra

All Cranes: When crane operator is operating equipment that requires a fully licensed crane operator to operate he receives an extra $1.00 premium in addition to the hourly wage rate and benefit contributions:

1) Crane handling or erecting structural steel or stone, hoisting engineer(2 drums or over)
2) Cranes(100 ton rated capacity and over) Bauer Drill/Caisson

3) Cranes(under 100 ton rated capacity)

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.

POWER EQUIPMENT OPERATORS CLASSIFICATIONS

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.

GROUP 2: Cranes (100 ton capacity & over), Excavator over 2 cubic yards, piledriver ($3.00 premium when operator controls hammer), Bauer Drill/Caisson

GROUP 3: Excavator, 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 or operation) Rubber Tire Excavator (drott 1085 or similar); Grader Operator; Bulldozer Fine Grade (slopes, shaping, laser or GPS, etc.)

GROUP 4: Trenching machines, lighter derrick, concrete finishing machine, CMI machine or similar, Koehring Loader (skooper).

GROUP 5: Specialty railroad equipment, asphalt spreader, asphalt reclaiming machine, line grider, concrete pumps, drills with self contained power units, boring machine, post hole digger, auger, pounder, well digger, milling machine (over 24' mandrel), side boom, combination hoe and loader, directional driller

GROUP 6: Front end loader (3 cu. yds. up to 7 cu. yards), bulldozer (Rough grade dozer) .

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).

GROUP 8: Mechanic, grease truck operator, hydoblaster, barrier mover, power stone spreader, welder, work boat under 26 ft. transfer machine.

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).

GROUP 10: Vibratory hammer,ice machine, diesel & air, hammer, etc.

GROUP 11: Conveyor, earth roller, power pavement breaker (whiphammer), robot demolition equipment.

GROUP 12: Wellpoint operator.

GROUP 13: Portable asphalt plant operator, portable concrete plant operator, portable crusher plant operator.

GROUP 14: Compressor battery operator.

GROUP 15: Power Safety boat, Vacuum truck, Zim mixer, Sweeper; (Minimum for any job requiring a CDL license) .

GROUP 16: Elevator operator, tow motor operator (solid tire no rough terrain).

GROUP 17: Generator operator, compressor operator, pump operator,welding machine operator; Heater operator.

GROUP 18: Maintenance engineer.

ENGI0478-010 04/06/2014

	Rates	Fringes
POWER EQUIPMENT OPERATOR:		
Asphalt Paver	$ 34.76	22.30
Asphalt Roller	$ 34.11	22.30
Asphalt Spreader	$ 34.76	22.30
Bulldozer (Rough Grade Dozer)	$ 34.45	22.30
Bulldozer Fine Grade(includes slopes, shaping, laser or gps)	$ 35.74	22.30
Crane handling or erecting structural steel or stone	$ 36.80	22.30
Cranes (100 ton capacity & over)	$ 36.48	22.30
Cranes (under 100 ton rated capacity)	$ 35.74	22.30
Drills with self contained power units; Directional driller	$ 34.76	22.30
Earth Roller	$ 31.24	22.30
Excavator/Backhoe 2 cubic yards and over	$ 36.48	22.30
Excavator/Backhoe under 2 cubic yards	$ 35.74	22.30
Forklift	$ 33.28	22.30
Front End Loader (3 cubic yards up to 7 cubic yards)	$ 34.45	22.30
Front End Loader (7 cubic yards or over)	$ 36.80	22.30
Front End Loader (under 3 cubic yards)	$ 33.28	22.30
Grader/Blade	$ 35.74	22.30
Maintenance Engineer/Oiler	$ 28.40	22.30
Mechanic	$ 33.71	22.30

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.

b. Crane with boom, including jib, 150 feet - $1.50 extra .
Crane with boom, including jib, 200 feet- $2.50 extra.
Crane with boom, including jib, 250 feet - $5.00 extra.

Crane with boom, including jib, 300 feet - $7.00 extra.
Crane with boom, including jib, 400 feet - $10.00 extra.

All Cranes: When crane operator is operating equipment that requires a fully licensed crane operator to operate he receives an extra $1.00 premium in addition to the hourly wage rate and benefit contributions:

1) Crane handling or erecting structural steel or stone, hoisting engineer(2 drums or over)
2) Cranes(100 ton rated capacity and over) Bauer Drill/Caisson
3) Cranes(under 100 ton rated capacity)

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* IRON0015-007 06/30/2014

	Rates	Fringes
IRONWORKER, STRUCTURAL	$ 34.47	29.74

a. PAID HOLIDAY: Labor Day provided employee has been on the payroll for the 5 consecutive work days prior to Labor Day.

LABO0056-004 04/06/2014

	Rates	Fringes
Laborers: (TUNNEL CONSTRUCTION)		
CLEANING, CONCRETE AND CAULKING TUNNEL:		
Concrete Workers, Form Movers and Strippers	$ 30.37	17.80
Form Erectors	$ 30.68	17.80
ROCK SHAFT, CONCRETE, LINING OF SAME AND TUNNEL IN FREE AIR:		
Brakemen, Trackmen, Tunnel Laborers, Shaft Laborers	$ 30.37	17.80
Laborers Topside, Cage Tenders, Bellman	$ 30.26	17.80
Miners	$ 31.28	17.80
SHIELD DRIVE AND LINER PLATE TUNNELS IN FREE AIR:		
Brakemen and Trackmen	$ 30.37	17.80
Miners, Motormen, Mucking Machine Operators, Nozzlemen, Grout Men, Shaft and Tunnel, Steel and Rodmen, Shield and Erector, Arm Operator, Cable Tenders	$ 31.28	17.80
TUNNELS, CAISSON AND CYLINDER WORK IN COMPRESSED AIR:		
Blaster	$ 37.41	17.80
Brakemen, Trackmen, Groutman, Laborers, Outside Lock Tender, Gauge Tenders	$ 37.22	17.80
Change House Attendants,		

Powder Watchmen, Top on
Iron Bolts.....$ 35.35 17.80
Mucking Machine Operator...$ 37.97 17.80

a. PAID HOLIDAYS: On tunnel work only: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day.

No employee shall be eligible for holiday pay when he fails, without cause, to work the regular work day preceding the holiday or the regular work day following the holiday.

LABO0056-006 04/06/2014

	Rates	Fringes
LABORERS		
GROUP 1	$ 27.05	17.80
GROUP 2	$ 27.30	17.80
GROUP 3	$ 27.55	17.80
GROUP 4	$ 28.05	17.80
GROUP 5	$ 28.80	17.80
GROUP 6	$ 29.05	17.80
GROUP 7	$ 16.00	17.80

LABORERS CLASSIFICATIONS

GROUP 1: Laborers (Unskilled), acetylene burner, concrete specialist

GROUP 2: Chain saw operators, fence and guard rail erectors, pneumatic tool operators and powdermen.

GROUP 3: Pipelayers, Jackhammer/Pavement breaker (handheld), mason tenders/catch basin builders, asphalt rakers, air track operators, block paver and curb setter

GROUP 4: Asbestos/lead removal

GROUP 5: Blasters

GROUP 6: Toxic waste remover

GROUP 7: Traffic control signalman

PAIN0011-013 06/01/2013

	Rates	Fringes
PAINTER		
Brush and Roller	$ 30.62	17.75
Spray Only	$ 33.62	17.75
Steel Only	$ 32.62	17.75

TEAM0064-001 04/06/2014

	Rates	Fringes
Truck drivers:		
2 Axle Ready Mix	$ 28.43	19.14

2 Axle	$ 28.33	19.14
3 Axle Ready Mix	$ 28.48	19.14
3 Axle	$ 28.43	19.14
4 Axle Ready Mix	$ 28.58	19.14
4 Axle	$ 28.53	19.14
Heavy Duty Trailer 40 tons and over	$ 28.78	19.14
Heavy Duty Trailer up to 40 tons	$ 28.53	19.14
Specialized (Earth moving equipment other than conventional type on-the-road trucks and semi-trailers, including Euclids)	$ 28.58	19.14

Hazardous waste removal work receives additional $1.25 per hour.

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.

TEAM0064-006 04/06/2014

	Rates	Fringes
TRUCK DRIVER: 4 Axle Truck	$ 28.53	19.14

Hazardous waste removal work receives additional $1.25 per hour.

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.

SUCT2002-009 12/16/2008

	Rates	Fringes
IRONWORKER, REINFORCING	$ 27.13	13.57
LABORER: Common or General	$ 21.03	5.30
OPERATOR: Excavator	$ 27.77	7.60
TRUCK DRIVER: 3 Axle & Semi - Truck	$ 19.93	7.39

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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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 clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is union or non-union.

Union Identifiers

An identifier enclosed in dotted lines beginning with characters other than "SU" denotes that the union classification and rate have found to be prevailing for that classification. Example: PLUM0198-005 07/01/2011. The first four letters , PLUM, indicate the international union and the four-digit number, 0198, that follows indicates the local union number or district council number where applicable , i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. The date, 07/01/2011, following these characters is the effective date of the most current negotiated rate/collective bargaining agreement which would be July 1, 2011 in the above example.

Union prevailing wage rates will be updated to reflect any changes in the collective bargaining agreements governing the rates.

0000/9999: weighted union wage rates will be published annually each January.

Non-Union Identifiers

Classifications listed under an "SU" identifier were derived from survey data by computing average rates and are not union rates; however, the data used in computing these rates may include both union and non-union data. Example: SULA2004-007 5/13/2010. SU indicates the rates are not union majority rates, LA indicates the State of Louisiana; 2004 is the year of the survey; and 007 is an internal number used in producing the wage determination. A 1993 or later date, 5/13/2010, indicates the classifications and rates under that identifier were issued as a General Wage Determination on that date.

Survey wage rates will remain in effect and will not change until a new survey is conducted.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can

be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION

General Decision Number: CT140015 07/11/2014 CT15

Superseded General Decision Number: CT20130015

State: Connecticut

Construction Type: Heavy

Counties: Middlesex and Tolland Counties in Connecticut.

HEAVY CONSTRUCTION PROJECTS

Modification Number	Publication Date
0	01/03/2014
1	01/31/2014
2	04/11/2014
3	05/23/2014
4	05/30/2014
5	06/13/2014
6	07/04/2014
7	07/11/2014

BRCT0001-011 12/30/2013

	Rates	Fringes
BRICKLAYER	$ 32.50	27.06

BRCT0001-012 12/30/2013

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER	$ 32.50	27.06

CARP0024-016 05/05/2014

MIDDLESEX COUNTY
TOLLAND COUNTY
Andover, Columbia, Coventry, Hebron, Mansfield, Union, Willington

	Rates	Fringes
CARPENTER		
CARPENTERS, PILEDRIVERS	$ 31.00	22.50
DIVER TENDER	$ 31.00	22.50
DIVER	$ 39.46	22.50
MILLWRIGHT	$ 31.60	22.75

CARP0043-006 05/05/2014

TOLLAND COUNTY
Bolton, Ellington, Somers, Tolland, Vernon

	Rates	Fringes
CARPENTER		
CARPENTER, PILEDRIVER	$ 31.00	22.50
DIVER TENDER	$ 31.00	22.50
DIVER	$ 39.46	22.50
MILLWRIGHT	$ 31.60	22.75

ELEC0035-004 06/01/2014

Cromwell, Middlefield, Middleton and Portland

	Rates	Fringes
ELECTRICIAN	$ 38.10	23.86

ELEC0090-006 06/01/2014

Chester, Clinton, Deep River, Durham, East Haddam, East Hampton, Essex, Haddam, Killingsworth, Old Saybrook, Westbrook

	Rates	Fringes
ELECTRICIAN	$ 37.05	24.37

ENGI0478-001 04/06/2014

	Rates	Fringes
Power equipment operators:		
GROUP 1	$ 36.80	22.30
GROUP 2	$ 36.48	22.30
GROUP 3	$ 35.74	22.30
GROUP 4	$ 35.35	22.30
GROUP 5	$ 34.76	22.30
GROUP 6	$ 34.45	22.30
GROUP 7	$ 34.11	22.30
GROUP 8	$ 33.71	22.30
GROUP 9	$ 33.28	22.30
GROUP 10	$ 31.24	22.30
GROUP 11	$ 31.24	22.30
GROUP 12	$ 31.18	22.30
GROUP 13	$ 32.71	22.30
GROUP 14	$ 30.60	22.30
GROUP 15	$ 30.29	22.30
GROUP 16	$ 29.46	22.30
GROUP 17	$ 29.05	22.30
GROUP 18	$ 28.40	22.30

Hazardous waste premium $3.00 per hour over classified rate.

Crane with boom, including jib, 150 feet - $1.50 extra.
Crane with boom, including jib, 200 feet - $2.50 extra.
Crane with boom, including jib, 250 feet - $5.00 extra.
Crane with boom, including jib, 300 feet - $7.00 extra.
Crane with boom, including jib, 400 feet - $10.00 extra

All Cranes: When crane operator is operating equipment that requires a fully licensed crane operator to operate he receives an extra $1.00 premium in addition to the hourly wage rate and benefit contributions:

1) Crane handling or erecting structural steel or stone, hoisting engineer(2 drums or over)
2) Cranes(100 ton rated capacity and over) Bauer Drill/Caisson
3) Cranes(under 100 ton rated capacity)

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.

POWER EQUIPMENT OPERATORS CLASSIFICATIONS

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.

GROUP 2: Cranes (100 ton capacity & over), Excavator over 2 cubic yards, piledriver ($3.00 premium when operator controls hammer), Bauer Drill/Caisson

GROUP 3: Excavator, 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 or operation) Rubber Tire Excavator (drott 1085 or similar); Grader Operator; Bulldozer Fine Grade (slopes, shaping, laser or GPS, etc.)

GROUP 4: Trenching machines, lighter derrick, concrete finishing machine, CMI machine or similar, Koehring Loader (skooper).

GROUP 5: Specialty railroad equipment, asphalt spreader, asphalt reclaiming machine, line grider, concrete pumps, drills with self contained power units, boring machine, post hole digger, auger, pounder, well digger, milling machine (over 24' mandrel), side boom, combination hoe and loader, directional driller

GROUP 6: Front end loader (3 cu. yds. up to 7 cu. yards), bulldozer (Rough grade dozer) .

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).

GROUP 8: Mechanic, grease truck operator, hydoblaster, barrier mover, power stone spreader, welder, work boat under 26 ft. transfer machine.

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).

GROUP 10: Vibratory hammer,ice machine, diesel & air, hammer, etc.

GROUP 11: Conveyor, earth roller, power pavement breaker (whiphammer), robot demolition equipment.

GROUP 12: Wellpoint operator.

GROUP 13: Portable asphalt plant operator, portable concrete plant operator, portable crusher plant operator.

GROUP 14: Compressor battery operator.

GROUP 15: Power Safety boat, Vacuum truck, Zim mixer,

Sweeper; (Minimum for any job requiring a CDL license) .

GROUP 16: Elevator operator, tow motor operator (solid tire no rough terrain).

GROUP 17: Generator operator, compressor operator, pump operator,welding machine operator; Heater operator.

GROUP 18: Maintenance engineer.

ENGI0478-007 04/06/2014

	Rates	Fringes
POWER EQUIPMENT OPERATOR:		
Asphalt Paver	$ 34.76	22.30
Asphalt Roller	$ 34.11	22.30
Asphalt Spreader	$ 34.76	22.30
Backhoe/Excavator 2 cubic yards and over	$ 36.48	22.30
Backhoe/Excavator under 2 cubic yards	$ 35.74	22.30
Bulldozer (Rough Grade Dozer)	$ 34.45	22.30
Bulldozer Fine Grade(includes slopes, shaping, laser or gps)	$ 35.74	22.30
Crane handling or erecting structural steel or stone	$ 36.80	22.30
Cranes (100 ton capacity & over)	$ 36.48	22.30
Cranes (under 100 ton rated capacity)	$ 35.74	22.30
Drills with self contained power units; Directional driller	$ 34.76	22.30
Earth Roller	$ 31.24	22.30
Forklift	$ 33.28	22.30
Front End Loader (3 cubic yards up to 7 cubic yards)	$ 34.45	22.30
Front End Loader (7 cubic yards or over)	$ 36.80	22.30
Front End Loader (under 3 cubic yards)	$ 33.28	22.30
Grader/Blade	$ 35.74	22.30
Maintenance Engineer/Oiler	$ 28.40	22.30
Mechanic	$ 33.71	22.30
Rubber Tire Backhoe/Excavator	$ 35.74	22.30

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.

b. Crane with boom, including jib, 150 feet - $1.50 extra .
Crane with boom, including jib, 200 feet- $2.50 extra.
Crane with boom, including jib, 250 feet - $5.00 extra.
Crane with boom, including jib, 300 feet - $7.00 extra.
Crane with boom, including jib, 400 feet - $10.00 extra.

All Cranes: When crane operator is operating equipment that requires a fully licensed crane operator to operate he receives an extra $1.00 premium in addition to the hourly wage rate and benefit contributions:

1) Crane handling or erecting structural steel or stone, hoisting engineer(2 drums or over)
2) Cranes(100 ton rated capacity and over) Bauer Drill/Caisson
3) Cranes(under 100 ton rated capacity)

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* IRON0015-008 06/30/2014

	Rates	Fringes
IRONWORKER, REINFORCING AND STRUCTURAL	$ 34.47	29.74

a. PAID HOLIDAY: Labor Day provided employee has been on the payroll for the 5 consecutive work days prior to Labor Day.

LABO0056-004 04/06/2014

	Rates	Fringes
Laborers: (TUNNEL CONSTRUCTION)		
CLEANING, CONCRETE AND CAULKING TUNNEL:		
Concrete Workers, Form Movers and Strippers	$ 30.37	17.80
Form Erectors	$ 30.68	17.80
ROCK SHAFT, CONCRETE, LINING OF SAME AND TUNNEL IN FREE AIR:		
Brakemen, Trackmen, Tunnel Laborers, Shaft Laborers	$ 30.37	17.80
Laborers Topside, Cage Tenders, Bellman	$ 30.26	17.80
Miners	$ 31.28	17.80
SHIELD DRIVE AND LINER PLATE TUNNELS IN FREE AIR:		
Brakemen and Trackmen	$ 30.37	17.80
Miners, Motormen, Mucking Machine Operators, Nozzlemen, Grout Men, Shaft and Tunnel, Steel and Rodmen, Shield and Erector, Arm Operator, Cable Tenders	$ 31.28	17.80
TUNNELS, CAISSON AND CYLINDER WORK IN COMPRESSED AIR:		
Blaster	$ 37.41	17.80
Brakemen, Trackmen, Groutman, Laborers, Outside Lock Tender, Gauge Tenders	$ 37.22	17.80
Change House Attendants, Powder Watchmen, Top on		

Iron Bolts.....$ 35.35 17.80
Mucking Machine Operator...$ 37.97 17.80

a. PAID HOLIDAYS: On tunnel work only: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day.

No employee shall be eligible for holiday pay when he fails, without cause, to work the regular work day preceding the holiday or the regular work day following the holiday.

LABO0056-007 04/06/2014

	Rates	Fringes
LABORERS		
GROUP 1	$ 27.05	17.80
GROUP 2	$ 27.30	17.80
GROUP 3	$ 27.55	17.80
GROUP 4	$ 28.05	17.80
GROUP 5	$ 28.80	17.80
GROUP 6	$ 29.05	17.80
GROUP 7	$ 16.00	17.80

LABORERS CLASSIFICATIONS

GROUP 1: Laborers (Unskilled), acetylene burner, concrete specialist

GROUP 2: Chain saw operators, fence and guard rail erectors, pneumatic tool operators and powdermen.

GROUP 3: Pipelayers, Jackhammer/Pavement breaker (handheld), mason tenders/catch basin builders, asphalt rakers, air track operators, block paver and curb setter

GROUP 4: Asbestos/lead removal

GROUP 5: Blasters

GROUP 6: Toxic waste remover

GROUP 7: Traffic control signalman

PAIN0011-013 06/01/2013

	Rates	Fringes
PAINTER		
Brush and Roller	$ 30.62	17.75
Spray Only	$ 33.62	17.75
Steel Only	$ 32.62	17.75

TEAM0064-001 04/06/2014

	Rates	Fringes
Truck drivers:		
2 Axle Ready Mix	$ 28.43	19.14
2 Axle	$ 28.33	19.14

3 Axle Ready Mix	$ 28.48	19.14
3 Axle	$ 28.43	19.14
4 Axle Ready Mix	$ 28.58	19.14
4 Axle	$ 28.53	19.14
Heavy Duty Trailer 40 tons and over	$ 28.78	19.14
Heavy Duty Trailer up to 40 tons	$ 28.53	19.14
Specialized (Earth moving equipment other than conventional type on-the-road trucks and semi-trailers, including Euclids)	$ 28.58	19.14

Hazardous waste removal work receives additional $1.25 per hour.

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.

TEAM0064-006 04/06/2014

	Rates	Fringes
TRUCK DRIVER: 4 Axle Truck	$ 28.53	19.14

Hazardous waste removal work receives additional $1.25 per hour.

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.

SUCT2002-010 12/16/2008

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER	$ 25.52	8.49
TRUCK DRIVER: 3 Axle & Semi - Truck	$ 19.93	7.39

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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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 clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is union or non-union.

Union Identifiers

An identifier enclosed in dotted lines beginning with characters other than "SU" denotes that the union classification and rate have found to be prevailing for that classification. Example: PLUM0198-005 07/01/2011. The first four letters , PLUM, indicate the international union and the four-digit number, 0198, that follows indicates the local union number or district council number where applicable , i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. The date, 07/01/2011, following these characters is the effective date of the most current negotiated rate/collective bargaining agreement which would be July 1, 2011 in the above example.

Union prevailing wage rates will be updated to reflect any changes in the collective bargaining agreements governing the rates.

0000/9999: weighted union wage rates will be published annually each January.

Non-Union Identifiers

Classifications listed under an "SU" identifier were derived from survey data by computing average rates and are not union rates; however, the data used in computing these rates may include both union and non-union data. Example: SULA2004-007 5/13/2010. SU indicates the rates are not union majority rates, LA indicates the State of Louisiana; 2004 is the year of the survey; and 007 is an internal number used in producing the wage determination. A 1993 or later date, 5/13/2010, indicates the classifications and rates under that identifier were issued as a General Wage Determination on that date.

Survey wage rates will remain in effect and will not change until a new survey is conducted.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on

a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION

General Decision Number: CT140016 07/11/2014 CT16

Superseded General Decision Number: CT20130016

State: Connecticut

Construction Type: Heavy

County: New Haven County in Connecticut.

HEAVY CONSTRUCTION PROJECTS

Modification Number	Publication Date
0	01/03/2014
1	01/31/2014
2	04/11/2014
3	05/23/2014
4	05/30/2014
5	06/13/2014
6	07/04/2014
7	07/11/2014

BRCT0001-011 12/30/2013

	Rates	Fringes
BRICKLAYER	$ 32.50	27.06

BRCT0001-012 12/30/2013

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER	$ 32.50	27.06

CARP0024-015 05/05/2014

Beacon Falls, Bethany, Branford, Cheshire, East Haven, Guilford, Hamden, Madison, Meriden, Middlebury, Naugatuck, New Haven, North Branford, North Haven, Orange (east of Orange Center Road and north of Route 1, and north of Route 1 and east of the Oyster River), Prospect, Southbury, Wallingford, Waterbury, West Haven, Wolcott, Woodbridge

	Rates	Fringes
CARPENTER		
CARPENTERS, PILEDRIVERS	$ 31.00	22.50
DIVER TENDER	$ 31.00	22.50
DIVER	$ 39.46	22.50
MILLWRIGHTS	$ 31.60	22.75

CARP0210-006 05/05/2014

Ansonia, Derby, Milford, Orange (West of Orange Center Road and South of Route 1 and West of the Oyster River), Oxford, Seymour

	Rates	Fringes
CARPENTER		
CARPENTER, PILEDRIVER	$ 31.00	22.50
DIVER TENDER	$ 31.00	22.50

DIVER	$ 39.46	22.50
MILLWRIGHT	$ 31.60	22.75

ELEC0090-004 06/01/2014

Entire County excluding Beacon Falls, Middlebury, Milford, Naugatuck, Oxford, Prospect, Seymour, Southbury, Waterbury and Wolcott Townships

	Rates	Fringes
ELECTRICIAN	$ 37.05	24.37

ELEC0488-007 06/01/2014

Beacon Falls, Middlebury, Milford, Naugatuck, Oxford, Prospect, Seymour, Southbury, Waterbury and Wolcott Townships

	Rates	Fringes
ELECTRICIAN	$ 37.27	23.37

ENGI0478-001 04/06/2014

	Rates	Fringes
Power equipment operators:		
GROUP 1	$ 36.80	22.30
GROUP 2	$ 36.48	22.30
GROUP 3	$ 35.74	22.30
GROUP 4	$ 35.35	22.30
GROUP 5	$ 34.76	22.30
GROUP 6	$ 34.45	22.30
GROUP 7	$ 34.11	22.30
GROUP 8	$ 33.71	22.30
GROUP 9	$ 33.28	22.30
GROUP 10	$ 31.24	22.30
GROUP 11	$ 31.24	22.30
GROUP 12	$ 31.18	22.30
GROUP 13	$ 32.71	22.30
GROUP 14	$ 30.60	22.30
GROUP 15	$ 30.29	22.30
GROUP 16	$ 29.46	22.30
GROUP 17	$ 29.05	22.30
GROUP 18	$ 28.40	22.30

Hazardous waste premium $3.00 per hour over classified rate.

Crane with boom, including jib, 150 feet - $1.50 extra.
Crane with boom, including jib, 200 feet - $2.50 extra.
Crane with boom, including jib, 250 feet - $5.00 extra.
Crane with boom, including jib, 300 feet - $7.00 extra.
Crane with boom, including jib, 400 feet - $10.00 extra

All Cranes: When crane operator is operating equipment that requires a fully licensed crane operator to operate he receives an extra $1.00 premium in addition to the hourly wage rate and benefit contributions:

1) Crane handling or erecting structural steel or stone, hoisting engineer(2 drums or over)

2) Cranes(100 ton rated capacity and over) Bauer Drill/Caisson
3) Cranes(under 100 ton rated capacity)

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.

POWER EQUIPMENT OPERATORS CLASSIFICATIONS

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.

GROUP 2: Cranes (100 ton capacity & over), Excavator over 2 cubic yards, piledriver ($3.00 premium when operator controls hammer), Bauer Drill/Caisson

GROUP 3: Excavator, 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 or operation) Rubber Tire Excavator (drott 1085 or similar); Grader Operator; Bulldozer Fine Grade (slopes, shaping, laser or GPS, etc.)

GROUP 4: Trenching machines, lighter derrick, concrete finishing machine, CMI machine or similar, Koehring Loader (skooper).

GROUP 5: Specialty railroad equipment, asphalt spreader, asphalt reclaiming machine, line grider, concrete pumps, drills with self contained power units, boring machine, post hole digger, auger, pounder, well digger, milling machine (over 24' mandrel), side boom, combination hoe and loader, directional driller

GROUP 6: Front end loader (3 cu. yds. up to 7 cu. yards), bulldozer (Rough grade dozer) .

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).

GROUP 8: Mechanic, grease truck operator, hydoblaster, barrier mover, power stone spreader, welder, work boat under 26 ft. transfer machine.

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).

GROUP 10: Vibratory hammer,ice machine, diesel & air, hammer, etc.

GROUP 11: Conveyor, earth roller, power pavement breaker (whiphammer), robot demolition equipment.

GROUP 12: Wellpoint operator.

GROUP 13: Portable asphalt plant operator, portable concrete

plant operator, portable crusher plant operator.

GROUP 14: Compressor battery operator.

GROUP 15: Power Safety boat, Vacuum truck, Zim mixer, Sweeper; (Minimum for any job requiring a CDL license) .

GROUP 16: Elevator operator, tow motor operator (solid tire no rough terrain).

GROUP 17: Generator operator, compressor operator, pump operator,welding machine operator; Heater operator.

GROUP 18: Maintenance engineer.

ENGI0478-011 04/06/2014

	Rates	Fringes
POWER EQUIPMENT OPERATOR:		
Asphalt Paver	$ 34.76	22.30
Asphalt Roller	$ 34.11	22.30
Asphalt Spreader	$ 34.76	22.30
Backhoe/Excavator 2 cubic yards and over	$ 36.48	22.30
Backhoe/Excavator under 2 cubic yards	$ 35.74	22.30
Crane handling or erecting structural steel or stone	$ 36.80	22.30
Cranes (100 ton capacity & over)	$ 36.48	22.30
Cranes (under 100 ton rated capacity)	$ 35.74	22.30
Drills with self contained power units; Directional driller	$ 34.76	22.30
Earth Roller	$ 31.24	22.30
Forklift	$ 33.28	22.30
Front End Loader (3 cubic yards up to 7 cubic yards)	$ 34.45	22.30
Front End Loader (7 cubic yards or over)	$ 36.80	22.30
Front End Loader (under 3 cubic yards)	$ 33.28	22.30
Grader/Blade	$ 35.74	22.30
Maintenance Engineer/Oiler	$ 28.40	22.30
Mechanic	$ 33.71	22.30
Rubber Tire Backhoe/Excavator	$ 35.74	22.30

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.

b. Crane with boom, including jib, 150 feet - $1.50 extra .
Crane with boom, including jib, 200 feet- $2.50 extra.
Crane with boom, including jib, 250 feet - $5.00 extra.
Crane with boom, including jib, 300 feet - $7.00 extra.
Crane with boom, including jib, 400 feet - $10.00 extra.

All Cranes: When crane operator is operating equipment that requires a fully licensed crane operator to operate he receives an extra $1.00 premium in addition to the hourly wage rate and benefit contributions:

1) Crane handling or erecting structural steel or stone, hoisting engineer(2 drums or over)
2) Cranes(100 ton rated capacity and over) Bauer Drill/Caisson
3) Cranes(under 100 ton rated capacity)

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* IRON0015-005 06/30/2014

	Rates	Fringes
IRONWORKER, REINFORCING	$ 34.47	29.74

a. PAID HOLIDAY: Labor Day provided employee has been on the payroll for the 5 consecutive work days prior to Labor Day.

LABO0056-004 04/06/2014

	Rates	Fringes
Laborers: (TUNNEL CONSTRUCTION)		
CLEANING, CONCRETE AND CAULKING TUNNEL:		
Concrete Workers, Form Movers and Strippers	$ 30.37	17.80
Form Erectors	$ 30.68	17.80
ROCK SHAFT, CONCRETE, LINING OF SAME AND TUNNEL IN FREE AIR:		
Brakemen, Trackmen, Tunnel Laborers, Shaft Laborers	$ 30.37	17.80
Laborers Topside, Cage Tenders, Bellman	$ 30.26	17.80
Miners	$ 31.28	17.80
SHIELD DRIVE AND LINER PLATE TUNNELS IN FREE AIR:		
Brakemen and Trackmen	$ 30.37	17.80
Miners, Motormen, Mucking Machine Operators, Nozzlemen, Grout Men, Shaft and Tunnel, Steel and Rodmen, Shield and Erector, Arm Operator, Cable Tenders	$ 31.28	17.80
TUNNELS, CAISSON AND CYLINDER WORK IN COMPRESSED AIR:		
Blaster	$ 37.41	17.80
Brakemen, Trackmen, Groutman, Laborers, Outside Lock Tender, Gauge Tenders	$ 37.22	17.80
Change House Attendants, Powder Watchmen, Top on Iron Bolts	$ 35.35	17.80

Mucking Machine Operator...$ 37.97 17.80

a. PAID HOLIDAYS: On tunnel work only: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day.

No employee shall be eligible for holiday pay when he fails, without cause, to work the regular work day preceding the holiday or the regular work day following the holiday.

LABO0056-005 04/06/2014

	Rates	Fringes
LABORERS		
GROUP 1	$ 27.05	17.80
GROUP 2	$ 27.30	17.80
GROUP 3	$ 27.55	17.80
GROUP 4	$ 28.05	17.80
GROUP 5	$ 28.80	17.80
GROUP 6	$ 29.05	17.80
GROUP 7	$ 16.00	17.80

LABORERS CLASSIFICATIONS

GROUP 1: Laborers (Unskilled), acetylene burner, concrete specialist

GROUP 2: Chain saw operators, fence and guard rail erectors, pneumatic tool operators and powdermen.

GROUP 3: Pipelayers, Jackhammer/Pavement breaker (handheld), mason tenders/catch basin builders, asphalt rakers, air track operators, block paver and curb setter

GROUP 4: Asbestos/lead removal

GROUP 5: Blasters

GROUP 6: Toxic waste remover

GROUP 7: Traffic control signalman

PAIN0011-013 06/01/2013

	Rates	Fringes
PAINTER		
Brush and Roller	$ 30.62	17.75
Spray Only	$ 33.62	17.75
Steel Only	$ 32.62	17.75

TEAM0064-001 04/06/2014

	Rates	Fringes
Truck drivers:		
2 Axle Ready Mix	$ 28.43	19.14
2 Axle	$ 28.33	19.14
3 Axle Ready Mix	$ 28.48	19.14

3 Axle	$ 28.43	19.14
4 Axle Ready Mix	$ 28.58	19.14
4 Axle	$ 28.53	19.14
Heavy Duty Trailer 40 tons and over	$ 28.78	19.14
Heavy Duty Trailer up to 40 tons	$ 28.53	19.14
Specialized (Earth moving equipment other than conventional type on-the-road trucks and semi-trailers, including Euclids)	$ 28.58	19.14

Hazardous waste removal work receives additional $1.25 per hour.

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.

TEAM0064-006 04/06/2014

	Rates	Fringes
TRUCK DRIVER: 4 Axle Truck	$ 28.53	19.14

Hazardous waste removal work receives additional $1.25 per hour.

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.

SUCT2002-011 12/16/2008

	Rates	Fringes
IRONWORKER, STRUCTURAL	$ 24.85	13.83
OPERATOR: Bulldozer	$ 25.33	9.64

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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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 clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is union or non-union.

Union Identifiers

An identifier enclosed in dotted lines beginning with characters other than "SU" denotes that the union classification and rate have found to be prevailing for that classification. Example: PLUM0198-005 07/01/2011. The first four letters , PLUM, indicate the international union and the four-digit number, 0198, that follows indicates the local union number or district council number where applicable , i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. The date, 07/01/2011, following these characters is the effective date of the most current negotiated rate/collective bargaining agreement which would be July 1, 2011 in the above example.

Union prevailing wage rates will be updated to reflect any changes in the collective bargaining agreements governing the rates.

0000/9999: weighted union wage rates will be published annually each January.

Non-Union Identifiers

Classifications listed under an "SU" identifier were derived from survey data by computing average rates and are not union rates; however, the data used in computing these rates may include both union and non-union data. Example: SULA2004-007 5/13/2010. SU indicates the rates are not union majority rates, LA indicates the State of Louisiana; 2004 is the year of the survey; and 007 is an internal number used in producing the wage determination. A 1993 or later date, 5/13/2010, indicates the classifications and rates under that identifier were issued as a General Wage Determination on that date.

Survey wage rates will remain in effect and will not change until a new survey is conducted.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION

General Decision Number: CT140017 07/11/2014 CT17

Superseded General Decision Number: CT20130017

State: Connecticut

Construction Type: Heavy

County: New London County in Connecticut.

HEAVY CONSTRUCTION PROJECTS

Modification Number	Publication Date
0	01/03/2014
1	01/31/2014
2	04/11/2014
3	05/23/2014
4	05/30/2014
5	06/13/2014
6	07/04/2014
7	07/11/2014

BRCT0001-011 12/30/2013

	Rates	Fringes
BRICKLAYER	$ 32.50	27.06

BRCT0001-012 12/30/2013

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER	$ 32.50	27.06

CARP0024-007 05/05/2014

	Rates	Fringes
CARPENTER		
CARPENTERS, PILEDRIVERS	$ 31.00	22.50
DIVER TENDERS	$ 31.00	22.50
DIVERS	$ 39.46	22.50
MILLWRIGHTS	$ 31.60	22.75

ELEC0035-011 06/01/2014

Bozrah, Colchester, Franklin, Griswold, Lebanon, Ledyard, Lisbon, Montville, North Stonington, Norwich, Preston, Salem, Sprague, Stonington and Voluntown

	Rates	Fringes
ELECTRICIAN	$ 38.10	23.86

ELEC0090-003 06/01/2014

East Lyme, Groton, New London, Old Lyme, Waterford, plus the part of Ledyard wherein the property of the Submarine Base is located

	Rates	Fringes

ELECTRICIAN.....$ 37.05 24.37

ENGI0478-001 04/06/2014

	Rates	Fringes
Power equipment operators:		
GROUP 1	$ 36.80	22.30
GROUP 2	$ 36.48	22.30
GROUP 3	$ 35.74	22.30
GROUP 4	$ 35.35	22.30
GROUP 5	$ 34.76	22.30
GROUP 6	$ 34.45	22.30
GROUP 7	$ 34.11	22.30
GROUP 8	$ 33.71	22.30
GROUP 9	$ 33.28	22.30
GROUP 10	$ 31.24	22.30
GROUP 11	$ 31.24	22.30
GROUP 12	$ 31.18	22.30
GROUP 13	$ 32.71	22.30
GROUP 14	$ 30.60	22.30
GROUP 15	$ 30.29	22.30
GROUP 16	$ 29.46	22.30
GROUP 17	$ 29.05	22.30
GROUP 18	$ 28.40	22.30

Hazardous waste premium $3.00 per hour over classified rate.

Crane with boom, including jib, 150 feet - $1.50 extra.
Crane with boom, including jib, 200 feet - $2.50 extra.
Crane with boom, including jib, 250 feet - $5.00 extra.
Crane with boom, including jib, 300 feet - $7.00 extra.
Crane with boom, including jib, 400 feet - $10.00 extra

All Cranes: When crane operator is operating equipment that requires a fully licensed crane operator to operate he receives an extra $1.00 premium in addition to the hourly wage rate and benefit contributions:

1) Crane handling or erecting structural steel or stone, hoisting engineer(2 drums or over)
2) Cranes(100 ton rated capacity and over) Bauer Drill/Caisson
3) Cranes(under 100 ton rated capacity)

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.

POWER EQUIPMENT OPERATORS CLASSIFICATIONS

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.

GROUP 2: Cranes (100 ton capacity & over), Excavator over 2 cubic yards, piledriver ($3.00 premium when operator controls hammer), Bauer Drill/Caisson

GROUP 3: Excavator, 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 or operation) Rubber Tire Excavator (drott 1085 or similar); Grader Operator; Bulldozer Fine Grade (slopes, shaping, laser or GPS, etc.)

GROUP 4: Trenching machines, lighter derrick, concrete finishing machine, CMI machine or similar, Koehring Loader (skooper).

GROUP 5: Specialty railroad equipment, asphalt spreader, asphalt reclaiming machine, line grider, concrete pumps, drills with self contained power units, boring machine, post hole digger, auger, pounder, well digger, milling machine (over 24' mandrel), side boom, combination hoe and loader, directional driller

GROUP 6: Front end loader (3 cu. yds. up to 7 cu. yards), bulldozer (Rough grade dozer) .

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).

GROUP 8: Mechanic, grease truck operator, hydoblaster, barrier mover, power stone spreader, welder, work boat under 26 ft. transfer machine.

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).

GROUP 10: Vibratory hammer,ice machine, diesel & air, hammer, etc.

GROUP 11: Conveyor, earth roller, power pavement breaker (whiphammer), robot demolition equipment.

GROUP 12: Wellpoint operator.

GROUP 13: Portable asphalt plant operator, portable concrete plant operator, portable crusher plant operator.

GROUP 14: Compressor battery operator.

GROUP 15: Power Safety boat, Vacuum truck, Zim mixer, Sweeper; (Minimum for any job requiring a CDL license) .

GROUP 16: Elevator operator, tow motor operator (solid tire no rough terrain).

GROUP 17: Generator operator, compressor operator, pump operator,welding machine operator; Heater operator.

GROUP 18: Maintenance engineer.

ENGI0478-008 04/06/2014

	Rates	Fringes
POWER EQUIPMENT OPERATOR:		

Asphalt Paver	$ 34.76	22.30
Asphalt Roller	$ 34.11	22.30
Asphalt Spreader	$ 34.76	22.30
Backhoe/Excavator 2 cubic yards and over	$ 36.48	22.30
Backhoe/Excavator under 2 cubic yards	$ 35.74	22.30
Bulldozer (Rough Grade Dozer)	$ 34.45	22.30
Bulldozer Fine Grade(includes slopes, shaping, laser or gps)	$ 35.74	22.30
Crane handling or erecting structural steel or stone	$ 36.80	22.30
Cranes (100 ton capacity & over)	$ 36.48	22.30
Cranes (under 100 ton rated capacity)	$ 35.74	22.30
Drills with self contained power units; Directional driller	$ 34.76	22.30
Earth Roller	$ 31.24	22.30
Forklift	$ 33.28	22.30
Front End Loader (3 cubic yards up to 7 cubic yards)	$ 34.45	22.30
Front End Loader (7 cubic yards or over)	$ 36.80	22.30
Front End Loader (under 3 cubic yards)	$ 33.28	22.30
Grader/Blade	$ 35.74	22.30
Maintenance Engineer/Oiler	$ 28.40	22.30
Mechanic	$ 33.71	22.30
Rubber Tire Backhoe/Excavator	$ 35.74	22.30

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.

b. Crane with boom, including jib, 150 feet - $1.50 extra .
Crane with boom, including jib, 200 feet- $2.50 extra.
Crane with boom, including jib, 250 feet - $5.00 extra.
Crane with boom, including jib, 300 feet - $7.00 extra.
Crane with boom, including jib, 400 feet - $10.00 extra.

All Cranes: When crane operator is operating equipment that requires a fully licensed crane operator to operate he receives an extra $1.00 premium in addition to the hourly wage rate and benefit contributions:

1) Crane handling or erecting structural steel or stone, hoisting engineer(2 drums or over)
2) Cranes(100 ton rated capacity and over) Bauer Drill/Caisson
3) Cranes(under 100 ton rated capacity)

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* IRON0015-008 06/30/2014

	Rates	Fringes

IRONWORKER, REINFORCING AND
STRUCTURAL.....$ 34.47 29.74

a. PAID HOLIDAY: Labor Day provided employee has been on the payroll for the 5 consecutive work days prior to Labor Day.

LABO0056-004 04/06/2014

	Rates	Fringes
Laborers: (TUNNEL CONSTRUCTION)		
CLEANING, CONCRETE AND CAULKING TUNNEL:		
Concrete Workers, Form Movers and Strippers.....	$ 30.37	17.80
Form Erectors.....	$ 30.68	17.80
ROCK SHAFT, CONCRETE, LINING OF SAME AND TUNNEL IN FREE AIR:		
Brakemen, Trackmen, Tunnel Laborers, Shaft Laborers.....	$ 30.37	17.80
Laborers Topside, Cage Tenders, Bellman.....	$ 30.26	17.80
Miners.....	$ 31.28	17.80
SHIELD DRIVE AND LINER PLATE TUNNELS IN FREE AIR:		
Brakemen and Trackmen.....	$ 30.37	17.80
Miners, Motormen, Mucking Machine Operators, Nozzlemen, Grout Men, Shaft and Tunnel, Steel and Rodmen, Shield and Erector, Arm Operator, Cable Tenders.....	$ 31.28	17.80
TUNNELS, CAISSON AND CYLINDER WORK IN COMPRESSED AIR:		
Blaster.....	$ 37.41	17.80
Brakemen, Trackmen, Groutman, Laborers, Outside Lock Tender, Gauge Tenders.....	$ 37.22	17.80
Change House Attendants, Powder Watchmen, Top on Iron Bolts.....	$ 35.35	17.80
Mucking Machine Operator...	$ 37.97	17.80

a. PAID HOLIDAYS: On tunnel work only: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day.

No employee shall be eligible for holiday pay when he fails, without cause, to work the regular work day preceding the holiday or the regular work day following the holiday.

LABO0056-007 04/06/2014

	Rates	Fringes

LABORERS

GROUP 1	$ 27.05	17.80
GROUP 2	$ 27.30	17.80
GROUP 3	$ 27.55	17.80
GROUP 4	$ 28.05	17.80
GROUP 5	$ 28.80	17.80
GROUP 6	$ 29.05	17.80
GROUP 7	$ 16.00	17.80

LABORERS CLASSIFICATIONS

GROUP 1: Laborers (Unskilled), acetylene burner, concrete specialist

GROUP 2: Chain saw operators, fence and guard rail erectors, pneumatic tool operators and powdermen.

GROUP 3: Pipelayers, Jackhammer/Pavement breaker (handheld), mason tenders/catch basin builders, asphalt rakers, air track operators, block paver and curb setter

GROUP 4: Asbestos/lead removal

GROUP 5: Blasters

GROUP 6: Toxic waste remover

GROUP 7: Traffic control signalman

PAIN0011-013 06/01/2013

	Rates	Fringes
PAINTER		
Brush and Roller	$ 30.62	17.75
Spray Only	$ 33.62	17.75
Steel Only	$ 32.62	17.75

TEAM0064-001 04/06/2014

	Rates	Fringes
Truck drivers:		
2 Axle Ready Mix	$ 28.43	19.14
2 Axle	$ 28.33	19.14
3 Axle Ready Mix	$ 28.48	19.14
3 Axle	$ 28.43	19.14
4 Axle Ready Mix	$ 28.58	19.14
4 Axle	$ 28.53	19.14
Heavy Duty Trailer 40 tons and over	$ 28.78	19.14
Heavy Duty Trailer up to 40 tons	$ 28.53	19.14
Specialized (Earth moving equipment other than conventional type on-the-road trucks and semi-trailers, including Euclids)	$ 28.58	19.14

Hazardous waste removal work receives additional $1.25 per

hour.

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.

TEAM0064-006 04/06/2014

	Rates	Fringes
TRUCK DRIVER: 4 Axle Truck.....	$ 28.53	19.14

Hazardous waste removal work receives additional $1.25 per hour.

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.

SUCT2002-012 12/16/2008

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER...	$ 25.52	8.49
TRUCK DRIVER: 3 Axle & Semi - Truck.....	$ 19.93	7.01

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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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 clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is union or non-union.

Union Identifiers

An identifier enclosed in dotted lines beginning with characters other than "SU" denotes that the union classification and rate have found to be prevailing for that

classification. Example: PLUM0198-005 07/01/2011. The first four letters , PLUM, indicate the international union and the four-digit number, 0198, that follows indicates the local union number or district council number where applicable , i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. The date, 07/01/2011, following these characters is the effective date of the most current negotiated rate/collective bargaining agreement which would be July 1, 2011 in the above example.

Union prevailing wage rates will be updated to reflect any changes in the collective bargaining agreements governing the rates.

0000/9999: weighted union wage rates will be published annually each January.

Non-Union Identifiers

Classifications listed under an "SU" identifier were derived from survey data by computing average rates and are not union rates; however, the data used in computing these rates may include both union and non-union data. Example: SULA2004-007 5/13/2010. SU indicates the rates are not union majority rates, LA indicates the State of Louisiana; 2004 is the year of the survey; and 007 is an internal number used in producing the wage determination. A 1993 or later date, 5/13/2010, indicates the classifications and rates under that identifier were issued as a General Wage Determination on that date.

Survey wage rates will remain in effect and will not change until a new survey is conducted.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations

Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

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Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION

General Decision Number: CT140026 10/17/2014 CT26

Superseded General Decision Number: CT20130026

State: Connecticut

Construction Type: Heavy

Counties: Litchfield and Windham Counties in Connecticut.

HEAVY CONSTRUCTION PROJECTS

Modification Number	Publication Date
0	01/03/2014
1	01/31/2014
2	02/21/2014
3	04/11/2014
4	05/23/2014
5	05/30/2014
6	06/13/2014
7	06/27/2014
8	07/04/2014
9	07/11/2014
10	07/25/2014
11	10/17/2014

BRCT0001-015 12/30/2013

	Rates	Fringes
BRICKLAYER		
BRICKLAYERS, CEMENT MASONS, CEMENT FINISHERS, STONE MASONS	$ 32.50	27.06

CARP0024-011 05/05/2014

	Rates	Fringes
CARPENTER		
Carpenters, Piledrivers	$ 31.00	22.50
Diver Tenders	$ 31.00	22.50
Divers	$ 39.46	22.50
Millwrights	$ 31.60	22.75

ELEC0035-008 06/01/2014

WINDHAM COUNTY

	Rates	Fringes
ELECTRICIAN	$ 38.10	23.86

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* ELEC0042-001 08/31/2014

	Rates	Fringes
Line Construction: (Railroad Construction and Maintenance)		
Eqiupment Operator	$ 38.62	6.25%+16.68
Groundmen	$ 24.99	6.25%+10.87
Heavy Equipment Operators	$ 40.89	6.25%+17.18

Lineman, Cable Splicer,
Technician.....$ 45.43 6.25%+19.20
Truck Driver.....$ 34.07 6.25%+15.41

ELEC0090-008 06/01/2014

LITCHFIELD COUNTY
Plymouth Township

	Rates	Fringes
ELECTRICIAN.....	$ 37.05	24.37

ELEC0488-011 06/01/2014

LITCHFIELD COUNTY (Excluding Plymouth Township)

	Rates	Fringes
ELECTRICIAN.....	$ 37.27	23.37

ENGI0478-001 04/06/2014

	Rates	Fringes
Power equipment operators:		
GROUP 1.....	$ 36.80	22.30
GROUP 2.....	$ 36.48	22.30
GROUP 3.....	$ 35.74	22.30
GROUP 4.....	$ 35.35	22.30
GROUP 5.....	$ 34.76	22.30
GROUP 6.....	$ 34.45	22.30
GROUP 7.....	$ 34.11	22.30
GROUP 8.....	$ 33.71	22.30
GROUP 9.....	$ 33.28	22.30
GROUP 10.....	$ 31.24	22.30
GROUP 11.....	$ 31.24	22.30
GROUP 12.....	$ 31.18	22.30
GROUP 13.....	$ 32.71	22.30
GROUP 14.....	$ 30.60	22.30
GROUP 15.....	$ 30.29	22.30
GROUP 16.....	$ 29.46	22.30
GROUP 17.....	$ 29.05	22.30
GROUP 18.....	$ 28.40	22.30

Hazardous waste premium $3.00 per hour over classified rate.

Crane with boom, including jib, 150 feet - $1.50 extra.
Crane with boom, including jib, 200 feet - $2.50 extra.
Crane with boom, including jib, 250 feet - $5.00 extra.
Crane with boom, including jib, 300 feet - $7.00 extra.
Crane with boom, including jib, 400 feet - $10.00 extra

All Cranes: When crane operator is operating equipment that requires a fully licensed crane operator to operate he receives an extra $1.00 premium in addition to the hourly wage rate and benefit contributions:

1) Crane handling or erecting structural steel or stone, hoisting engineer(2 drums or over)
2) Cranes(100 ton rated capacity and over) Bauer Drill/Caisson
3) Cranes(under 100 ton rated capacity)

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.

POWER EQUIPMENT OPERATORS CLASSIFICATIONS

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.

GROUP 2: Cranes (100 ton capacity & over), Excavator over 2 cubic yards, piledriver ($3.00 premium when operator controls hammer), Bauer Drill/Caisson

GROUP 3: Excavator, 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 or operation) Rubber Tire Excavator (drott 1085 or similar); Grader Operator; Bulldozer Fine Grade (slopes, shaping, laser or GPS, etc.)

GROUP 4: Trenching machines, lighter derrick, concrete finishing machine, CMI machine or similar, Koehring Loader (skooper).

GROUP 5: Specialty railroad equipment, asphalt spreader, asphalt reclaiming machine, line grider, concrete pumps, drills with self contained power units, boring machine, post hole digger, auger, pounder, well digger, milling machine (over 24' mandrel), side boom, combination hoe and loader, directional driller

GROUP 6: Front end loader (3 cu. yds. up to 7 cu. yards), bulldozer (Rough grade dozer) .

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).

GROUP 8: Mechanic, grease truck operator, hydoblaster, barrier mover, power stone spreader, welder, work boat under 26 ft. transfer machine.

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).

GROUP 10: Vibratory hammer,ice machine, diesel & air, hammer, etc.

GROUP 11: Conveyor, earth roller, power pavement breaker (whiphammer), robot demolition equipment.

GROUP 12: Wellpoint operator.

GROUP 13: Portable asphalt plant operator, portable concrete plant operator, portable crusher plant operator.

GROUP 14: Compressor battery operator.

GROUP 15: Power Safety boat, Vacuum truck, Zim mixer, Sweeper; (Minimum for any job requiring a CDL license) .

GROUP 16: Elevator operator, tow motor operator (solid tire no rough terrain).

GROUP 17: Generator operator, compressor operator, pump operator,welding machine operator; Heater operator.

GROUP 18: Maintenance engineer.

IRON0015-001 06/30/2014

	Rates	Fringes
Ironworkers: (Ornamental, Reinforcing, Structural and Precast Concrete Erection).....	$ 34.47	29.74

PAID HOLIDAY: Labor Day provided employee has been on the payroll for the 5 consecutive work days prior to Labor Day.

LABO0056-004 04/06/2014

	Rates	Fringes
Laborers: (TUNNEL CONSTRUCTION)		
CLEANING, CONCRETE AND CAULKING TUNNEL:		
Concrete Workers, Form Movers and Strippers.....	$ 30.37	17.80
Form Erectors.....	$ 30.68	17.80
ROCK SHAFT, CONCRETE, LINING OF SAME AND TUNNEL IN FREE AIR:		
Brakemen, Trackmen, Tunnel Laborers, Shaft Laborers.....	$ 30.37	17.80
Laborers Topside, Cage Tenders, Bellman.....	$ 30.26	17.80
Miners.....	$ 31.28	17.80
SHIELD DRIVE AND LINER PLATE TUNNELS IN FREE AIR:		
Brakemen and Trackmen.....	$ 30.37	17.80
Miners, Motormen, Mucking Machine Operators, Nozzlemen, Grout Men, Shaft and Tunnel, Steel and Rodmen, Shield and Erector, Arm Operator, Cable Tenders.....	$ 31.28	17.80
TUNNELS, CAISSON AND CYLINDER WORK IN COMPRESSED AIR:		
Blaster.....	$ 37.41	17.80
Brakemen, Trackmen, Groutman, Laborers, Outside Lock Tender, Gauge Tenders.....	$ 37.22	17.80

Change House Attendants,
Powder Watchmen, Top on
Iron Bolts.....$ 35.35 17.80
Mucking Machine Operator...$ 37.97 17.80

a. PAID HOLIDAYS: On tunnel work only: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day.

No employee shall be eligible for holiday pay when he fails, without cause, to work the regular work day preceding the holiday or the regular work day following the holiday.

LABO0056-013 04/06/2014

	Rates	Fringes
LABORER (HEAVY CONSTRUCTION)		
GROUP 1	$ 27.05	17.80
GROUP 2	$ 27.30	17.80
GROUP 3	$ 27.55	17.80
GROUP 4	$ 28.05	17.80
GROUP 5	$ 28.80	17.80
GROUP 6	$ 29.05	17.80
GROUP 7	$ 16.00	17.80

LABORERS CLASSIFICATIONS

GROUP 1: Laborers (Unskilled), acetylene burner, concrete specialist

GROUP 2: Chain saw operators, fence and guard rail erectors, pneumatic tool operators and powdermen.

GROUP 3: Pipelayers, Jackhammer/Pavement breaker (handheld), mason
tenders/catch basin builders, asphalt rakers, air track operators, block paver and curb setter

GROUP 4: Asbestos/lead removal

GROUP 5: Blasters

GROUP 6: Toxic waste remover

GROUP 7: Traffic control signalman

PAIN0011-003 06/01/2014

	Rates	Fringes
Painters: (BRIDGE CONSTRUCTION)		
Brush, Roller, Blasting (Sand, Water, etc.) Spray	$ 45.10	18.55

PAIN0011-018 06/01/2014

	Rates	Fringes
PAINTER		

Blast and Spray	$ 34.02	18.55
Brush and Roll	$ 31.02	18.55
Tanks, Towers, Swing	$ 33.02	18.55

PLUM0777-002 06/01/2014

	Rates	Fringes
PLUMBER/PIPEFITTER	$ 40.31	26.82

TEAM0064-001 04/06/2014

	Rates	Fringes
Truck drivers:		
2 Axle Ready Mix	$ 28.43	19.14
2 Axle	$ 28.33	19.14
3 Axle Ready Mix	$ 28.48	19.14
3 Axle	$ 28.43	19.14
4 Axle Ready Mix	$ 28.58	19.14
4 Axle	$ 28.53	19.14
Heavy Duty Trailer 40 tons and over	$ 28.78	19.14
Heavy Duty Trailer up to 40 tons	$ 28.53	19.14
Specialized (Earth moving equipment other than conventional type on-the-road trucks and semi-trailers, including Euclids)	$ 28.58	19.14

Hazardous waste removal work receives additional $1.25 per hour.

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.

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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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 clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular

rate is union or non-union.

Union Identifiers

An identifier enclosed in dotted lines beginning with characters other than "SU" denotes that the union classification and rate have found to be prevailing for that classification. Example: PLUM0198-005 07/01/2011. The first four letters , PLUM, indicate the international union and the four-digit number, 0198, that follows indicates the local union number or district council number where applicable , i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. The date, 07/01/2011, following these characters is the effective date of the most current negotiated rate/collective bargaining agreement which would be July 1, 2011 in the above example.

Union prevailing wage rates will be updated to reflect any changes in the collective bargaining agreements governing the rates.

0000/9999: weighted union wage rates will be published annually each January.

Non-Union Identifiers

Classifications listed under an "SU" identifier were derived from survey data by computing average rates and are not union rates; however, the data used in computing these rates may include both union and non-union data. Example: SULA2004-007 5/13/2010. SU indicates the rates are not union majority rates, LA indicates the State of Louisiana; 2004 is the year of the survey; and 007 is an internal number used in producing the wage determination. A 1993 or later date, 5/13/2010, indicates the classifications and rates under that identifier were issued as a General Wage Determination on that date.

Survey wage rates will remain in effect and will not change until a new survey is conducted.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial

contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION

Minimum Rates and Classifications
for Heavy/Highway Construction

ID#: **H** 19849

Connecticut Department of Labor
Wage and Workplace Standards Division

By virtue of the authority vested in the Labor Commissioner under provisions of Section 31-53 of the General Statutes of Connecticut, as amended, the following are declared to be the prevailing rates and welfare payments and will apply only where the contract is advertised for bid within 20 days of the date on which the rates are established. Any contractor or subcontractor not obligated by agreement to pay to the welfare and pension fund shall pay this amount to each employee as part of his/her hourly wages.

Project Number:

Project Town: Hartford

FAP Number: FR-HSR-0125-12-01-00

State Number: 170-3261

Project: Upgrades To The Existing Railroad Station

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	27.06
2) Carpenters, Piledrivermen	31.00	22.50

As of: Tuesday, October 28, 2014

Project: Upgrades To The Existing Railroad Station

2a) Diver Tenders	31.00	22.50
3) Divers	39.46	22.50
4) Painters: (Bridge Construction) Brush, Roller, Blasting (Sand, Water, etc.), Spray	45.10	18.55
4a) Painters: Brush and Roller	31.02	18.55
4b) Painters: Spray Only	34.02	18.55
4c) Painters: Steel Only	33.02	18.55
4d) Painters: Blast and Spray	34.02	18.55

As of: Tuesday, October 28, 2014

Project: Upgrades To The Existing Railroad Station

4e) Painters: Tanks, Tower and Swing	33.02	18.55
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)	38.10	22.72 + 3% of gross wage
6) Ironworkers: Ornamental, Reinforcing, Structural, and Precast Concrete Erection	34.47	29.74 + 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)	40.31	26.82
----LABORERS---- -		
8) Group 1: Laborer (Unskilled), Common or General, acetylene burner, concrete specialist	27.05	17.80
9) Group 2: Chain saw operators, fence and guard rail erectors, pneumatic tool operators, powdermen, air tool operator	27.30	17.80

As of: Tuesday, October 28, 2014

Project: Upgrades To The Existing Railroad Station

10) Group 3: Pipelayers	27.55	17.80
11) Group 4: Jackhammer/Pavement breaker (handheld); mason tenders (cement/concrete), catch basin builders, asphalt rakers, air track operators, block pavers and curb setters	27.55	17.80
12) Group 5: Toxic waste removal (non-mechanical systems)	29.05	17.80
13) Group 6: Blasters	28.80	17.80
Group 7: Asbestos Removal, non-mechanical systems (does not include leaded joint pipe)	28.05	17.80
Group 8: Traffic control signalmen	16.00	17.80

----LABORERS (TUNNEL CONSTRUCTION, FREE AIR). Shield Drive and Liner Plate Tunnels in Free Air.----

As of: Tuesday, October 28, 2014

Project: Upgrades To The Existing Railroad Station

13a) Miners, Motormen, Mucking Machine Operators, Nozzle Men, Grout Men, Shaft & Tunnel Steel & Rodmen, Shield & Erector, Arm Operator, Cable Tenders	31.28	17.80 + a
13b) Brakemen, Trackmen	30.37	17.80 + a
14) Concrete Workers, Form Movers, and Strippers	30.37	17.80 + a
15) Form Erectors	30.68	17.80 + a
----ROCK SHAFT LINING, CONCRETE, LINING OF SAME AND TUNNEL IN FREE AIR:----		
16) Brakemen, Trackmen, Tunnel Laborers, Shaft Laborers	30.37	17.80 + a
17) Laborers Topside, Cage Tenders, Bellman	30.26	17.80 + a

As of: Tuesday, October 28, 2014

Project: Upgrades To The Existing Railroad Station

18) Miners	31.28	17.80 + a
----TUNNELS, CAISSON AND CYLINDER WORK IN COMPRESSED AIR: ----		
18a) Blaster	37.41	17.80 + a
19) Brakemen, Trackmen, Groutman, Laborers, Outside Lock Tender, Gauge Tenders	37.22	17.80 + a
20) Change House Attendants, Powder Watchmen, Top on Iron Bolts	35.35	17.80 + a
21) Mucking Machine Operator	37.97	17.80 + a
----TRUCK DRIVERS----(*see note below)		

As of: Tuesday, October 28, 2014

Two axle trucks	28.33	19.14 + a
Three axle trucks; two axle ready mix	28.43	19.14 + a
Three axle ready mix	28.48	19.14 + a
Four axle trucks, heavy duty trailer (up to 40 tons)	28.53	19.14 + a
Four axle ready-mix	28.58	19.14 + a
Heavy duty trailer (40 tons and over)	28.78	19.14 + a
Specialized earth moving equipment other than conventional type on-the road trucks and semi-trailer (including Euclids)	28.58	19.14 + a

Project: Upgrades To The Existing Railroad Station

----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)	36.80	22.30 + a
Group 2: Cranes (100 ton rate capacity and over); Excavator over 2 cubic yards; Piledriver ($3.00 premium when operator controls hammer); Bauer Drill/Caisson. (Trade License Required)	36.48	22.30 + 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)	35.74	22.30 + a
Group 4: Trenching Machines; Lighter Derrick; Concrete Finishing Machine; CMI Machine or Similar; Koehring Loader (Skooper)	35.35	22.30 + 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)	34.76	22.30 + a
Group 5 continued: Side Boom; Combination Hoe and Loader; Directional Driller.	34.76	22.30 + a

As of: Tuesday, October 28, 2014

Project: Upgrades To The Existing Railroad Station

Group 6: Front End Loader (3 up to 7 cubic yards); Bulldozer (rough grade dozer).	34.45	22.30 + 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).	34.11	22.30 + a
Group 8: Mechanic, Grease Truck Operator, Hydroblaster, Barrier Mover, Power Stone Spreader; Welder; Work Boat under 26 ft.; Transfer Machine.	33.71	22.30 + 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).	33.28	22.30 + a
Group 10: Vibratory Hammer, Ice Machine, Diesel and Air Hammer, etc.	31.24	22.30 + a
Group 11: Conveyor, Earth Roller; Power Pavement Breaker (whiphammer), Robot Demolition Equipment.	31.24	22.30 + a
Group 12: Wellpoint Operator.	31.18	22.30 + a

As of: Tuesday, October 28, 2014

Project: Upgrades To The Existing Railroad Station

Group 13: Compressor Battery Operator.	30.60	22.30 + a
Group 14: Elevator Operator; Tow Motor Operator (Solid Tire No Rough Terrain).	29.46	22.30 + a
Group 15: Generator Operator; Compressor Operator; Pump Operator; Welding Machine Operator; Heater Operator.	29.05	22.30 + a
Group 16: Maintenance Engineer/Oiler	28.40	22.30 + a
Group 17: Portable asphalt plant operator; portable crusher plant operator; portable concrete plant operator.	32.71	22.30 + a
Group 18: Power Safety Boat; Vacuum Truck; Zim Mixer; Sweeper; (minimum for any job requiring CDL license).	30.29	22.30 + a

**NOTE: SEE BELOW

As of: Tuesday, October 28, 2014

Project: Upgrades To The Existing Railroad Station

----LINE CONSTRUCTION----(Railroad Construction and Maintenance)----

20) Lineman, Cable Splicer, Technician	44.30	6.5%+17.70
21) Heavy Equipment Operator	39.87	6.5%+15.83
22) Equipment Operator, Tractor Trailer Driver, Material Men	37.66	6.5%+15.40
23) Driver Groundmen	24.37	6.5%+10.04
23a) Truck Driver	33.23	6.5%+14.28

----LINE CONSTRUCTION----

As of: Tuesday, October 28, 2014

Project: Upgrades To The Existing Railroad Station

24) Driver Groundmen	30.92	6.5% + 9.70
25) Groundmen	22.67	6.5% + 6.20
26) Heavy Equipment Operators	37.10	6.5% + 10.70
27) Linemen, Cable Splicers, Dynamite Men	41.22	6.5% + 12.20
28) Material Men, Tractor Trailer Drivers, Equipment Operators	35.04	6.5% + 10.45

As of: Tuesday, October 28, 2014

Project: Upgrades To The Existing Railroad Station

Welders: Rate for craft to which welding is incidental.

**Note: Hazardous waste removal work receives additional $1.25 per hour for truck drivers.*

***Note: Hazardous waste premium $3.00 per hour over classified rate*

ALL Cranes: When crane operator is operating equipment that requires a fully licensed crane operator to operate he receives an extra $1.00 premium in addition to the hourly wage rate and benefit contributions:

1) Crane handling or erecting structural steel or stone; hoisting engineer (2 drums or over)

2) Cranes (100 ton rate capacity and over) Bauer Drill/Caisson

3) Cranes (under 100 ton rated capacity)

Crane with 150 ft. boom (including jib) - $1.50 extra
Crane with 200 ft. boom (including jib) - $2.50 extra
Crane with 250 ft. boom (including jib) - $5.00 extra
Crane with 300 ft. boom (including jib) - $7.00 extra
Crane with 400 ft. boom (including jib) - $10.00 extra

All classifications that indicate a percentage of the fringe benefits must be calculated at the percentage rate times the "base hourly rate".

Apprentices duly registered under the Commissioner of Labor's regulations on "Work Training Standards for Apprenticeship and Training Programs" Section 31-51-d-1 to 12, are allowed to be paid the appropriate percentage of the prevailing journeymen hourly base and the full fringe benefit rate, providing the work site ratio shall not be less than one full-time journeyperson instructing and supervising the work of each apprentice in a specific trade.

~~Connecticut General Statute Section 31-55a: Annual Adjustments to wage rates by contractors doing state work ~~

The Prevailing wage rates applicable to this project are subject to annual adjustments each July 1st for the duration of the project.

Each contractor shall pay the annual adjusted prevailing wage rate that is in effect each July 1st, as posted by the Department of Labor.

It is the contractor's responsibility to obtain the annual adjusted prevailing wage rate increases directly from the Department of Labor's website.

The annual adjustments will be posted on the Department of Labor's Web page: www.ct.gov/dol.

The Department of Labor will continue to issue the initial prevailing wage rate schedule to the Contracting Agency for the project.

All subsequent annual adjustments will be posted on our Web Site for contractor access.

Contracting Agencies are under no obligation pursuant to State labor law to pay any increase due to the annual adjustment provision.

As of: Tuesday, October 28, 2014

Project: Upgrades To The Existing Railroad Station

Effective October 1, 2005 - Public Act 05-50: any person performing the work of any mechanic, laborer, or worker shall be paid prevailing wage

All Person who perform work ON SITE must be paid prevailing wage for the appropriate mechanic, laborer, or worker classification.

All certified payrolls must list the hours worked and wages paid to All Persons who perform work ON SITE regardless of their ownership i.e.: (Owners, Corporate Officers, LLC Members, Independent Contractors, et. al)

Reporting and payment of wages is required regardless of any contractual relationship alleged to exist between the contractor and such person.

~~Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clause (29 CFR 5.5 (a) (1) (ii)).

Please direct any questions which you may have pertaining to classification of work and payment of prevailing wages to the Wage and Workplace Standards Division, telephone (860)263-6790.

As of: Tuesday, October 28, 2014

Minimum Rates and Classifications for Building Construction

ID# : B 19849

Connecticut Department of Labor
Wage and Workplace Standards Division

By virtue of the authority vested in the Labor Commissioner under provisions of Section 31-53 of the General Statutes of Connecticut, as amended, the following are declared to be the prevailing rates and welfare payments and will apply only where the contract is advertised for bid within 20 days of the date on which the rates are established. Any contractor or subcontractor not obligated by agreement to pay to the welfare and pension fund shall pay this amount to each employee as part of his/her hourly wages.

Project Number:

State#: 170-3261

Project Town: Hartford

FAP#: FR-HSR-0125-12-01-00

Project: Upgrades To The Existing Railroad Station

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	35.75	28.82
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	35.24	25.01

As of: **Tuesday, October 28, 2014**

Project: Upgrades To The Existing Railroad Station

3a) Bricklayer, Cement Mason, Concrete Finisher (including caulking), Stone Masons	32.50	27.46 + a
3b) Tile Setter	33.05	23.28
3c) Terrazzo Mechanics and Marble Setters	31.69	22.35
3d) Tile, Marble & Terrazzo Finishers	25.95	19.82
3e) Plasterer	32.50	27.46

------LABORERS------

As of: **Tuesday, October 28, 2014**

Project: Upgrades To The Existing Railroad Station

4) Group 1: Laborers (common or general), acetylene burners, carpenter tenders, concrete specialists, wrecking laborers, fire watchers.	27.05	17.80
4a) Group 2: Mortar mixers, plaster tender, power buggy operators, powdermen, fireproofer/mixer/nozzleman (Person running mixer and spraying fireproof only)..	27.30	17.80
4b) Group 3: Jackhammer Operators/Pavement Breaker, mason tender (brick) and mason tender (cement/concrete)	27.55	17.80
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) P6 and P7 rate is $26.80	27.30	17.80
4d) Group 5: Air track operators, Sand blasters	27.80	17.80
4e) Group 6: Nuclear toxic waste removers, blasters	30.05	17.80

As of: **Tuesday, October 28, 2014**

4f) Group 7: Asbestos/lead removal and encapsulation (except it's removal from mechanical systems which are not to be scrapped)	28.05	17.80
4g) Group 8: Bottom men on open air caisson, cylindrical work and boring crew	27.55	17.80
4h) Group 9: Top men on open air caisson, cylindrical work and boring crew	27.05	17.80
4i) Group 10: Traffic Control Signalman	16.00	17.80
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.	31.00	22.50
5a) Millwrights	31.60	22.75

As of: **Tuesday, October 28, 2014**

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)	38.10	22.72 + 3% of gross wage
7a) Elevator Mechanic (Trade License required: R-1,2,5,6)	47.15	26.785+a+b
-----LINE CONSTRUCTION----		
Groundman	24.37	6.5%+10.04
Linemen/Cable Splicer	44.30	6.5%+17.70
8) Glazier (Trade License required: FG-1,2)	34.58	18.55

9) Ironworker, Ornamental, Reinforcing, Structural, and Precast Concrete Erection	34.47	29.74 + 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)	36.80	22.30 + a
Group 2: Cranes (100 ton rate capacity and over); Excavator over 2 cubic yards; Piledriver ($3.00 premium when operator controls hammer); Bauer Drill/Caisson. (Trade License Required)	36.48	22.30 + 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.). (Trade License Required)	35.74	22.30 + a
Group 4: Trenching Machines; Lighter Derrick; Concrete Finishing Machine; CMI Machine or Similar; Koehring Loader (Skooper).	35.35	22.30 + a

Project: Upgrades To The Existing Railroad Station

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)	34.76	22.30 + a
Group 5 continued: Side Boom; Combination Hoe and Loader; Directional Driller; Pile Testing Machine.	34.76	22.30 + a
Group 6: Front End Loader (3 up to 7 cubic yards); Bulldozer (rough grade dozer).	34.45	22.30 + 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).	34.11	22.30 + a
Group 8: Mechanic, grease truck operator, hydroblaster; barrier mover; power stone spreader; welding; work boat under 26 ft.; transfer machine.	33.71	22.30 + 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).	33.28	22.30 + a

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Group 10: Vibratory hammer; ice machine; diesel and air, hammer, etc.	31.24	22.30 + a
Group 11: Conveyor, earth roller, power pavement breaker (whiphammer), robot demolition equipment.	31.24	22.30 + a
Group 12: Wellpoint operator.	31.18	22.30 + a
Group 13: Compressor battery operator.	30.60	22.30 + a
Group 14: Elevator operator; tow motor operator (solid tire no rough terrain).	29.46	22.30 + a
Group 15: Generator Operator; Compressor Operator; Pump Operator; Welding Machine Operator; Heater Operator.	29.05	22.30 + a

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Group 16: Maintenance Engineer/Oiler.	28.40	22.30 + a
Group 17: Portable asphalt plant operator; portable crusher plant operator; portable concrete plant operator.	30.60	22.30 + a
Group 18: Power safety boat; vacuum truck; zim mixer; sweeper; (Minimum for any job requiring a CDL license).	30.29	22.30 + a
------PAINTERS (Including Drywall Finishing)------		
10a) Brush and Roller	31.02	18.55
10b) Taping Only/Drywall Finishing	31.77	18.55

10c) Paperhanger and Red Label	31.52	18.55
10e) Blast and Spray	34.02	18.55
11) Plumber (excluding HVAC pipe installation) (Trade License required: P-1,2,6,7,8,9 J-1,2,3,4 SP-1,2)	40.31	26.82
12) Well Digger, Pile Testing Machine	33.01	19.40 + a
13) Roofer (composition)	32.85	17.72
14) Roofer (slate & tile)	33.35	17.72

Project: Upgrades To The Existing Railroad Station

15) Sheetmetal Worker (Trade License required for HVAC and Ductwork: SM-1,SM-2,SM-3,SM-4,SM-5,SM-6)	34.87	32.40
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)	40.31	26.82
------TRUCK DRIVERS------		
17a) 2 Axle	28.33	19.14 + a
17b) 3 Axle, 2 Axle Ready Mix	28.43	19.14 + a
17c) 3 Axle Ready Mix	28.48	19.14 + a

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17d) 4 Axle, Heavy Duty Trailer up to 40 tons	28.53	19.14 + a
17e) 4 Axle Ready Mix	28.58	19.14 + a
17f) Heavy Duty Trailer (40 Tons and Over)	28.78	19.14 + a
17g) Specialized Earth Moving Equipment (Other Than Conventional Type on-the-Road Trucks and Semi-Trailers, Including Euclids)	28.58	19.14 + a
18) Sprinkler Fitter (Trade License required: F-1,2,3,4)	39.76	19.87 + a
19) Theatrical Stage Journeyman	25.76	7.34

Project: Upgrades To The Existing Railroad Station

Welders: Rate for craft to which welding is incidental.

**Note: Hazardous waste removal work receives additional $1.25 per hour for truck drivers.*

***Note: Hazardous waste premium $3.00 per hour over classified rate*

ALL Cranes: When crane operator is operating equipment that requires a fully licensed crane operator to operate he receives an extra $1.00 premium in addition to the hourly wage rate and benefit contributions:

1) Crane handling or erecting structural steel or stone; hoisting engineer (2 drums or over)

2) Cranes (100 ton rate capacity and over) Bauer Drill/Caisson

3) Cranes (under 100 ton rated capacity)

Crane with 150 ft. boom (including jib) - $1.50 extra
Crane with 200 ft. boom (including jib) - $2.50 extra
Crane with 250 ft. boom (including jib) - $5.00 extra
Crane with 300 ft. boom (including jib) - $7.00 extra
Crane with 400 ft. boom (including jib) - $10.00 extra

All classifications that indicate a percentage of the fringe benefits must be calculated at the percentage rate times the "base hourly rate".

Apprentices duly registered under the Commissioner of Labor's regulations on "Work Training Standards for Apprenticeship and Training Programs" Section 31-51-d-1 to 12, are allowed to be paid the appropriate percentage of the prevailing journeymen hourly base and the full fringe benefit rate, providing the work site ratio shall not be less than one full-time journeyperson instructing and supervising the work of each apprentice in a specific trade.

The Prevailing wage rates applicable to this project are subject to annual adjustments each July 1st for the duration of the project.

Each contractor shall pay the annual adjusted prevailing wage rate that is in effect each July 1st, as posted by the Department of Labor.

It is the contractor's responsibility to obtain the annual adjusted prevailing wage rate increases directly from the Department of Labor's website.

The annual adjustments will be posted on the Department of Labor's Web page: www.ct.gov/dol. For those without internet access, please contact the division listed below.

The Department of Labor will continue to issue the initial prevailing wage rate schedule to the Contracting Agency for the project.

All subsequent annual adjustments will be posted on our Web Site for contractor access.

Contracting Agencies are under no obligation pursuant to State labor law to pay any increase due to the annual adjustment provision.

As of: **Tuesday, October 28, 2014**

Project: Upgrades To The Existing Railroad Station

Effective October 1, 2005 - Public Act 05-50: any person performing the work of any mechanic, laborer, or worker shall be paid prevailing wage

All Person who perform work ON SITE must be paid prevailing wage for the appropriate mechanic, laborer, or worker classification.

All certified payrolls must list the hours worked and wages paid to All Persons who perform work ON SITE regardless of their ownership i.e.: (Owners, Corporate Officers, LLC Members, Independent Contractors, et. al)

Reporting and payment of wages is required regardless of any contractual relationship alleged to exist between the contractor and such person.

~~Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clause (29 CFR 5.5 (a) (1) (ii)).

Please direct any questions which you may have pertaining to classification of work and payment of prevailing wages to the Wage and Workplace Standards Division, telephone (860)263-6790.

As of: **Tuesday, October 28, 2014**

Connecticut Department of Labor
Wage and Workplace Standards Division
FOOTNOTES

Please Note: If the "Benefits" listed on the schedule for the following occupations includes a letter(s) (+ a or + a+b for instance), refer to the information below.

Benefits to be paid at the appropriate prevailing wage rate for the listed occupation.

If the "Benefits" section for the occupation lists only a dollar amount, disregard the information below.

Bricklayers, Cement Masons, Cement Finishers, Concrete Finishers, Stone Masons
(Building Construction) and
(Residential- Hartford, Middlesex, New Haven, New London and Tolland Counties)

a. Paid Holiday: Employees shall receive 4 hours for Christmas Eve holiday provided the employee works the regularly scheduled day before and after the holiday. Employers may schedule work on Christmas Eve and employees shall receive pay for actual hours worked in addition to holiday pay.

Elevator Constructors: Mechanics

a. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Veterans' Day, Thanksgiving Day, Christmas Day, plus the Friday after Thanksgiving.

b. Vacation: Employer contributes 8% of basic hourly rate for 5 years or more of service or 6% of basic hourly rate for 6 months to 5 years of service as vacation pay credit.

Glaziers

a. Paid Holidays: Labor Day and Christmas Day.

Power Equipment Operators
(Heavy and Highway Construction & Building Construction)

a. Paid Holidays: New Year's Day, Good Friday, Memorial day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day, provided the employee works 3 days during the week in which the holiday falls, if scheduled, and if scheduled, the working day before and the working day after the holiday. Holidays falling on Saturday may be observed on Saturday, or if the employer so elects, on the preceding Friday.

Ironworkers

a. Paid Holiday: Labor Day provided employee has been on the payroll for the 5 consecutive work days prior to Labor Day.

Laborers (Tunnel Construction)

a. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day. No employee shall be eligible for holiday pay when he fails, without cause, to work the regular work day preceding the holiday or the regular work day following the holiday.

Roofers

a. Paid Holidays: July 4th, Labor Day, and Christmas Day provided the employee is employed 15 days prior to the holiday.

Sprinkler Fitters

a. Paid Holidays: Memorial Day, July 4th, Labor Day, Thanksgiving Day and Christmas Day, provided the employee has been in the employment of a contractor 20 working days prior to any such paid holiday.

Truck Drivers

(Heavy and Highway Construction & Building Construction)

a. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Christmas day, and Good Friday, provided the employee has at least 31 calendar days of service and works the last scheduled day before and the first scheduled day after the holiday, unless excused.

Information Bulletin
Occupational Classifications

The Connecticut Department of Labor has the responsibility to properly determine "job classification" on prevailing wage projects covered under C.G.S. Section 31-53.

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.

Below are additional clarifications of specific job duties performed for certain classifications:

- **ASBESTOS WORKERS**

  Applies all insulating materials, protective coverings, coatings and finishes to all types of mechanical systems.

- **ASBESTOS INSULATOR**

  Handle, install apply, fabricate, distribute, prepare, alter, repair, dismantle, heat and frost insulation, including penetration and fire stopping work on all penetration fire stop systems.

- **BOILERMAKERS**

  Erects hydro plants, incomplete vessels, steel stacks, storage tanks for water, fuel, etc. Builds incomplete boilers, repairs heat exchanges and steam generators.

- **BRICKLAYERS, CEMENT MASONS, CEMENT FINISHERS, MARBLE MASONS, PLASTERERS, STONE MASONS, PLASTERERS. STONE MASONS, TERRAZZO WORKERS, TILE SETTERS**

  Lays building materials such as brick, structural tile and concrete cinder, glass, gypsum, terra cotta block. Cuts, tools and sets marble, sets stone, finishes concrete, applies decorative steel, aluminum and plastic tile, applies cements, sand, pigment and marble chips to floors, stairways, etc.

- **CARPENTERS, MILLWRIGHTS. PILEDRIVERMEN. LATHERS. RESILEINT FLOOR LAYERS, DOCK BUILDERS, DIKERS, DIVER TENDERS**

  Constructs, erects, installs and repairs structures and fixtures of wood, plywood and wallboard. Installs, assembles, dismantles, moves industrial machinery. Drives piling into ground to provide foundations for structures such as buildings and bridges, retaining walls for earth embankments, such as cofferdams. Fastens wooden, metal or rockboard lath to walls, ceilings and partitions of buildings, acoustical tile layer, concrete form builder. Applies firestopping materials on fire resistive joint systems only. Installation of curtain/window walls only where attached to wood or metal studs. Installation of insulated material of all types whether blown, nailed or attached in other ways to walls, ceilings and floors of buildings. Assembly and installation of modular furniture/furniture systems. Free-standing furniture is not covered. This includes free standing: student chairs, study top desks, book box desks, computer furniture, dictionary stand, atlas stand, wood shelving, two-position information access station, file cabinets, storage cabinets, tables, etc.

- **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, including the Installation or maintenance of telecommunication, LAN wiring or computer equipment, and low voltage wiring. ***License required per Connecticut General Statutes: E-1,2 L-5,6 C-5,6 T-1,2 L-1,2 V-1,2,7,8,9.**

- **ELEVATOR CONSTRUCTORS**

  Install, erect, maintenance and repair of all types of elevators, escalators, dumb waiters and moving walks. ***License required by Connecticut General Statutes: R-1,2,5,6.**

- **FORK LIFT OPERATOR**

  Laborers Group 4) Mason Tenders - operates forklift solely to assist a mason to a maximum height of nine (9) feet only.

  Power Equipment Operator Group 9 - operates forklift to assist any trade, and to assist a mason to a height over nine (9) feet.

- **GLAZIERS**

  Glazing wood and metal sash, doors, partitions, and 2 story aluminum storefronts. Installs glass windows, skylights, store fronts and display cases or surfaces such as building fronts, interior walls, ceilings and table tops and metal store fronts. Installation of aluminum window walls and curtain walls is the "joint" work of glaziers and ironworkers which requires either a blended rate or equal composite workforce.

- **IRONWORKERS**

  Erection, installation and placement of structural steel, precast concrete, miscellaneous iron, ornamental iron, metal curtain wall, rigging and reinforcing steel. Handling, sorting, and installation of reinforcing steel (rebar). Metal bridge rail (traffic), metal bridge handrail, and decorative security fence installation. Installation of aluminum window walls and curtain walls is the "joint" work of glaziers and ironworkers which requires either a blended rate or equal composite workforce. Insulated metal and insulated composite panels are still installed by the Ironworker.

- **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.

- **LABORERS**

  Acetylene burners, asphalt rakers, chain saw operators, concrete and power buggy operator, concrete saw operator, fence and guard rail erector (except metal bridge rail (traffic), metal bridge handrail, and decorative security fence installation.), hand operated concrete vibrator operator, mason tenders, pipelayers (installation of storm drainage or sewage lines on the street only), pneumatic drill operator, pneumatic gas and electric drill operator, powermen and wagon drill operator, air track operator, block paver, curb setters, blasters, concrete spreaders.

- **PAINTERS**

  Maintenance, preparation, cleaning, blasting (water and sand, etc.), painting or application of any protective coatings of every description on all bridges and appurtenances of highways, roadways, and railroads. Painting, decorating, hardwood finishing, paper hanging, sign writing, scenic art work and drywall hhg for any and all types of building and residential work.

- **LEAD PAINT REMOVAL**

  Painter's Rate
  1. Removal of lead paint from bridges.
  2. Removal of lead paint as preparation of any surface to be repainted.
  3. Where removal is on a Demolition project prior to reconstruction.

  Laborer's Rate
  1. Removal of lead paint from any surface NOT to be repainted.
  2. Where removal is on a *TOTAL* Demolition project only.

- **PLUMBERS AND PIPEFITTERS**

  Installation, repair, replacement, alteration or maintenance of all plumbing, heating, cooling and piping. ***License required per Connecticut General Statutes: P-1,2,6,7,8,9 J-1,2,3,4 SP-1,2 S-1,2,3,4,5,6,7,8 B-1,2,3,4 D-1,2,3,4.***

- **POWER EQUIPMENT OPERATORS**

  Operates several types of power construction equipment such as compressors, pumps, hoists, derricks, cranes, shovels, tractors, scrapers or motor graders, etc. Repairs and maintains equipment. ***License required, crane operators only, per Connecticut General Statutes.**

- **ROOFERS**

  Covers roofs with composition shingles or sheets, wood shingles, slate or asphalt and gravel to waterproof roofs, including preparation of surface. (tear-off and/or removal of any type of roofing and/or clean-up of any and all areas where a roof is to be relaid)

- **SHEETMETAL WORKERS**

  Fabricate, assembles, installs and repairs sheetmetal products and equipment in such areas as ventilation, air-conditioning, warm air heating, restaurant equipment, architectural sheet metal work, sheetmetal roofing, and aluminum gutters. Fabrication, handling, assembling, erecting, altering, repairing, etc. of coated metal material panels and composite metal material panels when used on building exteriors and interiors as soffits, facia, louvers, partitions, 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**

Definitions:

1) "Site of the work" (29 Code of Federal Regulations (CFR) 5.2(l)(b) is the physical place or places where the building or work called for in the contract will remain and any other site where a significant portion of the building or work is constructed, provided that such site is established specifically for the performance of the contact or project;

(a) Except as provided in paragraph (l) (3) of this section, job headquarters, tool yards, batch plants, borrow pits, etc. are part of the "site of the work"; provided they are dedicated exclusively, or nearly so, to the performance of the contract or project, and provided they are adjacent to "the site of work" as defined in paragraph (e)(1) of this section;

(b) Not included in the "site of the work" are permanent home offices, branch plant establishments, fabrication plants, tool yards etc, of a contractor or subcontractor whose location and continuance in operation are determined wholly without regard to a particular State or political subdivision contract or uncertain and indefinite periods of time involved of a few seconds or minutes duration and where the failure to count such time is due to consideration justified by industrial realities (29 CFR 785.47)

2) "Engaged to wait" is waiting time that belongs to and is controlled by the employer which is an integral part of the job and is therefore compensable as hours worked. (29 CFR 785.15)

3) "Waiting to be engaged" is waiting time that an employee can use effectively for their own purpose and is not compensable as hours worked. (29 CFR 785.16)

4) "De Minimus" is a rule that recognizes that unsubstantial or insignificant periods of time which cannot as a practical administrative matter be precisely recorded for payroll purposes, may be disregarded. This rule applies only where there are uncertain and indefinite periods of time involved of a short duration and where the failure to count such time is due to consideration justified by worksite realities. For example, with respect to truck drivers on prevailing wage sites, this is typically less than 15 minutes at a time.

Coverage of Truck Drivers on State or Political subdivision Prevailing Wage Projects

Truck drivers <u>are covered</u> for payroll purposes under the following conditions:

- Truck Drivers for time spent working on the site of the work.

- Truck Drivers for time spent loading and/or unloading materials and supplies on the site of the work, if such time is not de minimus

- Truck drivers transporting materials or supplies between a facility that is deemed part of the site of the work and the actual construction site.

- Truck drivers transporting portions of the building or work between a site established specifically for the performance of the contract or project where a significant portion of such building or work is constructed and the physical places where the building or work outlined in the contract will remain.

For example: Truck drivers delivering asphalt are covered under prevailing wage while" engaged to wait" on the site and when directly involved in the paving operation, provided the total time is not "de minimus"

Truck Drivers <u>are not</u> covered in the following instances:

- Material delivery truck drivers while off "the site of the work"

- Truck Drivers traveling between a prevailing wage job and a commercial supply facility while they are off the "site of the work"

- Truck drivers whose time spent on the "site of the work" is de minimus, such as under 15 minutes at a time, merely to drop off materials or supplies, including asphalt.

These guidelines are similar to U.S. Labor Department policies. The application of these guidelines may be subject to review based on factual considerations on a case by case basis.

For example:

- Material men and deliverymen are not covered under prevailing wage as long as they are not directly involved in the construction process. If, they unload the material, they would then be covered by prevailing wage for the classification they are performing work in: laborer, equipment operator, etc.
- Hauling material off site is not covered provided they are not dumping it at a location outlined above.
- Driving a truck on site and moving equipment or materials on site would be considered covered work, as this is part of the construction process.

Any questions regarding the proper classification should be directed to:
Public Contract Compliance Unit
Wage and Workplace Standards Division
Connecticut Department of Labor
200 Folly Brook Blvd, Wethersfield, CT 06109
(860) 263-6543

Statute 31-55a

Last Updated: June 02, 2008

- Special Notice -

To All State and Political Subdivisions,Their Agents, and Contractors

Connecticut General Statute 31-55a - Annual adjustments to wage rates by contractors doing state work.

Each contractor that is awarded a contract on or after October 1, 2002, for (1) the construction of a state highway or bridge that falls under the provisions of section 31-54 of the general statutes, or (2) the construction, remodeling, refinishing, refurbishing, rehabilitation, alteration or repair of any public works project that falls under the provisions of section 31-53 of the general statutes shall contact the Labor Commissioner on or before July first of each year, for the duration of such contract, to ascertain the prevailing rate of wages on an hourly basis and the amount of payment or contributions paid or payable on behalf of each mechanic, laborer or worker employed upon the work contracted to be done, and shall make any necessary adjustments to such prevailing rate of wages and such payment or contributions paid or payable on behalf of each such employee, effective each July first.

- The prevailing wage rates applicable to any contract or subcontract awarded on or after October 1, 2002 are subject to annual adjustments each July 1st for the duration of any project which was originally advertised for bids on or after October 1, 2002.
- Each contractor affected by the above requirement shall pay the annual adjusted prevailing wage rate that is in effect each July 1st, as posted by the Department of Labor.
- It is the ***contractor's*** responsibility to obtain the annual adjusted prevailing wage rate increases directly from the Department of Labor's Web Site. The annual adjustments will be posted on the Department of Labor Web page: www.ctdol.state.ct.us. For those without internet access, please contact the division listed below.
- The Department of Labor will continue to issue the initial prevailing wage rate schedule to the Contracting Agency for the project. All subsequent annual adjustments will be posted on our Web Site for contractor access.

Any questions should be directed to the Contract Compliance Unit, Wage and Workplace

Standards Division, Connecticut Department of Labor, 200 Folly Brook Blvd., Wethersfield, CT 06109 at (860)263-6790.

Workplace Laws

Published by the Connecticut Department of Labor, Project Management Office

November 29, 2006

Notice

To All Mason Contractors and Interested Parties Regarding Construction Pursuant to Section 31-53 of the Connecticut General Statutes (Prevailing Wage)

The Connecticut Labor Department Wage and Workplace Standards Division is empowered to enforce the prevailing wage rates on projects covered by the above referenced statute.

Over the past few years the Division has withheld enforcement of the rate in effect for workers who operate a forklift on a prevailing wage rate project due to a potential jurisdictional dispute.

The rate listed in the schedules and in our Occupational Bulletin (see enclosed) has been as follows:

Forklift Operator:

- **Laborers (Group 4) Mason Tenders -** operates forklift solely to assist a mason to a maximum height of nine feet only.

- **Power Equipment Operator (Group 9) -** operates forklift to assist any trade and to assist a mason to a height over nine feet.

The U.S. Labor Department conducted a survey of rates in Connecticut but it has not been published and the rate in effect remains as outlined in the above Occupational Bulletin.

Since this is a classification matter and not one of jurisdiction, effective January 1, 2007 the Connecticut Labor Department will enforce the rate on each schedule in accordance with our statutory authority.

Your cooperation in filing appropriate and accurate certified payrolls is appreciated.

Informational Bulletin

THE 10-HOUR OSHA CONSTRUCTION SAFETY AND HEALTH COURSE

(applicable to public building contracts entered into *on or after July 1, 2007,* where the total cost of all work to be performed is at least $100,000)

(1) This requirement was created by Public Act No. 06-175, which is codified in Section 31-53b of the Connecticut General Statutes (pertaining to the prevailing wage statutes);

(2) The course is required for public building construction contracts (projects funded in whole or in part by the state or any political subdivision of the state) entered into on or after July 1, 2007;

(3) It is required of private employees (not state or municipal employees) and apprentices who perform manual labor for a general contractor or subcontractor on a public building project where the total cost of all work to be performed is at least $100,000;

(4) The ten-hour construction course pertains to the ten-hour Outreach Course conducted in accordance with federal OSHA Training Institute standards, and, for telecommunications workers, a ten-hour training course conducted in accordance with federal OSHA standard, 29 CFR 1910.268;

(5) The internet website for the federal OSHA Training Institute is http://www.osha.gov/fso/ote/training/edcenters/fact_sheet.html;

(6) The statutory language leaves it to the contractor and its employees to determine who pays for the cost of the ten-hour Outreach Course;

(7) Within 30 days of receiving a contract award, a general contractor must furnish proof to the Labor Commissioner that all employees and apprentices performing manual labor on the project will have completed such a course;

(8) Proof of completion may be demonstrated through either: (a) the presentation of a *bona fide* student course completion card issued by the federal OSHA Training Institute; *or* (2) the presentation of documentation provided to an employee by a trainer certified by the Institute pending the actual issuance of the completion card;

(9) Any card with an issuance date more than 5 years prior to the commencement date of the construction project shall not constitute proof of compliance;

(10) Each employer shall affix a copy of the construction safety course completion card to the certified payroll submitted to the contracting agency in accordance with Conn. Gen. Stat. § 31-53(f) on which such employee's name first appears;

(11) Any employee found to be in non-compliance shall be subject to removal from the worksite if such employee does not provide satisfactory proof of course completion to the Labor Commissioner by the fifteenth day after the date the employee is determined to be in noncompliance;

(12) Any such employee who is determined to be in noncompliance may continue to work on a public building construction project for a maximum of fourteen consecutive calendar days while bringing his or her status into compliance;

(13) The Labor Commissioner may make complaint to the prosecuting authorities regarding any employer or agent of the employer, or officer or agent of the corporation who files a false certified payroll with respect to the status of an employee who is performing manual labor on a public building construction project;

(14) The statute provides the minimum standards required for the completion of a safety course by manual laborers on public construction contracts; any contractor can exceed these minimum requirements; and

(15) Regulations clarifying the statute are currently in the regulatory process, and shall be posted on the CTDOL website as soon as they are adopted in final form.

(16) Any questions regarding this statute may be directed to the Wage and Workplace Standards Division of the Connecticut Labor Department via the internet website of http://www.ctdol.state.ct.us/wgwkstnd/wgemenu.htm; or by telephone at (860)263-6790.

THE ABOVE INFORMATION IS PROVIDED EXCLUSIVELY AS AN EDUCATIONAL RESOURCE, AND IS NOT INTENDED AS A SUBSTITUTE FOR LEGAL INTERPRETATIONS WHICH MAY ULTMATELY ARISE CONCERNIG THE CONSTRUCTION OF THE STATUTE OR THE REGULATIONS.

Sec. 31-53b. **Construction safety and health course**. **Proof of completion required for employees on public building projects. Enforcement. Regulations**. (a) Each contract entered into on or after July 1, 2007, for the construction, remodeling, refinishing, refurbishing, rehabilitation, alteration or repair of any public building project by the state or any of its agents, or by an political subdivision of the state or any of its agents, where the total cost of all work to be performed by all contractors and subcontractors in connection with the contract is at least one hundred thousand dollars, shall contain a provision requiring that, not later than thirty days after the date such contract is awarded, each contractor furnish proof to the Labor Commissioner that all employees performing manual labor on or in such public building, pursuant to such contract, have completed a course of at least ten hours in duration in construction safety and health approved by the federal Occupational Safety and Health Administration or, in the case of telecommunications employees, have completed at least ten hours of training in accordance with 29 CFR 1910.268.

(b) Any employee required to complete a construction safety and health course required under subsection (a) of this section who has not completed the course shall be subject to removal from the worksite if the employee does not provide documentation of having completed such course by the fifteenth day after the date the employee is found to be in noncompliance. The Labor Commissioner or said commissioner's designee shall enforce this section.

(c) Not later than January 1, 2007, the Labor Commissioner shall adopt regulations, in accordance with the provisions of chapter 54, to implement the provisions of subsections (a) and (b) of this section. Such regulations shall require that the ten-hour construction safety and health courses required under subsection (a) of this section be conducted in accordance with federal Occupational Safety and Health Administration Training Institute standards, or in accordance with 29 CFR 1910.268, as appropriate. The Labor Commissioner shall accept as sufficient proof of compliance with the provisions of subsection (a) or (b) of this section a student course completion card issued by the federal Occupational Safety and Health Administration Training Institute, or such other proof of compliance said commissioner deems appropriate, dated no earlier than five years before the commencement date of such public works project.

(d) For the purposes of this section, "public building" means a structure, paid for in whole or in part with state funds, within a roof and within exterior walls or fire walls, designed for the housing, shelter, enclosure and support or employment of people, animals or property of any kind, including, but not limited to, sewage treatment plants and water treatment plants, "Public building" does not include site work, roads or bridges, rail lines, parking lots or underground water, sewer or drainage systems including pump houses or other utility systems.

CONNECTICUT DEPARTMENT OF LABOR
WAGE AND WORKPLACE STANDARDS DIVISION

CONTRACTORS WAGE CERTIFICATION FORM

I,_____of _____
Officer, Owner, Authorized Rep. Company Name

do hereby certify that the _____
Company Name

_____
Street

_____
City

and all of its subcontractors will pay all workers on the

_____
Project Name and Number

_____
Street and City

the wages as listed in the schedule of prevailing rates required for such project (a copy of which is attached hereto).

_____
Signed

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

_____
Notary Public

☞ Return to:

Connecticut Department of Labor
Wage & Workplace Standards Division
200 Folly Brook Blvd.
Wethersfield, CT 06109